

FIRE MANAGEMENT PLAN  
YUKON-CHARLEY RIVERS NATIONAL PRESERVE  
June 19, 2010

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## **I. INTRODUCTION**

The following Fire Management Plan (FMP) is a specific action plan for the implementation of agency-wide and park-specific policies. As stated in Director's Order 18 (DO-18), the National Park Service specifies that "Each park with burnable vegetation must have an approved Fire Management Plan that will address the need for adequate funding and staffing to support its fire management program." Accordingly, this plan is intended to facilitate the achievement of the goals and objectives identified in the General Management Plan (GMP) and Resource Management Plan (RMP) for the Yukon-Charley Rivers National Preserve (YUCH). As stated in the GMP, "Fire is of critical importance in the development and succession of the boreal forest. Consequently, natural fires will be allowed to burn and fulfill their role in vegetative succession to the fullest extent possible, consistent with necessary protection of life, property, and significant cultural resources." Within the Preserve's RMP, Project Statement YUCH N-004.0 mandates the on-going development of a fire program which will "protect human life, property and significant resources while allowing fire to fulfill its role as a dynamic natural process." Since 1983, guidance for fire management activities within the Preserve has come from a series of state-wide interagency plans developed cooperatively by the National Park Service, the Bureau of Land Management, the Alaska Department of Natural Resources, the Alaska Department of Fish and Game, the U.S. Forest Service, the U.S. Fish and Wildlife Service, the Bureau of Indian Affairs, and Native Regional and Village Corporations. This Fire Management Plan, in turn, comprises a park-specific action plan; as such, it will be used in conjunction with the current Alaska Interagency Wildland Fire Management Plan (AIWFMP) to direct all personnel engaged in fire management actions within the Preserve toward the fulfillment of the goals and objectives specified by the Preserve's RMP.

Authority for the implementation of this Fire Management Plan originates with the *Organic Act of the National Park System*, August 25, 1916. This Act states that the primary goal of the National Park Service is to preserve and protect the natural and cultural resources found on lands under its management in such a manner as will leave them unimpaired for future generations. Current service-wide fire management policy is specifically expressed; in Director's Order 18 (DO-18), the attendant Reference Manual (RM-18), *The National Park Service Management Policies* (January 16, 2008), *Interagency Standards for Fire and Aviation Operations*, *National Interagency Mobilization Guide*, *Interagency Business Management Handbook*, *Guidance for Implementation of Federal Wildland Fire Management Policy* (February 13, 2009), *Interagency Prescribed Fire Planning and Implementation Procedures Reference Guide*, and *Interagency Fire Program Management Qualifications Standards and Guide*.

The YUCH Fire Management Plan will also implement fire management policies and help achieve resource management and fire management goals defined in: (1) *Federal Wildland Fire Management Policy and Program Review* (2001), (2) *Managing Impacts of Wildfires on Communities and the Environment and Protecting and Sustaining Resources in Fire Adapted Ecosystems- A Cohesive Strategy* (USDOI / USDA) and (3) *A Collaborative Approach for Reducing Wildland Fire Risks to Communities and the Environment: 10-year Comprehensive Strategy Implementation Plan*.

The actions described within this plan also meet the requirements of the National Environmental Planning Act (NEPA), the National Historic Preservation Act (NHPA), and the Alaska National Interest Lands Conservation Act (ANILCA). Compliance with these acts will be demonstrated as follows:

- The YUCH Fire Management Plan is accompanied by an Environmental Assessment (Appendix D), a substantive discussion of the effects upon the Preserve's natural and cultural resources by several alternative actions, including the proposed course of action explained throughout the FMP.
- The Environmental Assessment, in turn, is accompanied by an ANILCA 810(a) Summary Evaluation and Findings document (Appendix D), an assessment of the impacts of the proposed actions upon subsistence activities within the Preserve.
- The Fire Management Plan, Environmental Assessment, and 810(a) Summary Evaluation and Findings will be submitted to National Park Service staff members at Yukon-Charley National Preserve and in the Alaska Regional Office for review of operational soundness and compliance with federal policy.
- The Fire Management Plan, Environmental Assessment, and 810(a) Summary Evaluation and Findings will be submitted for review to local communities, local native corporations, and to all state and federal agencies holding or administering lands adjacent to or in the proximity of the Preserve.
- The State Historic Preservation Officer (SHPO) will review the Fire Management Plan and Environmental Assessment for compliance with the National Historic Preservation Act; in addition the SHPO will review all individual prescribed fire burn plans prior to their approval by the Superintendent.
- Notice of Availability of the FMP and accompanying Environmental Assessment will be made locally, with public comments accepted by the NPS for a period of thirty days thereafter.

## II. RELATIONSHIP TO POLICY AND LAND MANAGEMENT PLANNING

### A. NPS Policy

In 1995, an interagency review of the risks and expenses associated with wildland fire management culminated in the *Final Report of the Federal Wildland Fire Management Policy and Program Review*. This review contained several principles, policy changes, and recommendations that were accepted and endorsed by the Secretary of the Interior. In response to these changes and recommendations, the director of the National Park Service (NPS) issued *Director's Order #18: Wildland Fire Management* (DO-18) in 1998. This DO sunsetted on December 31, 2006, and a new DO-18 was issued on January 16, 2008, with no sunset clause. The provisions of DO-18 supersede all previous requirements and statements of policy with regard to wildland fire management.

Foremost, DO-18 recognizes the need of the NPS to foster healthy and natural fire ecology within individual parks, through the development of fire management programs designed around resource management objectives. Central to this is the development of individual fire management plans (FMPs) for each park unit that are tailored to park resource management objectives and follow the national guidelines. To this end, each unit of the NPS is directed to prepare a fire management plan that supports cultural and natural resource management objectives while emphasizing safety for park visitors, employees, and developed facilities.

Wildland fire is a general term describing any non structure fire that occurs in the wildland. All fires burning in natural or landscaped vegetation will be considered wildland fires. Following both DO-18 and the AIWFMP, wildland fires may be managed for the accomplishment of resource management objectives. Current direction from

The *Guidance for Implementation of Federal Wildland Fire Management Policy (February 13, 2009)* states that “A wildland fire may be concurrently managed for one or more objectives and objectives can change as the fire spreads across the landscape. Objectives are affected by changes in fuels, weather, topography; varying social understanding and tolerance; and involvement of other governmental jurisdictions having different missions and objectives.”

**Wildfires** are unplanned ignitions of a wildland fire or escaped prescribed fires. All Wildfires will be effectively managed through application of the appropriate strategic and tactical management options. Those options will be selected after comprehensive consideration of firefighter and public safety, the resource values to be protected and costs.

**Prescribed Fires** are wildland fires originating from a planned ignition to meet specific objectives identified in a written, approved, prescribed fire plan for which NEPA requirements (where applicable) have been met prior to ignition.

**Planned Ignition** –the intentional initiation of a wildland fire by hand-held, mechanical or aerial device where the distance and timing between ignition lines or points and the sequence of igniting them is determined by environmental conditions (weather, fuel, topography), firing technique, and other factors which influence fire behavior and fire effects. Prescribed fire activities will include effective communication on prescribed fire activity in the park and local community and the monitoring programs that provide information on whether specific objectives are being met. In conformance with the preserve's fire

management plan, a systematic decision –making process will be used to determine the most appropriate management strategies for wildland fire that are no longer meeting resource management objectives.

## **B. DOI Alaska Policy**

In 1998 the Department of the Interior issued Departmental Manual 620 Chapter 2 which provides policy and guidance regarding wildland fire suppression and organization in Alaska. DM 620 Chapter 2 states, “BLM will maintain and operate the Department of the Interior wildland fire suppression organization in Alaska”. This policy document provides for the existence of Alaska Fire Service, and the Statewide Master Agreement entered into between the BLM-Alaska Fire Service, State of Alaska, the DOI agencies, and Native land managers. This statewide master agreement is available on the web at <http://fire.ak.blm.gov/logdisp/asma.php> and includes the Annual Operating Plan. The Master Agreement provides for cooperative wildland fire suppression between the BLM and State of Alaska and other fire suppression organizations. In Yukon-Charley Rivers National Preserve the Master Agreement gives protection authority to the Alaska Fire Service through the Upper Yukon Zone. However DM620 part 2 also states, “Nothing herein relieves agency administrators in the Interior bureaus of the management responsibility and accountability for activities occurring on their respective lands.” And, “Each bureau will continue to use its delegated authority for application of wildland fire management activities such as planning, education and prevention, use of prescribed fire, establishing emergency suppression strategies, and setting emergency suppression priorities for the wildland fire suppression organization on respective bureau lands.”

## **C. Establishment and Purpose of YUCH**

In 1980 Congress created the Yukon-Charley Rivers National Preserve through the passing of the Alaska National Interest Lands Conservation Act (ANILCA), a comprehensive statement of purpose for several new Alaskan Park and Preserve areas. Section 201[10] of ANILCA specifically establishes Yukon-Charley Rivers National Preserve and ascribes to it the following mission:

To maintain the environmental integrity of the entire Charley River basin, including streams, lakes and other natural features, in its undeveloped natural condition for public benefit and scientific study; to protect habitat for, and populations of, fish and wildlife, including but not limited to the peregrine falcons and other raptorial birds, caribou, moose, Dall sheep, grizzly bears, and wolves; and in a manner consistent with the foregoing, to protect and interpret historical sites and events associated with the gold rush on the Yukon River and the geological and paleontological history and cultural prehistory of the area. Except at such times when and locations where to do so would be inconsistent with the purposes of the preserve, the Secretary shall permit aircraft to continue to land at sites in the Upper Charley River watershed.

Sections 101 (a), (b) and (c) of ANILCA charges all national park units in Alaska with the preservation of historic and archeological sites.



Figure 1: Yukon Charley Rivers Preserve Vicinity Map

## **D. YUCH General Management Plan, Resource Management Plan**

The YUCH General Management Plan (1985) states that the Preserve will be managed so as to remain “a benchmark for measuring the effects of natural forces and human activity on similar environments”; accordingly, the GMP specifies that the Preserve’s natural resources “will be monitored so that threats to natural systems can be quickly identified and a strategy developed to avoid adverse effects.” The GMP also specifies the protection of significant cultural resources.

The current YUCH Resource Management Plan (1994) comprises an action plan for the implementation of the goals outlined in the Preserve’s GMP and as such provides resource-oriented guidelines for the development of a fire management program for Yukon-Charley Rivers National Preserve. With respect to fire management, the RMP identifies three especially relevant objectives: 1) the maintenance of natural processes, including fire, “to the greatest degree possible while protecting human life, private property, cultural sites, critical habitat, and endangered species”; 2) the minimization of human-caused disturbances, such as the manipulation of habitat or wildlife populations, except in extreme circumstances (e.g., the preservation of an endangered species); and 3) the stabilization and restoration of significant historical structures and districts. Project Statement YUCH-N-004.0, contained within the RMP, specifies the development of an integrated fire management program which will incorporate the existing interagency suppression plan while also addressing park-specific suppression capability as well as the possible use of wildland or prescribed fire [identified in the RMP as prescribed natural fire and management ignited prescribed fire, respectively] for resource benefit and/or hazard fuels reduction.

As defined by the Alaska National Interest Lands Conservation Act, the Preserve’s foremost purpose is

“to maintain the environmental integrity of the entire Charley River basin...in its undeveloped natural condition for public benefit and scientific study; to protect habitat for, and populations of, fish and wildlife...; and in a manner consistent with the foregoing, to protect and interpret historical sites and events associated with the gold rush on the Yukon River and the geological and paleontological history and cultural prehistory of the area....”

The accomplishment of the resource management objectives described above will occasionally demand the prioritization of wildland fire management activities by the entire Yukon-Charley staff. Large or complex wildland fire incidents may demand the involvement of most or all Preserve personnel, in some cases for extended periods of time.

This fire management Plan integrates the policy set forth in both DO-18 and the AIWFMP. Specifically, it is a detailed program of action to implement the fire management policies and objectives of the National Park Service. Additionally, this

FMP will help to meet the objectives set forth in the YUCH General Management Plan and the YUCH Resource Management Plan.

### **III. WILDLAND FIRE MANAGEMENT STRATEGIES**

#### **A. General Management Considerations**

In Alaska, primary responsibility for suppression is divided amongst the Alaska Department of Natural Resources (DNR), the US Forest Service, and the Bureau of Land Management's Alaska Fire Service (AFS). AFS carries the primary responsibility for suppression actions on lands within Yukon-Charley Rivers National Preserve. Although AFS has primary responsibility for suppression, the Department of Interior Departmental Manual, Part 620, Chapter 2, Section 2.4 states that "Nothing herein relieves agency administrators in the Interior bureaus of the management responsibility and accountability of activities occurring on their respective lands." Section 2.4 goes on to state that "Each bureau will continue to use its delegated authority for applications of wildland fire management activities such as planning, education, and prevention, use of prescribed fire, establishing emergency suppression strategies, and setting emergency suppression priorities for the wildland fire suppression organization on respective bureau lands."

The NPS, as well as the US Fish and Wildlife Service, the Bureau of Indian Affairs, and Native Corporations and Native Villages participates in wildland fire management training and provides suppression resources during periods of increased fire activity in the Preserve, Alaska and the contiguous United States. Although the use of NPS personnel for initial attack and structure protection is not common, qualified NPS personnel may provide initial attack if they are the closest resources or if no other initial attack resources are available. Qualified NPS personnel may also provide structure protection under similar circumstances. The use of these personnel will be coordinated with the Upper Yukon Zone (UYD) FMO of the Alaska Fire Service.

In 1983 the NPS cooperated with the BLM, the Alaska DNR, the Alaska Department of Fish and Game, the US Forest Service, the US Fish and Wildlife Service, the Bureau of Indian Affairs, and Native Regional and Village Corporations to produce an Interagency Fire Management Plan for the Fortymile Planning Area. This plan provided direction for fire management activity for YUCH until 1998, when a variety of documents, including 13 local planning area FMPs, were consolidated and approved as the *Alaska Interagency Wildland Fire Management Plan* (AIWFMP). Copies of these plans can be found at the Yukon-Charley Rivers National Preserve Headquarters in Eagle, Alaska or on line at <http://forestry.alaska.gov/pdfs/98AIFMP.pdf>. Under the AIWFMP, fire protection needs are determined through annual land manager/owner reviews, and lands are then placed under **Critical**, **Full**, **Modified** or **Limited** protection categories, with categorization based on values to be protected as well as the managing agency's resource management objectives, policies and mandates. These categories are discussed in detail in the AIWFMP. They are summarized below in Table 1.

Additionally, the NPS mandates the use of the Wildland Fire Decision Support System (WFDSS) for analysis and documentation of wildland fire incidents. This system replaces previous analysis tools that were cumbersome and time-consuming. Eastern Area Fire Management or the Agency Administrator will be responsible for accomplishing WFDSS for each incident occurring in YUCH. More information on WFDSS can be found in Section IV below and in Appendix H.

PROTECTION CATEGORY	POLICY	INTENT
CRITICAL	Aggressive suppression of fires within or threatening designated areas. Highest priority for available resources.	Prioritization of suppression actions for wildland fires threatening human life, inhabited property, and/or other designated structures. Complete protection of designated sites
FULL	Aggressive suppression of fires within or threatening designated areas, depending upon availability of resources.	Protection of uninhabited cultural and historical sites, private property, and high-value natural resources.
MODIFIED	Fires in designated areas receive initial attack depending on availability of resources, unless land manager chooses otherwise and documents with WFDSS. After designated <b>conversion date</b> , operational response to Modified protection zones is identical to that of Limited zones.	Greater flexibility in selection of suppression strategies when chance of spread is high (e.g., indirect attack). Reduced commitment of resources when risk is low. Balancing of acres burned with suppression costs and with accomplishment of resource management objectives.
LIMITED	Wildland fires allowed to burn within predetermined areas. Continued protection of human life and site-specific values. Surveillance.	Reduction of long-term costs and risks through reduced frequency of large fires. Reduction of immediate suppression costs. Facilitation of bio-diversity and ecological health

**Table 1: AIWFMP Management Options**

### **B. Fire Management Goals at YUCH**

Whenever safely possible, Yukon-Charley Rivers National Preserve will utilize the role of fire in the natural environment in the fulfillment of NPS natural resource management directives. Accordingly, the Preserve will direct all fire management activities toward the accomplishment of the following goals:

1. The protection of human life.
2. The protection of property, and irreplaceable natural and cultural resources.
3. The preservation of the natural fire ecology of the Yukon-Charley region.
4. The use of selected wildland fires for the accomplishment of resource management objectives and for the reduction of hazardous fuels.
5. The minimization of adverse effects of fire and/or fire-suppression activities.
6. The coordination and scientific management of wildland fire on the basis of the best natural resource management program goals and objectives.

7. The education of employees and public about the scope and effect of wildland fire management.
8. The management of wildland fire incidents in accordance with accepted interagency standards and the achievement of maximum efficiency through interagency coordination and cooperation.
9. The development of on-site protection capabilities at the Preserve through the training of YUCH personnel and acquisition of wildland firefighting equipment.
10. Provision of fire situation, fire behavior and fire effects information to the Preserve Superintendent and to appropriate Alaska Fire Service personnel.

## **C. Fire Management Options**

### **1. Response to Wildland Fire**

The NPS policy DO-18 specifies the various fire management options available for use by the fire management program.

Fire, as a critical natural process, will be integrated into Land and Resource Management Plans and activities on a landscape scale, across bureau boundaries. Response to wildland fires is based upon ecological, social and legal consequences of the fire. The circumstances under which a fire occurs, and the likely consequences on the firefighter and public safety and welfare, natural and cultural resources, and values to be protected, dictate the appropriate response to the fire. Wildland fire is defined as any ignition or non-structure fire that was not planned or ignited by management.

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. Use of fire will be based on approved Fire Management Plans and will follow specific prescriptions contained in operational plans. Response to wildland fire will include the full range of options presented in the AIWFMP. Following both DO-18 and the AIWFMP, wildland fires may be managed to accomplish resource management objectives. Current policy dictates that a wildland fire may be managed for one or more objectives concurrently. For example, sections of the same incident may be allowed to burn to meet ecological considerations while suppression actions may be taken on sections where fire managers have determined there is a need.

The classic example is a fire which begins in a **Limited** Protection FMU (Protection categories and FMU's in YUCH are discussed in detail in Section E, below) where the fire is meeting ecological considerations, but there are structures which require protection. Fire managers may deploy smokejumpers or other suppression resources to protect the specific values while allowing the rest of the fire to burn uninhibited. In

selecting suppression strategies Eastern Area Fire Management must consider firefighter and public safety, cost effectiveness, and impact of suppression activities, as well as protection of resources and values to be protected. Accordingly, suppression strategies may range from aggressive initial attack to surveillance and/or indirect containment. Any action or decision that changes a pre-planned Response must be approved and documented by either the UYD FMO, NPS Agency Administrator or the Incident Commander.

## **2. Fuels Management**

In wildland fire management, fuel is defined as live or dead organic matter. The two primary management options for fuel reduction are Prescribed Fire and Mechanical Fuels Reduction and are described below.

### **a. Prescribed Fire**

Prescribed Fire is defined as the planned implementation of fire within a predetermined area and under predetermined conditions, for the accomplishment of resource management objectives and/or hazard fuel reduction. Each implementation of prescribed fire must follow a Prescribed Fire Plan prepared by Alaska Eastern Area FMO (or delegate) and approved by the Superintendent.

Beginning in 2008 YUCH personnel have implemented the use of prescribed fire to burn piles which are created in hazard fuel reduction projects. The Preserve staff intends to continue to use prescribed fire in this manner to mitigate fire danger to identified sites within the Preserve.

In addition the Preserve intends to use prescribed fire in specific locations on a broadcast scale to accomplish resource management objectives. An additional Burn Plan will be developed for this purpose and added to the Fire Management Plan. Additional NEPA requirements will be met in a separate document. See [Appendix I](#) for the Preserve Burn Plan.

### **b. Mechanical Fuels Reduction**

Mechanical Fuels Reduction is defined as the use of power saws, cross-cut saws, mowers, hand tools, or similar devices to mitigate hazard fuel buildup or recreate historical landscape conditions in areas where fire would pose an unreasonable threat to property or resources. Each mechanical fuel reduction action at YUCH must follow a written plan prepared by the Alaska Eastern Area FMO (or delegate) and be approved by the Superintendent.

Management Option	Intent	Policy
Prescribed Fire Use Prescribed Fire Plan → management-implemented ignition	<ul style="list-style-type: none"> <li>• Immediate protection of life, property, and/or fire-sensitive resources.</li> <li>• Ecosystem sustainability</li> <li>• Achieve Resource Management goals and objectives</li> <li>• Long-term protection of life, property, and/or fire sensitive resources.</li> <li>• Restoration of historic conditions.</li> <li>• Cost effectiveness.</li> </ul>	<ul style="list-style-type: none"> <li>• Agency Administrator may select suppression actions in any FMU.</li> <li>• Context and circumstances of the fire dictate the appropriate response, based on the approved FMP.</li> <li>• Suppression actions triggered automatically in Full and Critical FMUs.</li> <li>• Management strategy or prescribed fire plan should be based on resource management objectives.</li> <li>• Suppression actions should comply with resource management objectives whenever possible.</li> </ul>
Response to Wildland Fire Any ignition → managed based on resource management objectives, values to be protected and likely consequences of firefighter and public safety		

**Table 2: DO-18 Fire Management Options**

## D. YUCH Physical and Biotic Characteristics

### 1. Natural Characteristics

Yukon-Charley Rivers National Preserve encompasses 2.52 million acres, of which the federal government holds 84%. Much of the remaining land belongs to Doyon, Ltd., the regional native corporation; other ownership categories include Village Corporation tracts, Native allotments, and patented/unpatented mining claims. Located in the eastern interior of Alaska and bordering the Yukon Territory, Canada, the Preserve is bracketed by the small, road-connected communities of Eagle and Eagle Village to the east and Circle City, Central, and Circle Hot Springs to the northwest. The large and historically significant Yukon River and nearly undisturbed Charley River provide access to the Preserve’s roadless interior.

The Yukon River valley is composed of low, rounded benches and ridges trending southwest to northeast. The valley region rises noticeably south of the Yukon River and gives way to the mountainous region of the Yukon-Tanana uplands. Elevations become progressively higher moving east from Circle, at 600 feet above sea level, to the U.S.-Canadian border, where mountains reach 6,000 feet. YUCH lies within a climatic region known as the interior basin. Mountains to the north and south tend to block moderating oceanic air masses, resulting in extremely low temperatures and low-level inversions in the winter and high temperatures and low precipitation in the summer. (See Chapter III, Section G YUCH Ecology and Fire for a discussion of historical weather.)

The Yukon-Charley region lies within a greater ecological zone known as the Taiga, or northern boreal forest, an area extending from the Alaskan interior east into Canada and dominated by spruce and several species of deciduous hardwoods. In the Preserve, as elsewhere in the Taiga, lowlands and drainages are often heavily forested. Uplands become more thinly forested with increasing elevation, with most areas above 2,000 feet consisting of treeless shrub tundra. Tundra dominated by tussock-forming sedges occurs at lower elevation sites where poor drainage precludes the presence of black spruce

stands. Much of the preserve is underlain by permafrost as much as several hundred feet thick, with the top of the permafrost layer often lying as little as 2 or 3 feet below the surface at the peak of summer. Permafrost hinders subsurface drainage, causing unstable soil conditions on sloping surfaces; consequently when surfaces are disturbed and permafrost is allowed to melt, soils often collapse.

The Preserve is home to Dall sheep, moose, caribou, grizzly and black bear, wolves, and various small-mammal species; to eighteen species of fish; and to 159 species of birds, including twenty different species of raptor.

(See APPENDIX C Chapter I Section D and the YUCH Resource Management Plan for discussions of threatened, endangered, or rare plant and animal species found within the Preserve.)

## **2. Cultural Features**

The history of the Yukon-Charley Rivers area includes occupations by Athabaskan peoples as well as by non-Native participants in the turn-of-the-century gold rush. There are 290 cultural sites recorded thus far for Yukon-Charley, approximately 126 of which contain some manner of combustible structural components, such as cabins, caches, root cellars, outhouses, meat drying racks, blacksmith shops, doghouses, etc. The remaining 164 sites are prehistoric and historic, containing largely lithic and organic materials and little to no combustible components, aside from an occasional fish or meat drying rack. (See YUCH Resource Management Plan, Chapter II, Sections C and D for a discussion of historic sites and their classification. The **Alaska NPS Structure Protection Procedures** document is included as [Appendix H.3](#).

## **3. Non-Federal Land Ownership within the Preserve**

Certain lands contained within Yukon-Charley Rivers National Preserve were previously made available for Native Alaskan selection under the Alaska Native Claims Settlement Act, through the establishment of regional and village corporations and their designation of small tract allotments. The majority of the corporate lands and small-tract allotments that were selected within the boundaries of Yukon-Charley have been conveyed; most are located in the northeastern portion of the Preserve and within the Nation and the Kandik river watersheds.

Other non-federal holdings within the preserve include mining claims, state-owned submerged lands, and small private tracks located at Miller Camp, near the Nation town site, at the Woodchopper mine, and near Twenty-eight Mile (upstream from Circle on the Yukon). Private lands are subject to development by their owners.

(See the Yukon-Charley GMPs accompanying Land Protection Plan for acreage and locations of the non-federal lands within the preserve.)

## **4. Ownership of Adjacent Lands**

Lands adjacent to YUCH fall under the following categories of ownership:

- Steese National Conservation Area (BLM)
- Public domain (BLM)
- State-owned
- State-selected
- Native-owned land
- Native-selected land
- Canadian public lands (Yukon territorial government)

(See the YUCH GMPs accompanying Land Protection Plan for details on ownership of adjacent lands.)

# Yukon-Charley Rivers National Park and Preserve Fire Management Units

Alaska Region  
National Park Service  
U. S. Department of the Interior

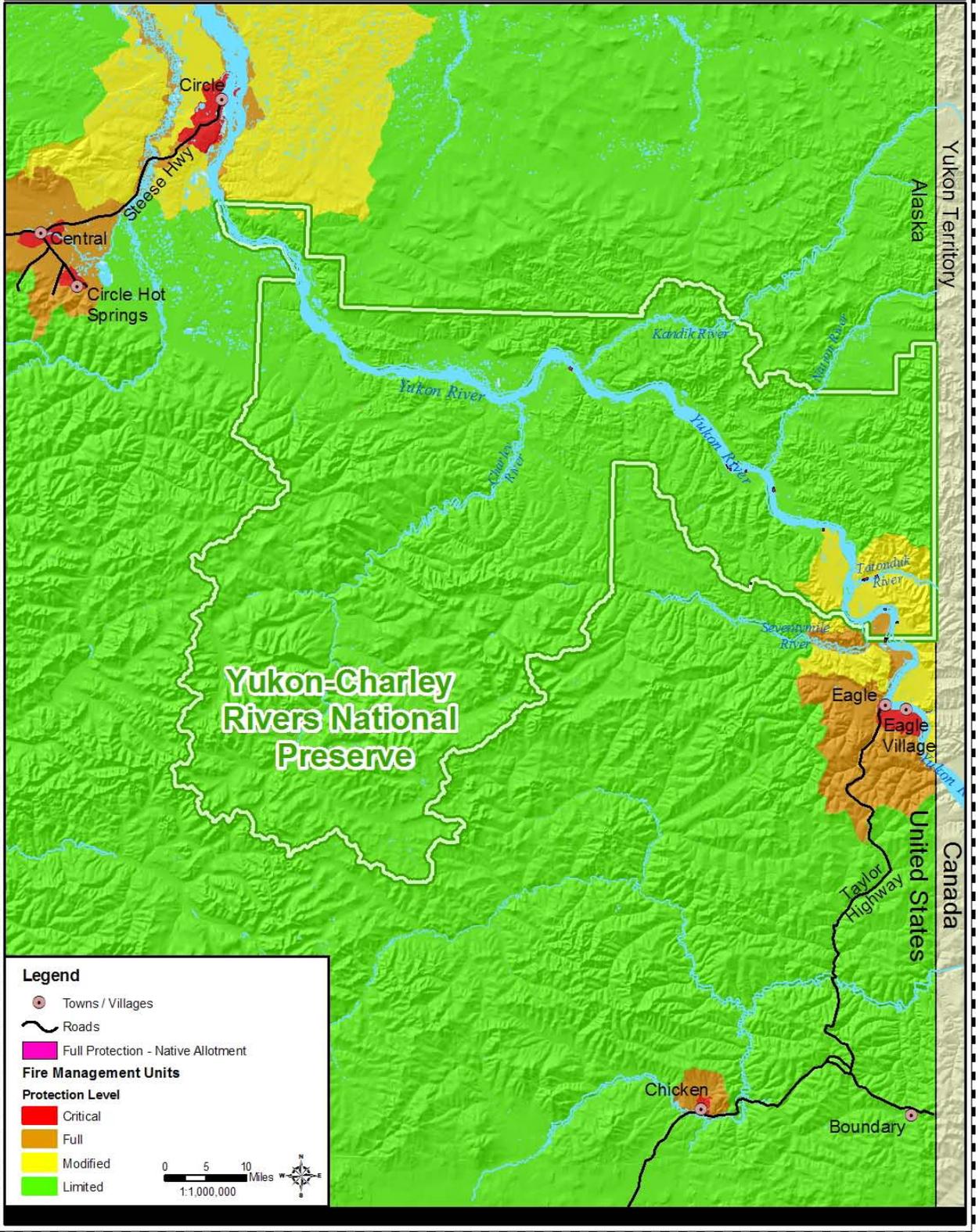


Figure 2: Map of Fire Management Units at YUCH

### **Description of YUCH Fire Management Units (FMUs)**

As stated in the AIWFMP, “The authority to determine fire management options for lands selected within the boundaries of federal conservation units rests with the Departments of the Interior and Agriculture. The State of Alaska and Native corporations may request fire management option(s) to the land manager/owner of the lands they selected, but [for which] the conveyance process has not been completed. For the purposes of the AIWFMP, land managers/owners who have received interim conveyance or tentative approval for conveyance of land will select the fire management for those lands.”

Determination of YUCH Fire Management Units and their respective policies is based on the proximity of values at risk, the role of fire within the Preserve’s vegetative communities, and overall management objectives. Variables such as fuel type, loading, and moisture level will be considered in the decision-making process for specific incidents, as well as in the writing of individual prescribed fire plans. Predetermined management parameters for FMUs, however, will tend to be based instead on relative risk posed to property or sensitive resources.

Each FMU corresponds with an appropriate Alaska Interagency Wildland Fire Management Plan protection category and will be managed accordingly. It should be noted that the areas contained within individual Fire Management Units at YUCH are not contiguous. The following map shows the general location of the Preserve’s FMU boundaries as well as the AIWFMP protection zones for adjacent lands (see Figure 1).

A statewide Multi-Agency Coordination (MAC) group will be convened when the Alaska Preparedness Level reaches Level 4 or 5, to establish priorities for suppression resource allocation and to determine the need for a temporary change in the selected fire management option identified in the AIWFMP for a specific geographic area(s). Such temporary changes may be implemented during periods of unusual fire conditions (e.g., numerous or unusually large fires, predicted drying trends, problematic smoke dispersal, shortages of suppression resources, unusually wet conditions, etc.). The duration and geographical extent of any such changes will be determined by the MAC group and will be reflected in the Preserve’s FMUs, which will be managed accordingly.

The fire management program at Yukon-Charley Rivers National Preserve complies with the policies resulting from the Federal Wildland Fire Management Policy Review of 1995 as well as those established by the Alaska Interagency Wildland Fire Management Plan. In accordance with DO-18, the Preserve has been sub-divided into three Fire Management Units, each indexed to an appropriate AIWFMP category. This integration of NPS categories and AIWFMP categories is summarized below in Table 3. (YUCH FMUs will be described in detail in Section E of Chapter III; the following summary is intended merely to clarify the relationship between NPS policy and the AIWFMP and to demonstrate the Preserve’s compliance with both.)

<b>YUCH Fire Management Units (derived from AIWFMP Protection Categories)</b>	<b>Possible Rationales for FMU Determination</b>	<b>Applicable Management Strategies</b>
CRITICAL (no YUCH FMUs in this category)	Presence of permanent residences and valuable cultural resources, including National Historical Landmarks.	Response to Wildland fire Suppression Prescribed Fire Use
FULL	Presence of private structures and of structures included on the National Register of Historical Places. Proximity to Critical FMU.	Response to Wildland fire Suppression Prescribed Fire Use
MODIFIED	Proximity to Critical and Full FMUs. Presence of fire-dependent ecosystems. Appropriate balance of cost and control.	Response to Wildland fire Suppression Prescribed Fire Use
LIMITED	Presence of fire-dependent ecosystems. Relative lack of significant fire-sensitive resources.	Response to Wildland fire Suppression Prescribed Fire Use

**Table 3: Integration of DO-18 and AIWFMP**

## **E. Wildland Fire Management Strategies by Fire Management Unit (FMU)**

### **1. Critical Protection Fire Management Unit**

#### **a. Physical Descriptors**

There are no Critical Protection FMUs at the Preserve. There are critical protection zones surrounding YUCH that are noted here and in Figure 1, Map of Fire Management Units at Yuch. The YUCH headquarters located in the community of Eagle as well as the area surrounding Eagle is in Critical protection. Northwest of the Preserve there are three critical protection zones. Central, Circle Hot Springs and Circle are all within Critical Protection zones.

#### **b. Management Objectives**

In accordance with the AIWFMP, the Alaska Fire Service and the National Park Service assign the highest priority to the aggressive suppression of ignitions occurring within Critical Protection zones and/or sites.

#### **c. Management Constraints**

The Preserve will make every reasonable effort to communicate to the public ongoing fire management efforts, fire situation, and socio-political and economic impacts of any fire management activities conducted within this FMU.

Retardant and heavy equipment (including bulldozers) will not be used without the permission of the Superintendent (or delegate), except in life-threatening situations.

#### **d. Special Concerns**

Employees involved in fire management activities will make every effort to avoid disruption of culturally and/or archeologically significant sites. The YUCH Agency Administrator has the primary responsibility for ensuring timely consultation with cultural specialists concerning the location and protection of any such sites which might be impacted by wildland fire or fire management actions. Personnel participating in detection and/or reconnaissance flights will note any unrecorded structures or sites and report them to the Agency Administrator.

### **2. Full Protection Fire Management Unit**

#### **a. Physical Descriptors**

The Full Protection FMU (7,982 acres with 5,633 consumable acres) consists of a single contiguous section in the Preserve's southeast corner, an area containing extensive tracts of Native-selected lands. In addition, several structures and Native allotments within the Preserve have been designated as full protection sites, as indicated on the Upper Yukon / Tanana dispatch fire atlas.

The southeast portion comprises all of the Preserve's holdings to the south and west of the Yukon River within Range 32 East, Township 1 North. This area is contained on one side by the portion of the Yukon running from the south edge of Calico Bluff to approximately one mile upstream from the mouth of the Seventymile River and on the other side by the right angle formed by the lines running west and south from these respective points.

#### **b. Management Objectives**

The primary objective in the Full Protection FMU is to protect valued resources by minimizing the presence of uncontrolled fire. The pre-planned response is that AFS and/or the NPS, in consultation with AFS, will respond whenever possible to ignitions within this FMU with aggressive suppression, unless the YUCH Agency Administrator requests otherwise. Use of wildland fire for ecological, cost or resource purposes will be discussed and documented as a NON-standard fire response, for this FMU, in WFDSS. Any change to the pre-planned response objectives will be documented by the Agency Administrator.

Prescribed fire may be implemented in this FMU, with the Superintendent's approval of a formal prescribed fire plan, for the purpose of reducing hazardous fuel accumulations or restoring historical conditions.

In all cases, fire management strategies for incidents within the Full Protection FMU and/or sites will be aimed primarily at the protection of structures and other valued resources. Mitigation of immediate threats will take precedence, but implementation of alternative strategies aimed at long-term hazard fuels reduction and/or other management goals will also be allowed when deemed appropriate by the YUCH FMO or Agency Administrator.

### **c. Management Constraints**

The Preserve will make every reasonable effort to communicate to the public ongoing fire management efforts, fire situation, and socio-political and economic impacts of any fire management activities conducted within this FMU.

Retardant and heavy equipment (including bulldozers) will not be used without the permission of the Superintendent (or delegate), except in life-threatening situations.

### **d. Special Concerns**

Employees involved in fire management activities will make every effort to avoid disruption of culturally and/or archeologically significant sites. The YUCH Agency Administrator has primary responsibility for ensuring timely consultation with cultural specialists concerning the location and protection of any such sites which might be impacted by wildland fire or fire management actions. Personnel participating in detection and/or reconnaissance flights will note any unrecorded structures or sites and report them to the Agency Administrator.

## **3. Modified Protection Fire Management Unit**

### **a. Physical Descriptors**

The Modified Protection FMU (100,291 acres with 96,607 consumable acres) consists of two portions, located in the southeast and northwest corners of the Preserve, respectively.

The perimeter of the northwest portion of the Modified Protection FMU runs west from the intersection of the Preserve boundary and the divide separating Little Black and Paddle Creek drainages, along this divide and over Point 2245, then down and across a tributary of Paddle Creek and along the Paddle Creek/Yukon River Divide to the Preserve Boundary at the northern edge of Township 9 North, Range 18 East. From here the perimeter runs due east along the Preserve's far northern boundary to where the boundary doglegs south. It then continues south along the boundary back to the Little Black/Paddle Creek drainage.

The perimeter of the southeast portion of the Modified FMU runs north from the Preserve's extreme southeast corner along the Preserve's eastern boundary to the divide separating Hard Luck Creek and the Tatonduk River drainages, near Squaw Mountain. From here the perimeter runs west to the origin of the unnamed creek immediately west of Point 3705, then down this creek to its confluence with the Yukon. At the Yukon River, the FMU perimeter *excludes* the two eastern most of the three islands at the mouth of the Tatonduk, but follows the opposite (west) shore of the Yukon downstream to the small drainage opposite the river from Montauk Point. The perimeter follows this drainage and continues up to Point 3348, then runs down the ridge running SSW. From where this ridge intersects with the Preserve boundary the FMU perimeter follows the boundary east until it intersects again with the Yukon River.

### **b. Management Objectives**

The primary objective in the Modified Protection FMU is to achieve an appropriate balance between protection of life and property and cost effectiveness through the implementation of alternative suppression strategies. The AFS and/or NPS will provide initial attack for ignitions

detected within the Modified Protection FMU if adequate firefighting resources are available and conversion has not occurred. Immediate reduction of acreage burned is less of a priority than in Critical or Full FMUs; accordingly, Incident Managers will consider a wide range of suppression strategies, including containment by natural barrier or indirect use of retardant or handline. The pre-planned response is that AFS and/or the NPS, in consultation with AFS, will respond whenever possible to ignitions within this FMU with aggressive suppression, unless the YUCH Agency Administrator requests otherwise. There may be a desire for use of wildland fire for ecological, cost or resource purposes in this FMU. If the fire goes into a second burn period, new objectives and actions will be addressed. ANY change to the pre-planned response objectives will be documented as a NON-standard response and documented by the Agency Administrator. Once the Modified Protection FMU has converted, management objectives are identical to those established for the Limited Protection FMU.

Prescribed fire may be implemented in this FMU, with the Superintendent's approval of a formal prescribed fire plan, for the purpose of reducing hazardous fuel accumulations or restoring historical conditions.

### **c. Management Constraints**

The Preserve will make every reasonable effort to communicate to the public ongoing fire management efforts, fire situation, and socio-political and economic impacts of any fire management activities conducted within this FMU.

Retardant and heavy equipment (including bulldozers) will not be used without the permission of the Superintendent (or delegate), except in life-threatening situations.

### **d. Special Concerns**

Employees involved in fire management activities will make every effort to avoid disruption of culturally and/or archeologically significant sites. The YUCH Agency Administrator has primary responsibility for ensuring timely consultation with cultural specialists concerning the location and protection of any such sites which might be impacted by wildland fire or fire management actions. Personnel participating in detection and/or reconnaissance flights will note any unrecorded structures or sites and report them to the Agency Administrator.

## **4. Limited Protection Fire Management Unit**

### **a. Physical Descriptors**

The Limited Protection FMU (2,410,373 acres with 2,021,151 consumable acres) includes all YUCH holdings not contained within the Full or Modified FMUs.

### **b. Management Objectives**

Due to the near absence of values at risk within this unit, most natural ignitions occurring within the Limited Protection FMU will be managed for the purpose of preserving fire within its natural role within the ecosystem.

Prescribed fire may be implemented in this FMU to accomplish resource management goals or to restore historical conditions, with the Superintendent's approval of a formal prescribed fire plan.

### **c. Management Constraints**

The Preserve will make every reasonable effort to communicate to the public ongoing fire management efforts, fire situation, and socio-political and economic impacts of any fire management activities conducted within this FMU.

Retardant and heavy equipment (including bulldozers) will not be used without the permission of the Superintendent (or delegate), except in life-threatening situations

### **d. Special Concerns**

Employees involved in fire management activities must make every effort to avoid disruption of culturally and/or archeologically significant sites. The YUCH Agency Administrator has primary responsibility for ensuring timely consultation with cultural specialists concerning the location and protection of any such sites which might be impacted by wildland fire or fire management actions. Personnel participating in detection and/or reconnaissance flights will note any unrecorded structures or sites and report them to the Agency Administrator.

## **G. YUCH Ecology and Fire**

### **1. Fuel Characteristics and Fire Behavior**

#### **a. Fuels**

The vegetation of YUCH forms part of the circumpolar boreal forest. About 45% of the preserve is covered by coniferous forest, 30% covered by deciduous forest, 12% is dominated by successional stages of herbaceous plants, shrubs and seedlings and grass, the remaining 13% of YUCH is unburnable. Land cover classification was derived from 1999 imagery at a 30 meter square resolution (USDI and Ducks Unlimited 2002). Table 4 is a Crosswalk from Land Cover Classification to CFFDRS fuel Models.

The major tree and shrub cover types on YUCH are (1) coniferous forest, consisting predominately of extensive stands of black spruce, and (2) broadleaf forest, which consists of mixed deciduous species. Black spruce (*Picea mariana*) dominates poorly drained and north-facing sites, while broadleaf forest occurs as a successional stage on better drained and south-facing sites. Smaller stands of discontinuous open white spruce (*Picea glauca*) are found on well-drained lowland sites along the major rivers. Deciduous tree species on the refuge include quaking aspen (*Populus tremuloides*), paper birch (*Betula papyrifera*), balsam poplar (*Populus balsamifera*), and tamarack (*Larix laricina*). Woody species in wetter scrub habitats also include two alder species (*Alnus* spp.), bog birch (*Betula nana*), and many species of willow (*Salix* spp.). Upland sites are characterized by open scrubby forests of black spruce as well as successional aspen stands interspersed with tall shrublands, depending upon aspect and recent fire history (USDA 2002).

Chemical composition and vegetation structure make many tree and shrub species in the boreal forest quite flammable. Black spruce is an example of a fire-adapted species (its cones open after

fire or prolonged hot and dry periods). Crowberry (*Empetrum nigrum*) and Labrador tea (*Ledum palustre*) burn with great intensity due to the oils contained within the plant (Johnson 1992).

### **1. Grass: O1A & O1B (123,443 & 167,227 acre)**

Grasses comprise 11.5% or 290,670 acres of YUCH of which 13% or 9,556 acres have burned between 1999 and 2008. Because these are light flashy fuels with low severity burns, it is anticipated that most of the burned areas would return as grasses with the ability to re-burn again within a short period of time.

This fuel type is characterized by continuous grass cover, with occasional trees or shrub clumps that do not appreciably affect fire behavior. Two subtypes are found in this system; matted grass common after snowmelt in the spring and standing dead grass common in late summer to early fall. The live to dead ratio and wind speed in grasslands has a pronounced effect on fire spread.

Fire behavior in both grass subtypes is relatively easy to suppress. This fuel type burns during the spring and fall. The burning period is shorter due to less solar radiation and high humidity recovery at night, diurnal effect. The rate of spread can be high in this fuel type but there is limited smoldering and mop-up is relatively easy.

Burning patterns of tundra ecosystems generally are characterized by moderate intensity surface fires that may kill all aboveground plant parts but seldom destroy underground parts (Bliss and Wein 1972; Van Wagner 1983; Viereck and Schandelmeier 1980).

Efforts to contain or stop the spread of fire in the tundra produce more drastic long-term effects than the fire itself (Brown 1971; Viereck and Schandelmeier 1980). Construction of fireline strips away all insulating moss and peat layers and exposes bare mineral soil. This causes a more rapid and greater degree of subsidence under the fireline than under the burned areas due to the melting of the ground ice (Brown 1971), erosion and gull formation (Brown 1983).

### **2. Mixed woods: M1 & M2 (464,603 & 298,425 acre)**

Deciduous forests cover 763,028 acres or 30% of YUCH acres. Between 1999 and 2008 59,734 acres or 8% have burned.

The deciduous forests of YUCH are characterized by aspen, willow, cottonwood, birch, and white spruce. On any specific site, individual species can be present or absent from the mixture. Stand mixtures exhibit wide variability in age and stand structure. Two phases associated with the seasonal variation in the flammability of the hardwoods are recognized; the leafless stage (M1) occurring during the spring and fall and the green stage (M2) during summer.

Rate of spread in both fuel types is weighted according to the proportion of softwood and hardwood components. In areas where the proportion of hardwoods is greater than softwoods, when the deciduous over story and understory are in leaf, fire spread is greatly reduced with maximum spread rates only 1/5 that of spring or fall fires under similar burning conditions. During spring and fall, when the deciduous over story and understory are leafless, the leaf litter can burn like the grass models. The diurnal effect shortens the burning period and there is little

smoldering. In areas where the proportion of softwoods is greater than hardwoods, the dryness of the organic matter will dictate difficulty of extinguishment. The rate of spread will be relatively slow in these areas unless there is a very large grass component.

TYPE	CFDRS	ACRES	PERCENT YUCH
CLOSED NEEDLELEAF	C2	12674.3	0.50
OPEN NEEDLELEAF	C1	757135.5	30.02
OPEN NEEDLELEAF - LICHEN	C1	384.3	0.02
WOODLAND NEEDLELEAF	C2	370878.1	14.71
WOODLAND NEEDLELEAF - LICHEN	C1	3783.8	0.15
WOODLAND NEEDLELEAF - MOSS	C1	1808.3	0.07
CLOSED DECIDUOUS	M2	142005.8	5.63
OPEN DECIDUOUS	M1	18014.7	0.71
CLOSED MIXED NEEDLELEAF/DECIDUOUS	M2	125965.8	5.00
OPEN MIXED NEEDLELEAF/DECIDUOUS	M1	107793.7	4.27
TALL SHRUB	M2	30453.9	1.21
LOW SHRUB	M1	286429.5	11.36
LOW SHRUB - LICHEN	O1B	137.9	0.01
LOW SHRUB - TUSSOCK	O1B	137181.6	5.44
DWARF SHRUB	O1A	109563.0	4.34
WET SEDGE	O1A	307.1	0.01
DRY HERBACEOUS	O1A	13572.8	0.54
TUSSOCK TUNDRA	O1B	29428.2	1.17
TUSSOCK TUNDRA - LICHEN	O1B	479.3	0.02
AQUATIC BED	N/A	21.8	0.00
CLEAR WATER	N/A	7606.3	0.30
TURBID WATER	N/A	38712.1	1.54
SNOW	N/A	6915.4	0.27
SPARSELY VEGETATED	N/A	70963.5	2.81
ROCK/GRAVEL	N/A	87994.5	3.49
CLOUDS	N/A	731.2	0.03
CLOUD SHADOWS	N/A	370.7	0.01
TERRAIN SHADOW	N/A	108116.4	4.29
FIRE (BURNED)	M1	52365.1	2.08

**Table 5: 1997 Land Cover**

Paper birch is a principal component of boreal mixed woods in Canada because of its pioneering habit is favored by the relatively frequent 50 – 125 year fire return interval (Day and Harvey 1981). Paper birch is a prolific seed producer which begins at age 15 with optimal production

CFDRS	ACRES	PERCENT
C2	383,552.4	15.21
C1	763,111.9	30.26
M2	298,425.4	11.83
M1	464,602.9	18.42
O1B	167,226.9	6.63
O1A	123,442.9	4.90
N/A	321,432.0	12.75

**Table 4: CFFDRS Fuel**

40 to 70 years of age (Brinkman 1974). It rapidly colonizes open disturbed sites created by wildfire or disturbance (Foote 1983). In boreal mixed wood it begins dying by 75 years after fire or disturbance, by 125 most paper birch are dead (Day and Harvey 1981).

Quaking aspen readily colonizes after fire or other disturbance (Perala 1995). Fire releases sprout primordial on roots from hormonally controlled growth inhibition; removes canopy

shade; and blackens the soil surface increasing heat absorption. (Bradley et al 1992). Crown fires in coniferous forest often drop to the surface in quaking aspen, or may extinguish after burning a few meters into a stand (Bevins and Collin 1984). Quaking aspen stands often act as natural fuel breaks during wildfires (Fechner et al 1976).

Balsam poplar flower production begins at about 8 years of age with good seed crops produced each year (Haeussler and Coates 1986). It is a pioneer species which invades disturbed wet sites by seedling or suckering (Dickmann et al 1983). Repeated wildfires have led to the development of balsam poplar and aspen dominated stands within white spruce forests (Peck and Ross 1988) and retards white spruce replacement (Maini 1968). Fire will stimulate balsam poplar to root sucker and increase in density where it is present in any successional stage (Haeussler and Coates 1986). This tree has an explosive recovery rate after even severe fires (Keith et al 1971).

White Spruce is a long lived climax tree that gradually replaced pine, aspen, birch and/or poplar on well drained sites. White spruce seedlings establish under seral hardwoods, develop and grow slowly and eventually replace them.

FUEL TYPE	ACRES	PERCENT
CONIFERS	1,146,664.3	45.47
DECIDUOUS	763,028.3	30.26
GRASS	290,669.8	11.53
UNBURNABLE	321,432.0	12.75

**Table 6: General Fuel Types**

### **3. Conifers: C1 & C2 (763,112 & 383,552 acre)**

Conifers cover 1,146,664 acres or 45% of the land in YUCH. Fire records indicate that 184,965 acres or 16% of this fuel type have been consumed since 1999.

Two different types exist under this system.

C1 Spruce-Lichen Woodland: This fuel type is characterized by open, park-like black spruce. Stands occupy well-drained upland sites. Forest cover occurs as widely spaced individuals and dense clumps. Tree heights vary considerably, but bole branches (live and dead) uniformly extend to the forest floor and layer development is extensive. Woody surface fuel accumulation is very light and scattered. Shrub cover is exceedingly sparse. The ground surface is fully exposed to the sun and covered by a nearly continuous mat of reindeer lichens, averaging 3-4 cm in depth.

If the surface fuels are dry, this fuel type may support a high rate of spread on the surface but may not support a continuous crown fire. Mop-up may be difficult if the organic mat is deep and dry. Fire in this fuel type is relatively easy to control, as the surface fire dominates it.

C2 Boreal Spruce: This fuel type is characterized by pure, moderately well stocked black spruce stands on poorly drained sites. Tree crowns extend to or near the ground and dead branches are typically draped with bearded lichens. The flaky nature of the bark on the lower portion of stem boles is pronounced. Low to moderate volumes of down woody material is present. Labrador tea is often the major shrub component. A carpet of feather mosses and/or ground-dwelling lichens dominate the forest floor. Sphagnum mosses may occasionally be present. A compacted organic layer commonly exceeds a depth of 20-30 cm.

Stand replacement and crown fires dominate fire behavior in this fuel type. Crown fire may be initiated at a spread rate of 10 chains per hour. It is common to have spotting by aerial firebrands

Fuel Type	2008*	2007*	2005*	2004*	2000*	1999*	Total Fuel Burned*	Total YUCH CFFDRS*	% CFFDRS
<b>C2</b>	121.3	4,307.9	728.1	12,802.3	121.3	16,109.0	34,189.9	383,552.4	8.91
<b>C1</b>	60.7	11,103.4	8,524.7	69,775.3	121.3	61,189.9	150,775.4	763,111.9	19.76
<b>M2</b>	91.0	3,033.7	3,215.7	20,902.3	30.3	14,683.2	41,956.2	298,425.4	14.06
<b>M1</b>	0.0	2,062.9	1,122.5	8,706.7	0.0	5,885.4	17,777.5	464,602.9	3.83
<b>O1B</b>	333.7	758.4	151.7	3,943.8	0.0	3,913.5	9,101.1	167,226.9	5.44
<b>O1A</b>	0.0	30.3	0.0	212.4	0.0	212.4	455.1	123,442.9	0.37
<b>Total By Year</b>	606.7	21,296.6	13,742.7	116,342.8	273.0	101,993.3			
<b>Conifers</b>	182	15,411	9,253	82,578	243	77,299	184,965.3	1,146,664.3	16.13
<b>Deciduous</b>	91	5,097	4,338	29,609	30	20,569	59,733.7	763,028.3	7.83
<b>Grass</b>	333	789	152	4,156	0	4,126	9,556.2	290,669.8	3.29

**Table 7: CFFDRS Fuel Fire History 1999-2008 \* Acres**

in a crowning spruce fire. Wind is the crucial factor, with spotting often occurring ½ mile ahead of the fire and up to two miles. The carrier fuel is the organic matter that has a tremendous surface-to volume ratio with immediate responses to changes in relative humidity, solar radiation, and wind. Rate of spread is relatively slow and predictable, while severity is high in surface fuels. Mop-up may be difficult if the organic mat is dry.

The frequent fire return interval in black spruce forests perpetuates numerous seral communities. Throughout boreal North America, paper birch and quaking aspen are seral hardwoods that frequently invade burns in black spruce types. (Viereck and Leslie 1975). Black spruce typically seeds in promptly after fire, and with the continued absence of fire, will eventually dominate the hardwoods. Throughout much of Alaska, aspen and paper birch often dominate seral stands until they begin to breakup at about 90 years, at which time black spruce attains dominance. (Foote and Joan 1983).

Black Spruce production of semi-serotinous cones that release seed slowly over a period of years begins at an early age. Thus, trees older than 30 years virtually always contain a large amount of seed. Following fire, this large seed supply is released onto burned areas allowing rapid seedling establishment.

#### **4. Unburnable: (321,423 acres or 12.75%)**

This class is comprised of terrain features on GIS which are not fuels capable of sustaining combustion. These include: Water (Turbid, Clear and Aquatic Bed), Snow, Sparsely Vegetated ground cover, Rocks and Cloud and Terrain Shadows. Fire Scars will be classified as M1. Figure 2 demonstrates the Landcover Vegetation Classifications in YUCH.

# Yukon-Charley Rivers National Park and Preserve Landcover - 1997

Alaska Region  
National Park Service  
U. S. Department of the Interior

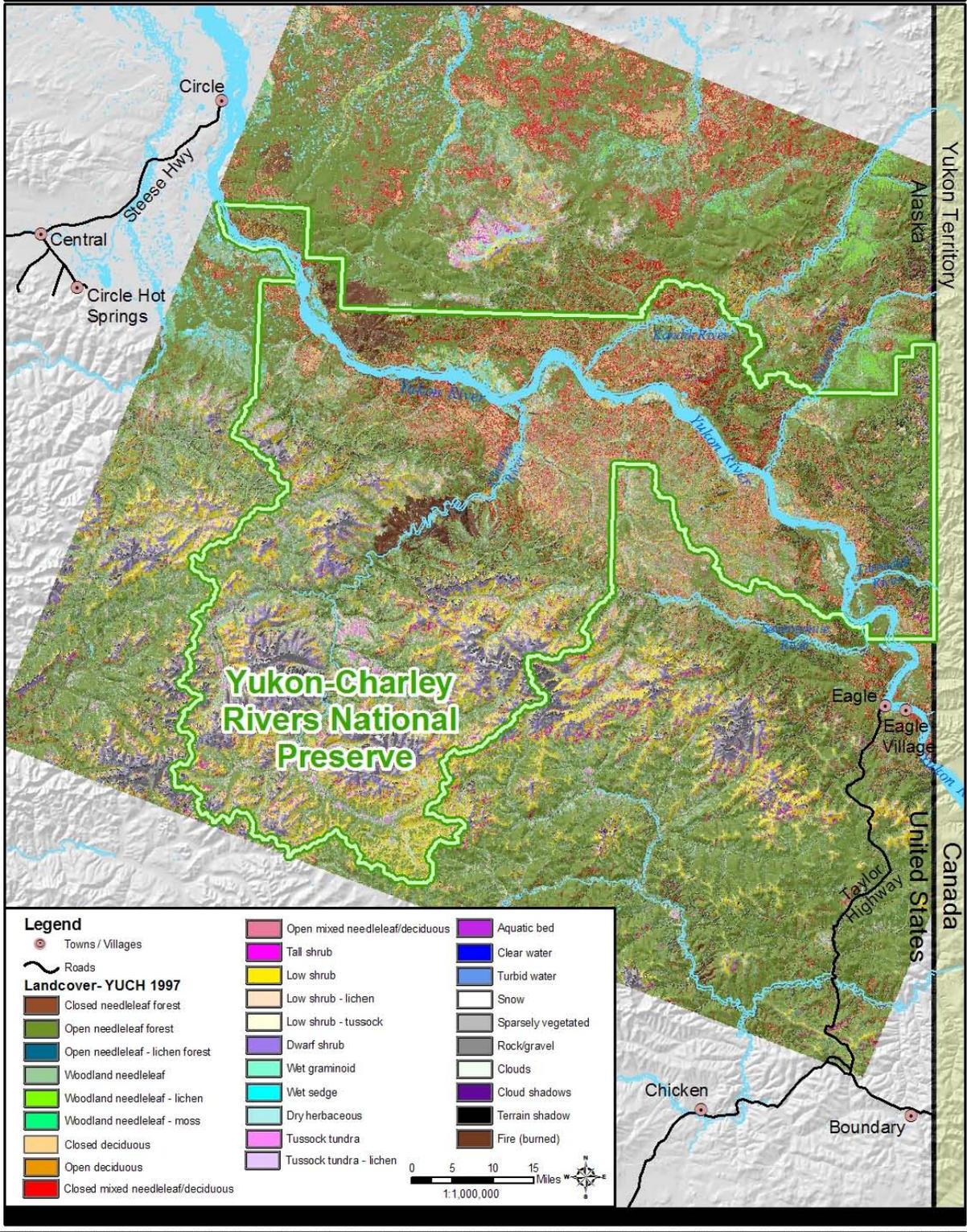


Figure 3: 1997 Land Cover

# Yukon-Charley Rivers National Park and Preserve CFFDRS Fuel Type

Alaska Region  
National Park Service  
U. S. Department of the Interior

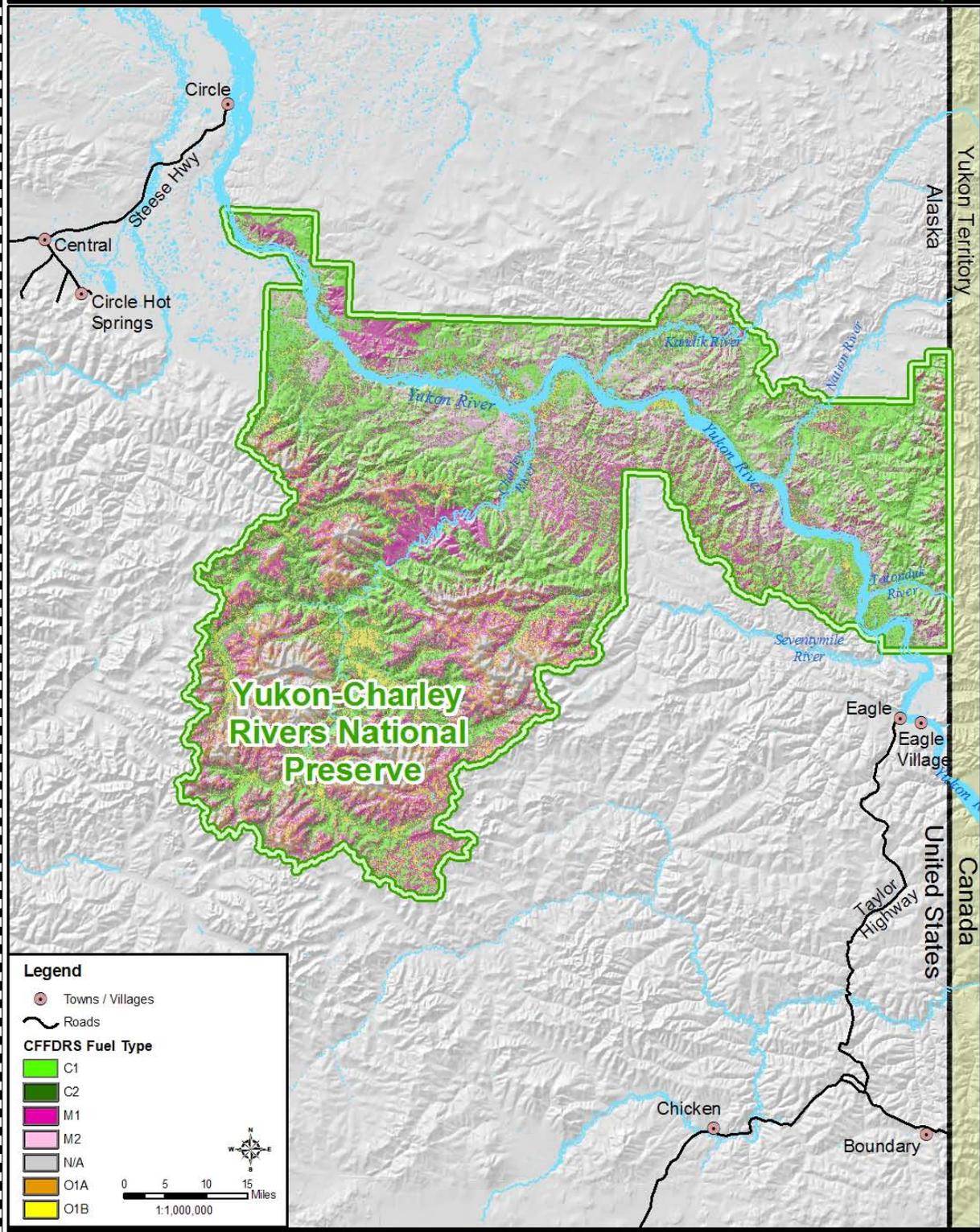


Figure 4: CFFDRS Fuels

## **b. Fire Behavior Prediction**

### **1. Canadian Forestry Fire Danger Rating System (CFFDRS)**

For the purpose of predicting fire behavior, YUCH uses the Canadian Forestry Fire Danger Rating System (CFFDRS). A full description can be accessed at [http://fire.cfs.nrcan.gc.ca/research/environment/cffdrs/cffdrs\\_e.htm](http://fire.cfs.nrcan.gc.ca/research/environment/cffdrs/cffdrs_e.htm)

**i. Fire Weather Index System (FWI)** Uses daily weather observations to estimate the moisture content of three different fuel classes which generate a set (three) of relative indicators of potential rate of fire spread, fire intensity and fuel consumption.

**Fine Fuel Moisture Content (FFMC)** Represents the moisture of litter and other cured fine fuels in a closed forest stand. Nominal depth of this fuel layer is 1.2cm.

**Duff Moisture Code (DMC)** Represents the moisture in the loosely compacted decomposing matter on the forest floor. Nominal depth of this fuel layer is approximately 7cm.

**Drought Code (DC)** Represents the moisture in deep, compact organic matter with a nominal depth of 18cm.

**Initial Spread Index (ISI)** A combination of wind speed and FFMC; indicator of rate of fire spread.

**Build Up Index (BUI)** A combination of DMC and DC and is an indicator of the total fuels available for combustion.

**Fire Weather Index (FWI)** A combination of ISI and BUI and is a relative estimate of potential fire intensity.

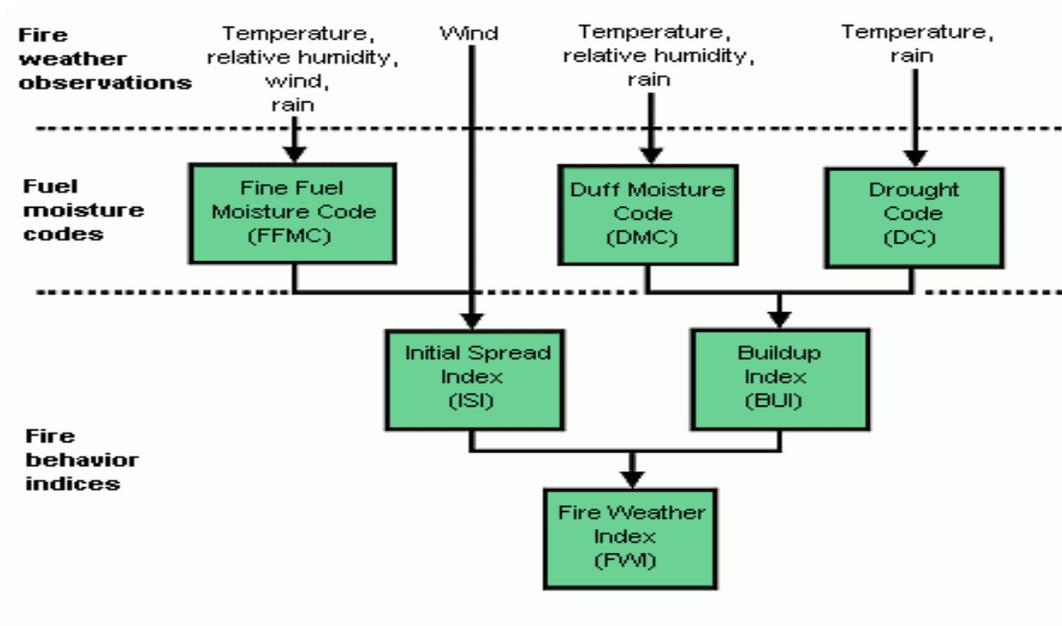
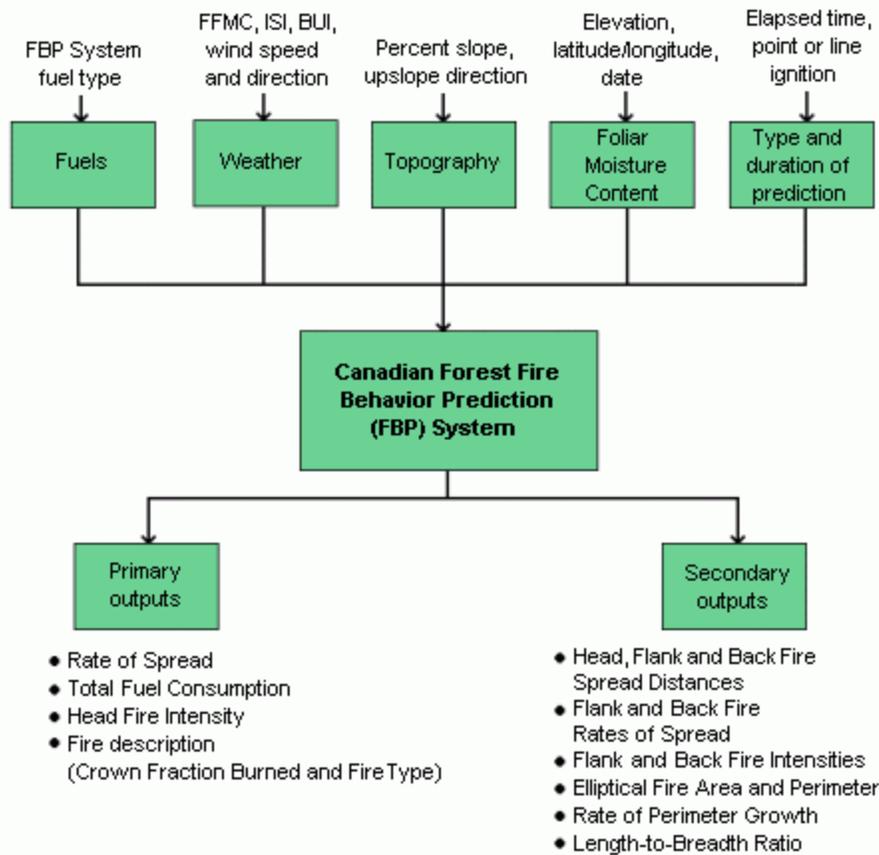


Figure 5: Structure of the Fire Weather Index System

**ii. Fire Behavior Prediction System (FBP)** Provides a systematic method of assessing fire behavior. FBP has five categories of inputs: fuels, weather, topography, foliar moisture content and type and duration of prediction. The four major outputs of the system are Rate of Spread, Head Fire Intensity, Fuel Consumption and Fire Description Code. A full description of the Fire Behavior Prediction System can be located at:

[http://cwfis.cfs.nrcan.gc.ca/en/background/bi\\_FBP\\_summary\\_e.php](http://cwfis.cfs.nrcan.gc.ca/en/background/bi_FBP_summary_e.php) .



**Figure 6: Structure of the Fire Behavior Prediction System**

## **2. Lightning Activity Level (LAL)**

The Lightning Activity Level is a common parameter that is part of fire weather forecasts nationwide. LAL is a measure of the amount of lightning activity using values 1 to 6 where:

**LAL 1:** No Thunderstorms

**LAL 2:** Cumulus clouds are common but only a few reach the towering cumulus stage. A single thunderstorm must be confirmed in the observation area. The clouds produce mainly virga, but light rain will occasionally reach the ground. Lightning is very infrequent. 1 – 8 Lightning strikes every 15 minutes.

**LAL 3:** Towering cumulus covers less than two-tenths of the sky. Thunderstorms are few, but two or three must occur within the observation area. Light to moderate rain will reach the ground, and lightning is infrequent. 9 – 15 Lightning strikes every 15 minutes.

**LAL 4:** Towering cumulus covers two to three-tenths of the sky. Thunderstorms are scattered and more than three must occur within the observation area. Moderate rain is common and lightning is frequent. 16 – 25 Lightning strikes every 15 minutes.

**LAL 5:** Towering cumulus and thunderstorms are numerous. They cover more than three-tenths of the sky and occasionally obscure the sky. Rain is moderate to heavy and lightning is frequent and intense. > 25 Lightning strikes every 15 minutes.

**LAL 6:** Similar to LAL 3 except thunderstorms are dry

Fire behavior is strongly tied to fuel moisture levels, especially in the duff and moss layer. Those fuels (FFMC and DMC) are relatively quick to change in response to rain and humidity variations. Number of sequential days without rain significantly correlates 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 deep drying into the duff layer (DC), as well as drying of live fuels (Pyne 1984, Johnson 1992). Depth of burn is extremely important in determining resistance to fire control efforts and fire effects on vegetation (Schimmel and Granstrom 1996).

## **2. Weather Analysis**

As already indicated, YUCH lies within Alaska's interior basin, where mountains to the north and south tend to block moderating oceanic air masses; this configuration results in extremely low temperatures and low-level inversions in the winter and high temperatures and low precipitation in the summer.

General weather patterns for the Preserve are as follows: During July, the warmest month at YUCH, the average daily temperature is approximately 60°F, with highs into the mid 90s. Average daily temperature for January, the coldest month, is approximately 13°F, with temperatures falling as low as -60 or -70°F. Daily fluctuations can be extreme, with freezing

temperatures possible throughout the summer. Summers are warm but short; the frost-free period typically lasts about 90 days. Sunlight approaches 22 hours on June 21. Precipitation generally totals less than 12 inches annually, about half of which occurs during the summer, usually in the form of short, potentially severe thunderstorms. Winds in the Preserve are predominantly out of the northeast; they generally follow canyons and valleys, where they can reach speeds around 60 mph.

The National Park Service maintains RAWS (Remote Automated Weather Station) at two sites within the Preserve: one at Eagle (Preserve headquarters) and another at Ben Creek (located atop the ridge immediately to the north of the Ben Creek drainage, on the south side of the Yukon River). Data from both RAWS sites is available on the Internet through the Alaska Fire Service homepage (go to [fire.ak.blm.gov](http://fire.ak.blm.gov); next click Fire Weather, then ROMAN – Alaska GCA then scroll down to UYK Upper Yukon and click Ben Creek or Eagle). Information collected from these RAWS sites contributes to the interagency efforts to monitor fire weather and generate fire weather indices. All RAWS records are kept at the Western Regional Climate Center.

### **3. Historic Role of Fire at YUCH**

Before 1940 an average of 1.5 to 2.5 million acres burned uncontrolled each year in Interior Alaska (Lutz 1956). With the creation of the Alaska Fire Control Service in 1939, the annual average decreased to 900,000 acres (Lutz 1956).

Fire has been an inextricable component of the ecosystems of the Yukon-Charley area for thousands of years, with periodic fires having served throughout the centuries to select plants and animals that are adapted to fire-caused change. Both the black and white spruce, for example, depend on intense ground fire to clear organic layers and to thereby expose a fertile seedbed. Black spruce, moreover, is at least partially dependent upon stand-replacement fire, in that its seeds become ready for germination at the peak of the Alaskan interior fire season and are released when its semi-serotinous cones are opened by canopy fire. Even more fundamentally, fire plays a key role in the regulation of the permafrost table throughout all the ecosystems of the Alaskan interior. Without fire, organic matter accumulates, the permafrost table rises, and ecosystem productivity declines. Vegetation communities become much less diverse, and wildlife habitat decreases. Fire rejuvenates these systems. It removes some of the insulating organic matter and elicits a warming of the soil. Nutrients are added both as a result of combustion and by increased decomposition rates.

Agencies responsible for fire management in the North American boreal forest recognize that fire exclusion is not possible, and is also neither economically nor ecologically desirable (Pyne 1982, Stocks 1993). Vegetation patterns in the boreal forest can be dominated by a few intense stand-replacing fires, especially in black spruce. These stand replacement fires burn in extreme weather conditions and cover hundreds of thousands of acres (Johnson 1992). Recovery from these severe fires tends to provide even-aged stands on a landscape scale. More frequent, smaller and less intense wildland fires provide better temporal and spatial heterogeneity to the natural fire recovery process. The small scale patchy environment resulting from these more frequent, lower intensity fires provide a varied habitat with an abundant edge-effect. This is clearly of value to many wildlife species. The smaller scale patchy fires also break up contiguous fuel loading and make future landscape-scale fires less intense.

Figure 7 displays the perimeters of all recorded fires 1950-2007 in the YUCH area. Fire records indicate that 964,785 or 43.85% of the consumable acres within YUCH have been burned. A total of 157 of the 167 incidents, or 94%, in which YUCH acres were consumed, may be attributed to lightning.

The 1950s recorded 19 incidents which were widely distributed within YUCH. Incidents consumed most of the land between Thanksgiving and Webber Creeks, and most of the preserve acres north of the Kandik River. Large incidents were also recorded west of the Charley River and east of Sam Creek.

The 1960s hold the record for acres consumed with 368,586 or 16.75% of all burnable acres. Most of this acreage (316,000) was consumed by the Butte Creek incident which burned east of the Charley River and south of the Yukon.

The 1970s and 1980s, while having the highest number of incidents, 33 and 36 respectively, both consumed less than 2% of YUCH acres. Fire activity within the 1980s was localized in the Eureka Creek area north of the Yukon River. The 1970s burned acres south of the Kandik by Johnsons Gorge and west of the Nation River.

The number of incidents decreased while the number of acres consumed increased in the 1990s with the 32 incidents burning 186,822 acres or 8.49%. Incidents were widely dispersed within the park consuming acres in the headwaters of both the Charley River and Woodchopper Creek, between Kathul Mountain and the Nation River and most of the acres between Three Castle Mountain and Lords Lake.

Between 2000 and 2007 there have been 22 incidents which have consumed 222,193 or 10.1% of YUCH consumable acres. Large fire activity was again widely dispersed on YUCH land. Much of the area around Woodchopper and Coal Creeks were consumed as well as most of the area north of the Yukon around Eureka Creek. Large incidents also consumed most of the acres east of the Nation River and north of Montauk Bluff.

<b>Decade</b>	<b>Acres</b>	<b>Incidents</b>	<b>% Burnable Acres</b>
1950s	124,416	19	5.65
1960s	368,586	25	16.75
1970s	29,145	33	1.32
1980s	33,623	36	1.53
1990s	186,822	32	8.49
2000s	222,193	22	10.10
<b>Burned Acres</b>	<b>964,785</b>		<b>43.85</b>
<b>Unburned Acres</b>	<b>1,235,577</b>		<b>54.46</b>
<b>Total Burnable Acres</b>	<b>2,200,362</b>		
<b>Total YUCH Acres</b>	<b>2,521,794</b>		

**Table 8: YUCH Fire History by Decade**

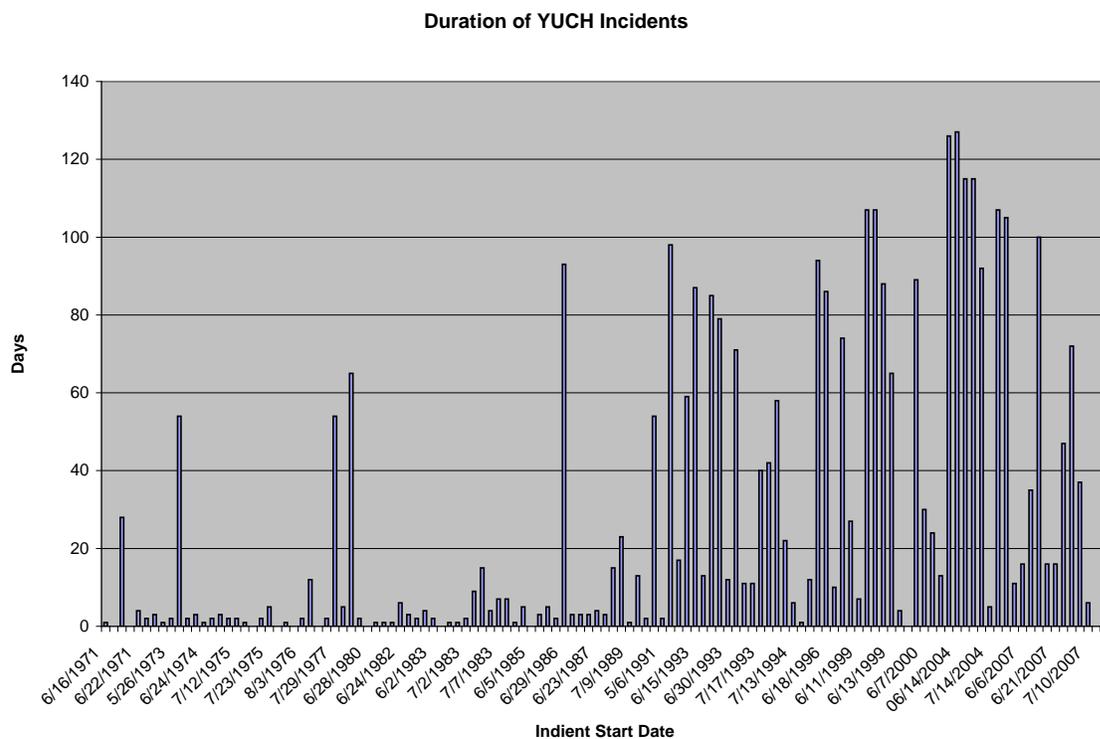
With the implementation of the Interagency Fire Management Plan for the Forty Mile Planning Area in 1983, wildland fires within YUCH began to be managed with ecological considerations in mind instead of a total suppression policy.

Between 1950 through 1983, 721,976 acres burned in YUCH for an average of 21,878 acres per year for this 33 year period. From 1984 through 2007, 1,001,188 acres have burned for an increased average of 43,530 acres per year for this 23 year period.

Between 1950 and 1983 the average duration of incidents was 23 days. For the years 1984-2007 the average duration of YUCH incidents increased to 128 days.

	Total Duration	Total Acres	Average Duration	Average Acres
<b>1950 -1983</b>	1046 Days	721,976	32 Days	21,878
<b>1984 - 2007</b>	2939 Days	1,001,188	128 Days	43,530

**Table 9: Duration of YUCH Incidents 1950-2007**



**Figure 7: Duration of YUCH Incidents 1971-2007**

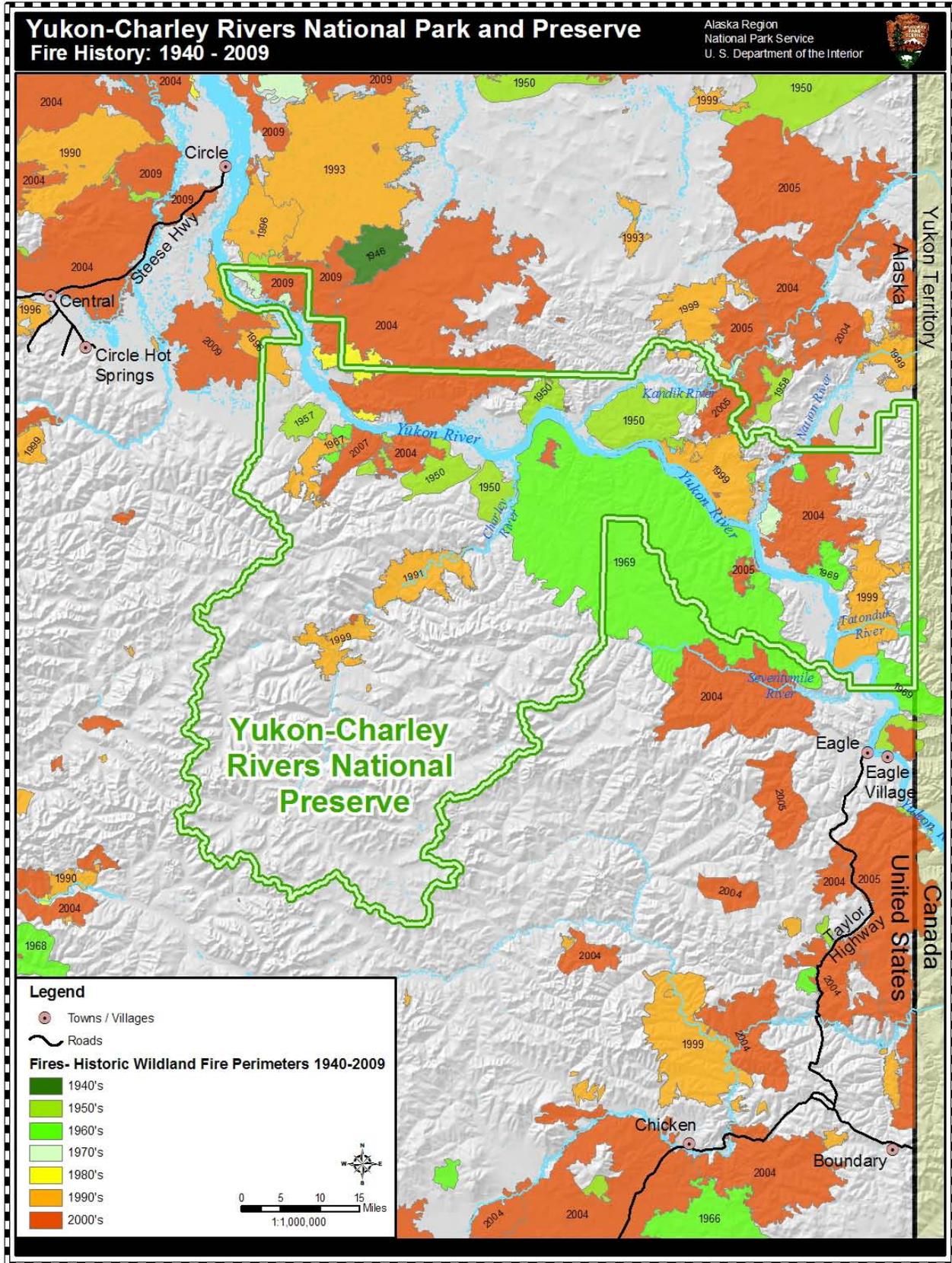


Figure 8: Fire History YUCH 1950-2009

## 4. Fire Season

As explained in the Fortymile Interim Fire Management Plan (1979), the seasonal fire cycle in the Alaskan interior consists of four “micro” seasons or phases, each varying with the changing weather patterns and the stages of vegetation development for the growing season.

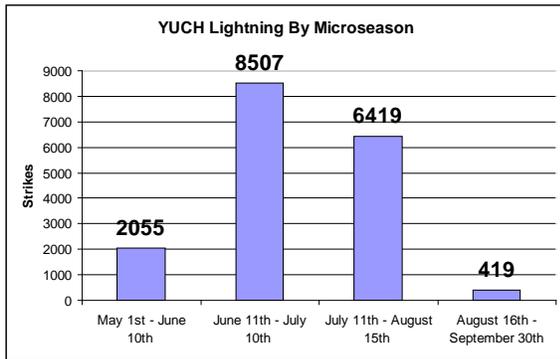


Figure 9: YUCH Lightning History 1986-2007

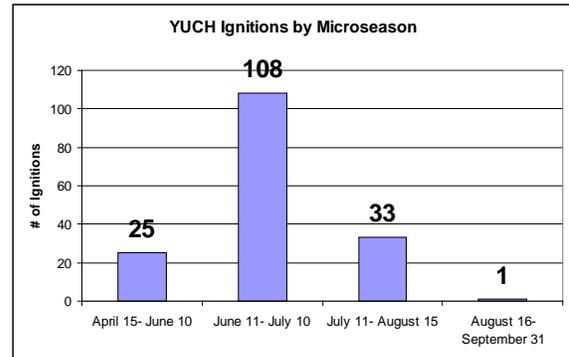


Figure 10: YUCH Ignition History 1950-2007

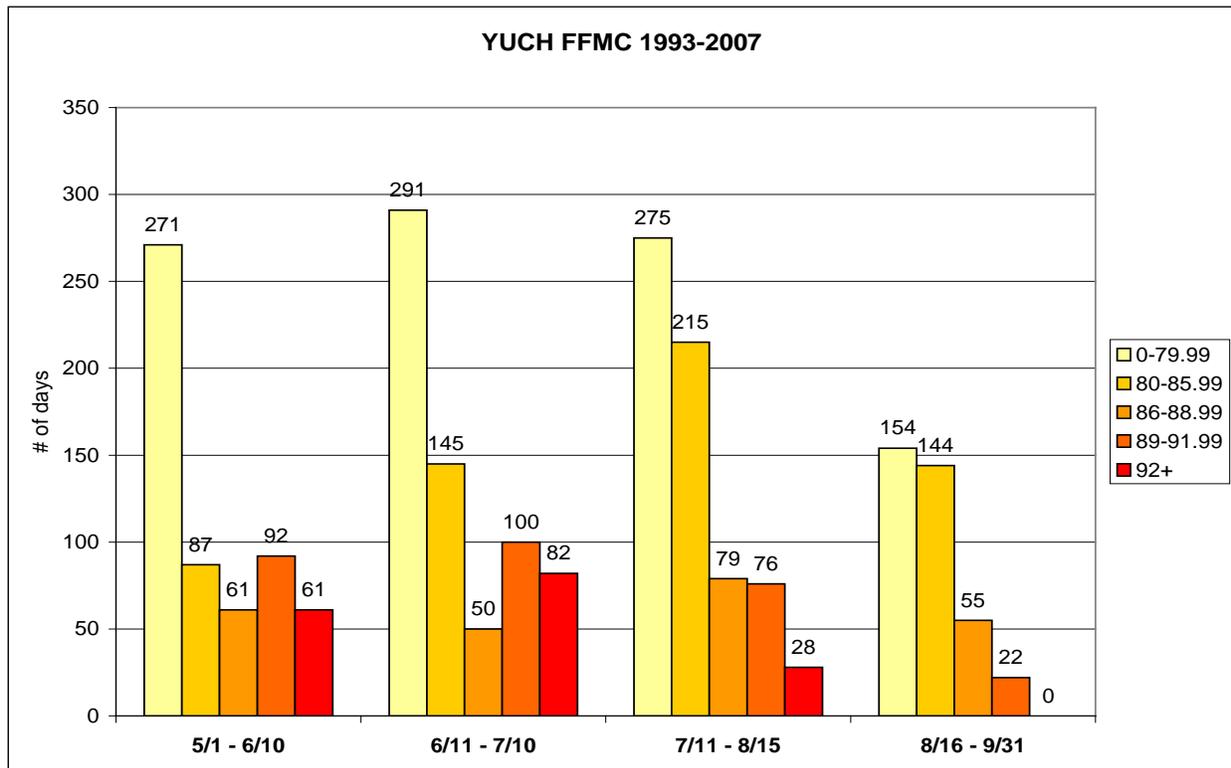


Figure 11: FFMC Values 1993-2007

### **April 1<sup>st</sup> through June 10<sup>th</sup> Green Up**

The first begins in late April or early May with the loss of snow cover, and ends in late May or early June when green-up begins. During the transition from 100% winter-cured fuels to green-up, ignitions are primarily due to human actions during this season. These fires are usually relatively easy to suppress due to high relative humidity recovery at night, cool day and night temperatures, and close proximity to roads, airstrips, and/or navigable water. Spring fires that are not suppressed, however, have the potential to grow later in the season as fuels become dryer.

Fire records indicate that since 1950 there have been 25 fires (15%) in YUCH during the Green Up season. Incidents which started in the Green up season have consumed 29.3% of all burned YUCH acres and averaged duration of 26 days. Lightning data, which began to be collected in 1986, shows that 12% occurred during this season.

### **June 11<sup>th</sup> through July 10<sup>th</sup> Transitional**

The second and third fire-cycle phases are primarily lightning driven. Suppression of such fires is harder, because of their occurrence in remote areas where detection and access are more difficult and because in turn more time typically passes between detection and initial attack. Fires occurring in June, the second period, usually do not develop the intensity of later summer fires; during hot, dry, and windy conditions, however, June wildland ignitions can result in extreme fire behavior.

Records show that the Transitional season has the most fire starts with 108, (65%) which have burned 51% of all acres. This is the peak season of lightning activity accounting for 49% of all strikes since 1986. The average duration of incidents decreases slightly; just over 24 days.

### **July 11<sup>th</sup> through August 15<sup>th</sup> Cumulative Drought**

The third period of fire activity begins in mid-July and runs through the first part of August. This is the period of maximum fire activity. The usual problems of accessibility and detection are compounded by increased rates of spread and higher fire intensities due to lower fuel moisture levels. Even with prompt initial attack, fires are often beyond immediate control by the time forces arrive, and indirect attack is often the only viable suppression strategy.

After the conversion date July 10<sup>th</sup> fire activity on YUCH has historically diminished. Records show that there have been 33 incidents during the Cumulative Drought season which account for 19% of the burned acres. There remain significant levels of lightning with 37% occurring. The average duration of incidents decreases slightly to 20 days.

### **August 16<sup>th</sup> through September 31<sup>st</sup> Diurnal Effect**

The final micro-season runs from late August into early September. Ignitions occurring during this period are usually caused by hunters and fishermen. These fires are generally easy to control except during particularly dry autumn weather.

The Diurnal Effect Season historically has less than 2% of the lightning and only one documented fire start for one tenth of an acre.

## **5. Historic Alterations of Fuel Regimes**

The Yukon Charley Rivers National Preserve lies within the boreal forest, which is often characterized by a combination of high intensity crown fires and severe surface fires covering large areas. Weather, fuels, and topography can combine to create these extremely large fires (Viereck 1983). Large-scale weather patterns are responsible for creation of conditions that control fire activity over these large areas (Johnson 1992, Cahoon and others 1994).

Over the last 400–500 years, the fire return interval in the boreal forest of Interior Alaska has been fairly stable at about 100 years (Mann and others 1995). That means, mathematically, that all parts of a large area (YUCH) would be expected to burn within 100 years. Some areas, however, would not burn at all during that time and areas with high lighting frequency, few natural barriers, and flammable fuel types would burn more than once (Mann and Plug 1999).

Examination of the YUCH fire history map shows that about 46% of the burnable acres (2,118,324 acres) of the 2,521,814 total YUCH acres have burned between 1950 and 2007 or 57 years. This information supports a fire cycle of 125 years, typical of the boreal forest.

The definition of Fire Regime Condition Class (FRCC) includes a qualitative measure describing the degree of departure from a reference (or historical) fire regime (see [www.frcc.gov](http://www.frcc.gov)). Severe departures, such as are evident in many areas of the contiguous United States as a result of 100 years of fire suppression, may result in alterations of key ecosystem components such as structural stage, stand age, canopy closure, and fuel loadings (GAO 2004). In Alaska, however, the relatively short period of fire suppression on YUCH (from the 1950's to 1984) may have caused a departure from the natural fire regime, but historical data are otherwise lacking. The effects of this period of fire suppression on the YUCH fire regime and the condition class are not well known, but it is believed that the vegetation attributes (i.e., the species composition and structure) remain intact on YUCH, and are functioning within the natural range.

Thus, the boreal forest in YUCH most likely remains within FRCC Condition Class 1, in which the fire regime remains within the natural range and the risk of losing key ecosystem components is low. The Fire Regime description for the boreal forest in YUCH best fits that of Group IV, with moderate frequency, stand replacement fires characterized by a 40 to 120 year fire return interval (GAO 2004). Fire management on YUCH is predicated on the assumption that the boreal forest is currently within the natural fire regime.

The large-scale alterations to the fuel regimes in the Preserve are the result of fire. There have been minimal large-scale alterations due to humans. Relatively small-scale alterations have occurred surrounding roadhouses, mining camps, and woodchopper cabins.

## **6. Control Problems**

Control and extinguishment problems are dependent on fuel type, fuel loading, weather, and time of year. Alaska has four distinct periods of fire activity with different control and extinguishment problems associated with each.

#### **a. Spring Green-up**

Ignitions during spring green-up are usually wind driven surface fires that are relatively easy to control and extinguish using direct attack tactics. High winds can cause high rates of spread and control may be more difficult. These fires are mostly limited to fine fuels directly exposed to solar radiation, humidity, wind, and precipitation (i.e. grass). This period is typically from April 1 to June 10.

#### **b. Transitional**

Ignitions during this time are typically more difficult to control as hand-constructed firebreaks are likely to be challenged. Fire behavior is more strongly influenced by the DMC as fuels are able to dry to a lower depth of the duff layer. Water under pressure (i.e. fire pumps with hose lays) and aerial support (i.e. medium helicopter with bucket) may be required for effective action at the fire's head. This period is typically from June 11 to July 10.

#### **c. Cumulative Drought**

Initial ignitions during this time and carryover fires from the previous period are most difficult to control and extinguish and may require indirect attack, aerial firing, and the use of natural barriers. Direct attack upon the head is difficult and dangerous. Direct suppression actions must adhere to standard tactics of "Anchor Flank and Pinch". Indirect attack with aerial ignition, if available, may be effective depending on the fire's forward rate of spread. Extinguishment may be difficult particularly in the conifers and mixed woods due to the deep, dry organic matter. This period is typically from July 11 to August 15.

#### **d. Diurnal Effect**

Ignitions during this period are easier to suppress due to the reduced daylight which allows the relative humidity to recover and results in a shorter burning period. FFMCs are available to burn less than 10 hours per day. These fires are limited to fine fuels directly exposed to solar radiation (i.e. grass). Smoldering and creeping from large fires from the previous periods may still be evident. This period is typically from August 16 to September 31.

## **IV. WILDLAND FIRE MANAGEMENT PROGRAM COMPONENTS**

### **A. Fire Fighter and Public Safety**

All actions defined in the Fire Management Plan will conform to safety policies defined in agency and departmental policy, including, but not limited to: *Interagency Standards for Fire and Aviation Operations* (NFES 2724), *NPS Director's Order 18*, and *NPS Reference Manual 18, Chapter 3, Standards for Operations and Safety*.

Specific Aviation Policy regarding YUCH may be located on the National Park Service FAC Server at : *I:\AVIATION\Aviation\_Plans\EAFM\_Aviation\_Operating\_Plan*.

Specific information regarding Aviation Mishaps may be located on the National Park Service FAC Server at: *I:\AVIATION\Mishap\_Response\_Plans\EAFM\_Aviation\_Mishap\_Response\_Plan\_2008*

Hard copies are available at the Fairbanks Administrative Center 4175 Guest Road.

Firefighter and public safety is our first priority. This Fire Management Plan and the activities defined within reflect this commitment. The commitment to and accountability for safety is a joint responsibility of all firefighters, managers and administrators. Individuals must be responsible for their own performance and accountability. Every supervisor, employee and volunteer is responsible for following safe work practices and procedures, as well as identifying and reporting unsafe conditions. All firefighters, fireline supervisors, fire managers and agency administrators have the responsibility to ensure compliance with established safe firefighting practices.

### **B. Air Quality and Smoke Management**

All fire management actions at Yukon-Charley Rivers National Preserve will be conducted in full compliance with local, state, and interstate air pollution control regulations as required by the Clean Air Act, 42 U.S.C. 7418. The Alaska Department of Environmental Conservation issues open burning permits; no local or interstate air pollution control regulations exist in Alaska. A Simple Approach Smoke Estimation Model (SASEM) analysis (or equivalent) will be performed prior to all prescribed fires and will be utilized as needed during wildland fires (as determined by the Ak Eastern Area FMO). During all wildland fire activities smoke will be monitored for trajectory, mixing height, and impact to overall air quality. The Preserve is designated as a federal "Class II" air shed. Air quality would be affected in the short-term during any type of ignition event.

### **C. General Implementation Procedures**

Yukon Charley Rivers National Preserve Fire Management is responsible for ensuring that each wildfire incident occurring within YUCH boundaries is documented and analyzed using the Wildland Fire Decision Support System (WFDSS). Pre-planned responses will be addressed following AIWFMP guidelines and each incident will be re-assessed as necessary. Any suppression action on a wildfire incident requires the Eastern Area FMO or the Agency Administrator to complete the following.

## 1. Decision Support

### a. Wildland Fire Decision Support System (WFDSS)

National Park Service policy mandates that the WFDSS be completed for **all** Wildland fires. The AK Eastern Area FMO will ensure that the objectives and costs associated with any action taken on a wildland fire are documented in WFDSS. WFDSS is a decision support system developed to assist fire managers by providing risk assessment, cost analysis, fire behavior information and models, weather information and various other tools to assist in the decision making process. The Agency Administrator is ultimately responsible for documenting objectives and subsequent decisions for a wildfire incident in WFDSS. Alternatives can also be analyzed that are simultaneously aimed at both resource benefit *and* protection. The program provides a framework for thorough documentation of the fire situation from the initial report until it is declared out. WFDSS is described further in [Appendix H](#) and on the WFDSS website at <http://wfdss.usgs.gov>.

### b. DI-1202

The 1202 is the standard format for submission of fire data. Data is entered at <https://www.nifc.blm.gov/cgi/nsdu/FireReporting.cgi>. On YUCH incidents an initial 1202 will be prepared by the Incident Commander and submitted by the Alaska Fire Service. The AK Eastern Area Fire Management Officer, however, will ensure the preparation and entry of an additional 1202 on behalf of the Preserve. The following items are pertinent to the production of the 1202; the AK Eastern Area FMO will ensure that these items are retained and filed at the Yukon-Charley/Gates of the Arctic office in Fairbanks.

- Fire number (obtained from Upper Yukon zone dispatch)
- Copy of WFDSS documents applicable.
- Resource order forms (NFES 1470)
- Equipment rental or purchase receipts
- Accident and/or injury reports
- Personnel lists (including Emergency Time slips)
- All weather data reports and records
- Situation maps
- Rehabilitation plan

## 2. Fire Management Components

### a. Limited

Federal and NPS policy requires that the following elements be in place before **Limited** or **Modified** Management Options are implemented: 1) an approved Fire Management Plan; 2) appropriate environmental/subsistence compliance; 3) pre-established Fire Management Units; 4) prescription for implementation including a natural ignition; and 5) management oversight. As defined in the *Department of the Interior's Department Manual, Part 620, Chapter 1, Section 1.3K*, the above-mentioned prescriptions will be based on "safety, public health, environmental, geographic, administrative, social or legal considerations." Geography comprises the primary prescriptive variable at Yukon-Charley; FMUs consist of extensive tracts of fire-dependent ecosystems, with relatively low numbers of resources to be protected.

As specified in the GMP and RMP, the Preserve's resource management objectives include the preservation of fire within its natural role whenever safely possible. Naturally occurring fires that do not threaten life or property offer an opportunity for the accomplishment of this objective; accordingly, wildland may be allowed to burn to accomplish resource benefit. Within the Limited and Modified Protection FMUs fire often poses little if any threat to sensitive or valued resources. Consequently, the detection of ignitions within this FMU will automatically trigger a limited response unless the Agency Administrator specifies otherwise. Ignitions within the Modified (prior to the conversion date) and Full Protection FMUs will trigger suppression actions. A full range of options, however, will remain available in these FMUs as an alternative response upon the request of the Agency Administrator.

Selection and formulation of all responses, including Limited or Modified response to wildfire, will be accomplished through WFDSS as described in Sections 4 through 9, below.

### b. Objectives

The primary objective for Limited or Modified FMUs at YUCH is to maintain the area's bio-diversity through the use of fire (including the naturally occurring spectrum of fire intensities and effects) while also ensuring the safety of life, property, and sensitive resources. Another important objective for wildland fire managed for resource benefits is the cost-effective reduction of hazardous-fuel loads.

### c. General Plan

**Limited** and **Modified** Management Options at YUCH are predicated upon the annual establishment and/or adjustment of appropriate boundaries and management options for the Preserve's FMUs. Each winter the AK Eastern Area FMO meets with Preserve staff members and fire management personnel from the AFS Upper Yukon Zone to re-evaluate the location and categorization of these units. Final authority for the adjustment of FMUs and/or fire protection categories within the Preserve rests with the YUCH Superintendent.

The FMU descriptions contained within this plan specify pre-planned management actions, to be enacted automatically by Upper Yukon - Tanana Zone dispatch. Alternative actions, however, may be considered and/or selected by the Agency Administrator on a case-by-case basis, as determined by

current fuel, weather, and fire management conditions and as dictated by NPS policy and the Preserve FMP.

#### **d. Responsibility for Initiation of Decision Process**

NPS policy requires that strategies for all wildland fires on NPS lands are analyzed and documented using WFDSS. Ignitions occurring in YUCH initiate pre-planned responses, specified by FMU parameters and implemented by zone dispatch (and/or the Incident Commander) on the authority of the AIWFMP and the YUCH Fire Management Plan. In the case of pre-planned response, the initial information is entered into WFDSS by the Upper Yukon-Tanana Zone dispatch which includes recording the ignition detection and determination of the incident location. The Preserve's FMU parameters also allow the implementation of non-standard response upon selection by the YUCH FMO or Agency Administrator, in consultation with UYD FMO. The Agency Administrator or YUCH FMO will be responsible for initiating WFDSS for any non-standard responses and will ensure approval of a decision before action is taken. Any suppression response in **Limited** and **Modified** (after conversion date) Protection FMUs will be considered a *non-standard response* and will require decision approval and documentation.

#### **e. Staffing Requirements for Limited Response**

The Preserve has no specific requirements for staffing. Because of the relative scarcity of structures or other sensitive values within portions of the Preserve, most incidents may often be adequately managed through aerial surveillance every few days; as dictated by need other incidents may demand the continuous presence of monitors or fire behavior analysts. The Agency Administrator will make final staffing decisions for all YUCH wildland fires managed fully or in part for resource benefit.

#### **f. Monitoring Limited Response**

Monitoring procedures at YUCH will follow guidelines established by Preserve staff as well as the Alaska Fire Effects Working Group. Monitoring actions conducted at YUCH specifically in support of limited response incidents will whenever possible include measurement of fuel moisture levels for subterranean fuels (as represented by the subterranean fuel models of the Canadian Forest Fire Danger Rating System, for instance) as well as for traditional fine and heavy fuel models. (See Chapter VI for a description of the Preserve's short and long-term fire monitoring program.)

#### **g. Limited Response Step-up Staffing**

See Chapter IV Section E Unit 3 for step-up staffing.

#### **h. Pre-determined Implementation Procedures for Limited Response**

The FMU parameters described within this plan (and adjusted annually) comprise the only pre-determined implementation procedures for Limited Response at YUCH. Wildland Fire Decision documents will be generated in WFDSS by the Eastern Area Fire Management Officer as needed, and provided to the Agency Administrator.

**i. Incident-Specific Implementation Procedures for Limited and/or Modified Response**

Agency Administrators and/or YUCH Fire Management, in consultation with the UYD FMO, will use WFDSS for analysis of any escalating wildland fire incident. The *pre-planned response* for Limited FMUs is for no suppression action to occur. For pre-planned responses within the Preserve, the Upper Yukon zone dispatch office records the initial detection and determination of the incident location. In the case of Limited Response, the WFDSS Response Level is always a Level 1. If it is determined, through periodic assessment, that fire complexity is increasing, management responses need to change correspondingly. Objectives may change throughout an incident for various reasons, and any new objectives or decisions that develop will be analyzed by the AK Eastern Area FMO or Agency Administrator. Changes in Response Level require analysis of Complexity Level and approval for decisions. All decisions or changing objectives will be documented in WFDSS. In the case of Limited Protection area, a Response Level 1 will rise to a Response Level 2 when the Agency Administrator determines that additional resources are necessary to accomplish objectives.

An analysis must be completed for all escaped fires that extend into the next burning period. The decision making process requires the following steps: a) identification of evaluating criteria that reflect land and resource management objectives, potential suppression costs, potential damage to natural rescues, safety, and other concerns; b) development of suppression strategies in sufficient numbers to represent a reasonable range of alternatives for the situation; and c) analysis of suppression alternatives addressing the evaluation criteria and other significant economic, environmental, political and social concerns. A summary of decision support actions in WFDSS that will assist Fire Management in determining changes in Response Levels is outlined below in Table 10.

**Table 10: Response Level Matrix (WFDSS).**

Many of these are recommended and not required.

	<b>Response Level 1</b>	<b>Response Level 2</b>	<b>Response Level 3</b>
<b>Suggested Incident Complexity</b>	Initial Attack or Initial decision to manage fire partially or only for resource benefit covered in pre-planned response from YUCH Annual Operating Plan or fire management plan (A course of action may be needed to manage an unplanned ignition for the single objective of resource benefit or multiple objectives which include resource benefit especially if incident spans more than one burn period and course of action is not covered in the pre-planned response = move to RL2)	Extended Attack; Short term durations; Resource benefit objectives; Short to long-term durations; All types of incident management organizations	Mid to long-term duration; All types of incident management organizations
<b>Documentation Required</b>	Minimal Documentation if following pre-planned response from Fire Management Plans <b>Decision document</b> -(DAR-Decision Analysis Report) required for Resource Benefit Fires	<b>More Documentation</b> Things to Consider: • Fire Behavior Models • Values Inventory • Relative Risk / Response Level Charts • Resource availability to Complete Course of Action • Cost & how cost was developed	<b>Most Documentation</b> Things to Consider: • Long term fire • Expense • Need to evaluate fire environment values and the landscape • More modeling • More detailed rationale documents • Are the resources available to achieve the decision objectives? <b>Things to Include:</b> • Fire Behavior Models • Values at Risk • Relative Risk / Response Level C

			<ul style="list-style-type: none"> <li>Resources availability to Complete Course of Action</li> <li>Cost &amp; how cost was developed</li> </ul>
<b>Agency Administrator Signature Required</b>	<b>It Depends –</b> -Is the pre-planned response followed? If so, <b>No</b> signature required -Is there a decision made to suppress a fire or monitor for resource benefit? If so, <b>Yes</b> signature required	YES	YES
<b>Information Mandatory Inputs</b>	-Incident Name -Coordinates -Geographic Area -Affected Jurisdictions -Fire Number -Incident Start -Date and Time -Incident Size -Incident Cause -Landscape Source	<b>See Response Level 1</b> Update inputs as necessary – Incident Size	<b>See Response Level 1</b> Update inputs as necessary – Incident Size
<b>Situation Assessment Tools Available -Within WFDSS</b>	-Location map -Fire Wx Forecast -Fire Danger ERC-G -Fuels Information -Values Inventory -Strategic Objectives/ Management Requirements Entered by the Data Manager -Basic (BFB) and Short-Term Fire Behavior (STFB)	<b>Can be included in the Decision Document</b> -Location map -Fire Wx Forecast -Fire Danger ERC-G -Fuels Information -Values Inventory -Strategic Objectives/ <b>Management Requirements</b> Entered by the Data Manager -Basic (BFB) and Short-Term Fire Behavior (STFB) - FSPro	<b>Should be included in the Decision Document</b> -Location map -Fire Wx Forecast -Fire Danger ERC-G -Fuels Information -Values Inventory -Strategic Objectives/ <b>Management Requirements</b> Entered by the Data Manager -Basic (BFB) and Short-Term Fire Behavior (STFB) - FSPro
<b>Situation Assessment Tools -Outside of WFDSS</b>	-Relative Risk Chart -Response Level chart	-Relative Risk Chart -Response Level chart -Constructed Cost -FARSITE -FlamMap	-Relative Risk Chart -Response Level chart -Constructed Cost -FARSITE -FlamMap
<b>Objectives</b>	-Following Pre-Planned Response from FMP / AOP	-Strategic Objectives and Management Requirements pre-loaded by Fire Management Unit -Develop Incident Objectives and Requirements tiered from Strategic Objectives and Management Requirements	-Strategic Objectives and Management Requirements pre-loaded by Fire Management Unit -Develop Incident Objectives and Requirements tiered from Strategic Objectives and Management Requirements
<b>Course of action</b>	-Following Pre-Planned Response from FMP / AOP	-Develop Strategic Direction for the Course of Action (COA) tiered from the Incident Objectives and Requirements -Can Consider Management Action Points (MAPs) if appropriate-see MAPs below	-Direction for the Course of Action (COA) tiered from the Incident Objectives and Requirements -Consider Management Action Points (MAPs)-see MAPs below
<b>Validation</b>	-Is your pre-planned response successful? <b>Yes or No</b> -If yes, you are done -If no, you need to move to RL2 and need to develop a course of action and complete a decision document	-Submenu tab – Summary of your quantitative support of your COA <b>In the Decision Doc Include:</b> -Quantitative support of your decision <ul style="list-style-type: none"> <li>Constructed cost</li> <li>Relative Risk Chart</li> <li>Response Level Chart</li> <li>Fire Behavior Models</li> </ul>	-Submenu tab – Summary of your quantitative support of your COA <b>In the Decision Doc Include:</b> -Quantitative support of your decision <ul style="list-style-type: none"> <li>Constructed cost</li> <li>Relative Risk Chart</li> <li>Response Level Chart</li> <li>Fire Behavior Models</li> <li>Resource Availability to support</li> </ul>

		<ul style="list-style-type: none"> <li>• Resource Availability to support COA</li> </ul>	
<b>DECISION</b>	<p>-Did you have to decide on whether to fully suppress a fire or manage it for resource benefit?</p> <p>-If no, you are done</p> <p>-If yes, you need to document your COA and decision.</p>	<p>The Decision is required of the Agency Administrator (AA). The AA needs to approve the decision here to publish the decision document.</p> <p><b>Decision Content</b></p> <p>-<b>Assessment</b> – Auto populates with Incident information and planning area fire weather forecast</p> <p>-<b>Objectives</b> – automatically pulls in all included strategic Objectives, Management Requirements, Incident Objectives and Incident requirements</p> <p>-<b>Course of Action</b> – automatically pulls in all included Strategic Direction</p> <p>-<b>Validation</b>- Users Include</p> <p>-Quantitative support of your decision</p> <ul style="list-style-type: none"> <li>• Constructed cost</li> <li>• Relative Risk Chart</li> <li>• Response Level Chart</li> <li>• Fire Behavior Models</li> <li>• Resource Availability to support COA</li> </ul> <p>-<b>Rationale</b> – Qualitative discussion to support decision.</p> <p>Things to consider:</p> <ul style="list-style-type: none"> <li>• Social Issues</li> <li>• Political Issues</li> <li>• Resource Issues</li> <li>• Intangible values &amp; issues</li> </ul>	<p>The Decision is required of the Agency Administrator (AA). The AA needs to approve the decision here to publish decision document.</p> <p><b>Decision Content</b></p> <p>-<b>Assessment</b> – Auto populates with Incident information and planning area fire weather forecast</p> <p>-<b>Objectives</b> – automatically pulls in all included strategic Objectives, Management Requirements, Incident Objectives and Incident requirements</p> <p>-<b>Course of Action</b> – automatically pulls in all included Strategic Direction</p> <p>-<b>Validation</b>- Users Include</p> <p>-Quantitative support of your decision</p> <ul style="list-style-type: none"> <li>• Constructed cost</li> <li>• Relative Risk Chart</li> <li>• Response Level Chart</li> <li>• Fire Behavior Models</li> <li>• Resource Availability to support COA</li> </ul> <p>-<b>Rationale</b> – Qualitative discussion to support decision.</p> <p>Things to consider:</p> <ul style="list-style-type: none"> <li>• Social Issues</li> <li>• Political Issues</li> <li>• Resource Issues</li> <li>• Intangible values &amp; issues</li> </ul>
<b>Periodic Assessment</b>	<p>Follow agency guidance on the number of days between assessments for Resource Benefit Fires. No need on IA Fires were there is full suppression.</p>	<p>-Approver fills out assessment</p> <p>-Comments for “Current Decision Valid” are not required, however are a good way to keep track of upcoming issues that may require a new decision (i.e., weather event , ERCs, cost, fire size)</p> <p>-Comments are required for “New Decision Required”</p> <p><b>-Periodic Assessment is required until an incident is declared out.</b></p>	<p>-Approver fills out assessment</p> <p>-Comments for “Current Decision Valid” are not required, however are a good way to keep track of upcoming issues that may require a new decision (i.e., weather event , ERCs, cost, fire size)</p> <p>-Comments are required for “New Decision Required”</p> <p><b>-Periodic Assessment is required until an incident is declared out.</b></p>
<b>Reports</b>	View as needed	View as needed	View as needed

## **j. Permanent Project Records for Limited Response**

The AK Eastern Area FMO will ensure that a complete project record will be produced and retained for each **Limited Response** incident at the Preserve. Each record will contain the following items:

- All approved planning documents guiding management options (WFDSS).
- Summary of monitoring activities, including monitoring schedule; individual monitoring reports and findings.
- Funding codes and cost accounting.
- Project maps.
- Other information as appropriate (e.g. photo points).

## **k. Information and Interpretation for Limited and Modified FMUs**

The information and interpretation component of the Preserve's fire management program is specifically addressed in Chapter IX. The following objectives, however, pertain directly to **Limited Response**:

- When extended **Limited Response** incidents are likely to be visible to visitors, Preserve personnel will prepare and distribute handouts explaining the YUCH fire management program, the nature of the specific incident, and the desirability of preserving the area's natural fire regime.
- An attempt will be made to educate all YUCH employees about local fire ecology, the Preserve's fire management objectives, and in-progress fire-use incidents.
- When **Limited Response** incidents occur near frequently used locations, interpreters or other Preserve employees will make periodic visits to answer questions.

## **l. Potential Impact of Limited or Modified FMUs**

In managing **Limited Response** incidents for resource benefit, YUCH administrators will take into account both the short and long-term impacts of any such activity upon all facets of Preserve use, including subsistence activity. Although some local residents have expressed concern over the impact of wildland fire upon subsistence hunting and/or trapping operations at YUCH, the preservation of the area's fire regime is important to the long-term viability of the Preserve's wildlife populations. Nonetheless, the Agency Administrator will in all cases consider the short-term impact of fire-use actions on subsistence activities.

## **D. Wildland Fire Suppression**

### **1. Range of Potential Fire Behavior**

Fire behavior in the Preserve can range from creeping subterranean fire in tundra to fast moving ground or canopy fire in surface fuels or spruce stands. For more detailed discussion refer to Fuel Characteristics and Fire Behavior (Chapter III Section F).

**2. Preparedness Actions**

**a. Fire Prevention Actions**

- Fire prevention and wildland fire managed for resource benefits will be discussed at selected staff safety meetings in the early spring to ensure that all personnel are aware of concerns and familiar with procedures for wildland fire, and prescribed fire.
- A brochure discussing campfire use will be included in all correspondence requesting information about the Preserve.
- Preserve personnel will participate in fire prevention and safety fairs at local schools so that the general public is aware of the importance of fire prevention.
- During periods of high danger, the general public and Preserve visitors will be informed of conditions through press releases, interpretive media and, if necessary, the posting of signs at Preserve headquarters, public-use cabins, etc.

**b. Staff readiness:**

The AK Eastern Area FMO will oversee the annual certification, training, and evaluation of YUCH personnel involved in fire management activities, in accordance with the timetable shown in Table 10:

<p><b>January-February</b></p> <ul style="list-style-type: none"> <li>• Triennial physical exams completed (for returning employees).</li> </ul>
<p>March-April</p> <ul style="list-style-type: none"> <li>• Fire qualifications updated and entered into Incident Qualifications and Certification System (IQCS).</li> </ul>
<p>May</p> <ul style="list-style-type: none"> <li>• Annual wildland fire refresher training for all red-carded personnel.</li> <li>• Annual pack tests administered, as per NPS-18 standards.</li> <li>• Fire personnel status updated in ROSS</li> <li>• NWCG courses in Fairbanks for fire crew members.</li> </ul>
<p>September</p> <ul style="list-style-type: none"> <li>• Critique fire season (all fire management activities).</li> <li>• Evaluate individual performance of Preserve staff; correct deficiencies and nominate personnel for specific training courses.</li> </ul>

**Table 11: Staff Readiness Schedule**

**c. Program readiness**

The AK Eastern Area FMO will ensure the accomplishment of the following objectives each winter:

- Inventory fire equipment; order needed supplies and update inventory list.
- Review and confirm established Preserve and/or Regional procedures for utilizing fire-related accounts.
- Review and adjust FMU parameters (i.e. AIWFMP protection categories).
- Review and revise YUCH Fire Management Plan.

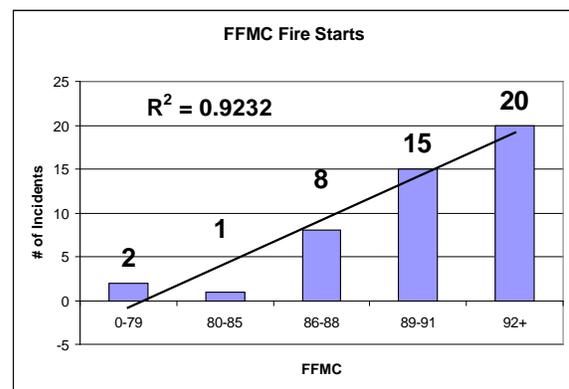
**3. Step-up Staffing and Pre-Attack Plan**

The Yukon Charley Rivers National Preserve fire step up plan will be in operation from approximately May 15<sup>th</sup> through August 15<sup>th</sup> every year. During years of unusual drought or wetness, starting and ending dates of the fire step up plan may be adjusted in writing by the AK Eastern Area FMO and approved by the Superintendent. As required by NPS Reference Manual 18 this plan will be revised on an annual basis. Minor revisions may be made to the plan in writing during the fire season if a revision better meets YUCH staffing needs. This need will be determined by the AK Eastern Area FMO and approved by the superintendent or the Chief of Resources.

The YUCH fire step up plan is based on the Fine Fuel Moisture Code in conjunction with the Lightning Activity Level. The FFMC is a component of the CFFDRS and represents the moisture of litter and other cured fine fuels in a closed forest stand. The Lightning Activity Level is the measure of the lightning activity. For the fire step up plan, staffing level determinations will be based upon the predicted FFMC observations for the BEN Creek Remote Automated Weather Station (RAWS) station ID 500414. Or other designated site as approved by the AK Eastern Area FMO.

FFMC	Fires
Low 0-80	2
Moderate 81-85	1
High 86-88	8
Very High 89-91	15
Extreme 92+	20

**Table 12: FFMC Values for Fire Ignitions 1993-2007**



**Figure 12: FFMC Fire Ignitions 1993-2007**

The FFMC values in Table 14 will be used for the purpose of defining the Step Up Staffing Level. Fire records indicate that 95% of all fire days (day where there is a fire start), 92% of all large fire days (defined as fires over 10 acres) and 100% of all multiple fire days (defined as days where there is more than one fire start) are on days where the FFMC has a value of “High”, “Very High” or “Extreme.”

The AK Eastern Area FMO will make sure that the weather (Wx) data is collected and a determination of the staffing level for the next day may be made. At 1400 each day, the Ben Creek RAWS (or other weather station designated by the Eastern Area FMO) will produce the current FFMC and a predicted FFMC for the following day. The Fire Weather Forecast for Fire Weather Zone 224 will provide the predicted LAL.

The AK Eastern Area FMO will use Table 15 Complexity Level to evaluate the predicted Fire Indices with the current number of fires. The complexity level is then evaluated against the Preparedness Level Table 16. The generated Preparedness Level is then applied to the appropriate Staffing Level.

**Staffing Level 1: Low**

FFMC 0-80

And

**Staffing Level 2 Moderate**

FFMC 81-85

Preparedness Level Table 15 has generated a “Moderate” or “Low” rating.

Fire personnel will work normal tour of duty hours and are required to have their fire packs and personal protective equipment immediately available. Fire personnel will monitor pertinent radio channels throughout the day.

The contract helicopter and two fire staff will be available within the state for response. Either AFS or YUCH fire staff will fly surveillance flights at the discretion of the AK Eastern Area FMO.

If the predicted LAL is a 4, 5 or 6 the staffing level may be moved up at the discretion of the AK Eastern Area FMO (per RM 18)

If a high visitation period is determined to pose exceptional human caused risk of wildland fire, the staffing level may be moved to a level 4 by the AK Eastern Area FMO (per RM 18)

If a “Red Flag Warning” has been issued by the National Weather Service, the staffing level may be moved to a level 5 by the AK Eastern Area FMO (per RM 18).

If the Preparedness Level Table 15 generates a “High”, “Very High” or “Extreme” rating, the staffing level may be moved up at the discretion of the AK Eastern Area FMO.

**Staffing Level 3: High**

FFMC 86-89 and

LAL 4, 5 or 6

Preparedness Level Table 15 has generated a “High” rating.

Fire personnel will status themselves with the AK Eastern Area FMO by 0900.

Fire personnel will work normal tour of duty hours and are required to have their fire packs and personal protective equipment immediately available. Fire personnel will monitor pertinent radio channels throughout the day.

The contract helicopter and two fire staff will be available within the state for response. Either AFS or YUCH fire staff will fly surveillance flights at a minimum of once per week.

If the predicted LAL is a 4, 5 or 6 the staffing level may be moved up at the discretion of the AK Eastern Area FMO (per RM 18)

If a high visitation period is determined to pose exceptional human caused risk of wildland fire, the staffing level may be moved to a level 4 by the AK Eastern Area FMO (per RM 18)

If a “Red Flag Warning” has been issued by the National Weather Service, the staffing level may be moved to a level 5 by the AK Eastern Area FMO (per RM 18).

Campfires will only be allowed in approved / designated campgrounds or work areas.

If the Preparedness Level Table 15 generates a “Very High” or “Extreme” rating, the staffing level may be moved up at the discretion of the AK Eastern Area FMO.

#### **Staffing Level 4: Very High**

FFMC 90-91 and  
LAL 4, 5 or 6

Preparedness Level Table 15 has generated a “Very High” rating.

Fire personnel will status themselves with the AK Eastern Area FMO by 0900.

Fire personnel will work normal tour of duty hours and are required to have their fire packs and personal protective equipment immediately available. Fire personnel will monitor pertinent radio channels throughout the day. Extended staffing of fire and other preserve red carded personnel will be determined by the AK Eastern Area FMO by 1600. Extended staffing will generally be until the end of the burning period, but can be modified at the discretion of the Ak Eastern Area FMO. Funding for extended staffing will be established through the appropriate emergency account.

Red Carded personnel working extended hours may be required to report to the Alaska Fire Service helibase by 1645. Personnel will be required to wear fire boots and Nomex and have their fire packs and personal protective equipment with them.

The contract helicopter and two fire staff will be available within the preserve. UYD FMO will be contacted daily for tactical and resource updates. Either AFS or YUCH fire staff will fly surveillance flights at a minimum of every other day.

If the predicted LAL is a 4, 5 or 6 the staffing level may be moved up at the discretion of the AK Eastern Area FMO (per RM 18). AK Eastern Area FMO will contact UYD FMO to discuss detection flights.

If a high visitation period is determined to pose exceptional human caused risk of wildland fire, the staffing level may be moved to a level 5 by the AK Eastern Area FMO (per RM 18)

If a “Red Flag Warning” has been issued by the National Weather Service, the staffing level may be moved to a level 5 by the AK Eastern Area FMO (per RM 18).

Campfires will only be allowed in approved / designated campgrounds or work areas...

If the Preparedness Level Table 15 generates an “Extreme” rating, the staffing level may be moved up at the discretion of the AK Eastern Area FMO.

**Staffing Level 5: Extreme**

FFMC 92+ and

LAL 4, 5 or 6

Or

RED FLAG WARNING

Preparedness Level Table 15 has generated an Extreme rating.

Fire personnel will status themselves with the AK Eastern Area FMO by 0900.

Fire personnel will work normal tour of duty hours and are required to have their fire packs and personal protective equipment immediately available. Fire personnel will monitor pertinent radio channels throughout the day. Extended staffing of fire and other preserve red carded personnel will be determined by the AK Eastern Area FMO by 1600. Extended staffing will generally be until the end of the burning period, but can be modified at the discretion of the AK Eastern Area FMO. Funding for extended staffing will be established through the appropriate emergency account.

Red Carded personnel working extended hours may be required to report to the Alaska Fire Service helibase by 1645. Personnel will be required to wear fire boots and Nomex and have their fire packs and personal protective equipment with them.

The contract helicopter and two fire staff and the FMO (or delegated representative) will be available within the preserve. UYD FMO will be contacted daily for tactical and resource updates. Either AFS or YUCH fire staff will fly surveillance flights every day.

Fire personnel will generally restrict physical activities to enable rapid response time.

If the predicted LAL is a 4, 5 or 6 the staffing level may be moved up at the discretion of the AK Eastern Area FMO (per RM 18). AK Eastern Area FMO will contact UYD FMO to discuss detection flights.

All open campfires within YUCH are banned. Only self contained gas stoves, self contained charcoal barbecues and preserve provided cooking grill will be permitted at designated campgrounds and work areas.

## Complexity Level:

The AK Eastern Area FMO and fire staff is responsible for Yukon-Charley Rivers, Wrangell-St. Elias, and Gates of the Arctic National Parks and Preserves. The following matrices will be used to assist in the pre-positioning of personnel in these units.

Fire Indices	0-3 fires	3-6 fires	6+ fires
FFMC 0-80	Low Complexity Level	Low Complexity Level	Low Complexity Level
FFMC 80-85	Low Complexity Level	Low Complexity Level	Moderate Complexity Level
FFMC 86-90 LAL 4, 5 or 6	Low Complexity Level	Moderate Complexity Level	High Complexity Level
FFMC 89-91 LAL 4, 5 or 6	Moderate Complexity Level	High Complexity Level	Very High Complexity Level
FFMC 92+ LAL 4, 5 or 6	High Complexity Level	Very High Complexity Level	Extreme Complexity Level

**Table 13: Complexity Level**

**Number of Current Fires** – A measure of complexity due to the number of fires within the park regardless of the FMU that is burning. This is also an indication of suppression or monitoring resource shortages.

**Low:** Few fires within the Preserve and relatively abundant resources available within the Upper Yukon Zone. May be early or late in the year and fire behavior is reduced and control and extinguishment are relatively easy.

**Moderate:** Several fires within the Preserve and relatively abundant resources available within the Upper Yukon Zone. Fires are difficult to extinguish and carryover fires are occurring.

**High:** Several fires within the Preserve and resources are becoming scarce within the Upper Yukon Zone. Fires are difficult to control and extinguish with multiple carryover fires occurring.

**Very High:** Many fires within the Preserve and resources are becoming scarce within the state of Alaska. Fires are difficult to control and extinguish with multiple carryover fires occurring.

**Extreme:** Many fires within the Preserve and there are **no** additional resources available within the state of Alaska. Fire activity is beyond the ability to control or mitigate and tactics are strictly point source protection around values at risk.

#### 4. Preparedness Levels

**Values at Risk:** These values include life and property including historically significant sites. The low values at risk are those under non-sensitive protection. The medium values at risk are those under full protection. The high values at risk include sites that are under critical protection (see Chapter XI Section A. Protection of Sensitive Resources for criteria for protection levels).

	Low Value at Risk	Moderate Value at Risk	High Value at Risk
Low Complexity Level	Low Preparedness Level	Low Preparedness Level	Moderate Preparedness Level
Moderate Complexity Level	Low Preparedness Level	Moderate Preparedness Level	High Preparedness Level
High Complexity Level	Moderate Preparedness Level	High Preparedness Level	Very High Preparedness Level
Very High Complexity Level	High Preparedness Level	High Preparedness Level	Extreme Preparedness Level
Extreme Complexity Level	High Preparedness Level	Very High Preparedness Level	Extreme Preparedness Level

**Table 14: Preparedness Level**

#### 5. Minimum Impact Suppression Tactics

It is the policy of the National Park Service that all fire management activities will be executed using minimum impact suppression guidelines. Accordingly, the following constraints apply to all fire management activity at Yukon-Charley Rivers National Preserve:

- Use water rather than retardant whenever possible; when retardant is necessary, use fugitives if available and avoid as much as possible the use of any retardant in or around lakes or marshes.
- Use cold-trailing or wet-lining techniques when feasible.
- Utilize soaker hoses or foggers in mop-up; avoid “boring” or other scaring hydraulic actions.
- Dozers and other heavy equipment will be used only with the approval of the Superintendent (or delegate), except in life-threatening circumstances.
- Minimize the falling of trees and the cutting of shrubs; limb vegetation adjacent to fireline only as needed to prevent additional fire spread.

#### 6. Rehabilitation

Fire lines will be rehabilitated to stabilize the burn area and to mitigate the effects of suppression activities. The Agency Administrator will ensure that the Incident Commander consults with natural resource managers as needed, regarding any specific rehabilitation needs. When possible, burned areas will be allowed to regenerate naturally.

#### E. Response to Wildland Fire

Most of the land within YUCH lies in a Limited Protection FMU. Natural ignitions in this FMU will be managed for the purpose of preserving fire within its natural role within the ecosystem.

Prescribed fire may be implemented to accomplish resource management goals or to restore historical conditions.

## **F. Fuels Management**

The fuels management program will implement fire management policies and help achieve resource management and fire management goals as defined in: (1) *Federal Wildland Fire Management Policy and Program Review*, including the recently released *Guidance for Implementation of Federal Wildland Fire Management Policy (February 13, 2009)*, (2) *Managing Impacts of Wildfires on Communities and the Environment, and Protecting People and Sustaining Resource in Fire Adapted Ecosystems- A Cohesive Strategy* (USDOJ / USDA); and (3) *A Collaborative Approach for Reducing Wildland Fire Risks to Communities and the Environment: 10-Year Comprehensive Strategy Implementation Plan*.

Beginning in 2008 YUCH personnel have implemented prescribed fire to burn piles which are created in mechanical fuel reduction projects. The Preserve staff intends to continue to use prescribed fire in this manner to mitigate fire danger to identified sites within the Preserve.

In addition the Preserve intends to use prescribed fire in specific locations on a broadcast scale to accomplish resource management objectives. An additional Burn Plan will be developed for this purpose and added to the Fire Management Plan. Additional NEPA requirements will be met in a this separate document. See [Appendix I](#) for the Preserve Burn Plan.

Because of the relatively undisturbed nature of the Yukon-Charley fire ecology, the Preserve does not anticipate implementing landscape-scale burning for the purpose of restoring or preserving the area's indigenous ecosystems. The Preserve may, however, use prescribed fire for the purposes of restoring historical conditions at selected sites or for reducing hazard fuel loads in the vicinity of valued resources. These uses would facilitate the accomplishment of goals identified in the Preserve's Resource Management Plan, particularly the stabilization and restoration of historical sites and structures associated with the Yukon gold rush. The Five-Year Fuels Management Plan is in draft form, pending approval.

Beginning in 2008 YUCH personnel have implemented prescribed fire to burn piles which are created in mechanical fuel reduction projects. The Preserve staff intends to continue to use prescribed fire in this manner to mitigate fire danger to identified sites within the Preserve.

In addition the Preserve intends to use prescribed fire in specific locations on a broadcast scale to accomplish resource management objectives. An additional Burn Plan will be developed for this purpose and added to the Fire Management Plan. Additional NEPA requirements will be met in a this separate document. See [Appendix I](#) for the Preserve Burn Plan.

### **1. Annual planning**

Any implementation of prescribed fire within the Preserve will be predicated upon an annual planning session attended by the AK Eastern Area FMO or Agency Administrator, the Chief of Resource Management, and any other interested parties. Topics covered in this meeting may include the determination of prescribed burn units; the establishment of prescribed fire objectives; the presence and protection of sensitive resources; the mitigation of smoke management problems; determination of prescriptions and/or burning windows; and the impact

of the proposed action on the full spectrum of Preserve uses, including subsistence hunting and trapping.

## 2. Individual plans

Each implementation of prescribed fire will follow a specific plan prepared by the FMO in accordance with the parameters outlined in the Interagency Prescribed Fire Planning & Implementation Procedures Reference Guide, available on the internet as follows: go to [http://www.fs.fed.us/fire/fireuse/rxfire/rx\\_index.html](http://www.fs.fed.us/fire/fireuse/rxfire/rx_index.html). The written plan will be reviewed by the State Historical Preservation Officer for compliance with the National Historic Preservation Act. It will then be reviewed and approved by the Superintendent, in consultation with the Chief of Resource Management. Final authority for the *implementation* of the prescribed fire plan rests with the designated Burn Boss.

## 3. Staffing

All prescribed fires at YUCH will be supervised by a Prescribed Fire Burn Boss (RXB3, RXB2, RXB1) certified by taskbook for the conduction of prescribed fires in appropriate fuel types and at the appropriate level of complexity. Burn bosses for YUCH prescribed fires may be obtained from other agencies, provided that designated individuals are certified as such. Prescribed fires at YUCH will be staffed exclusively by certified wildland firefighters. Specific operational positions will be filled in accordance with national requirements for training and experience as described in Chapter 6 of the Wildland Fire Policy Implementation Guidelines. The amount and specific nature of resources required for prescribed fire operations will be determined initially by the Ak Eastern Area FMO or Agency Administrator through the preparation of the prescribed fire plan. The designated burn boss, however, is responsible for the tactical implementation of the plan and as such must confirm the adequacy of planned staffing levels prior to ignition.

## 4. Monitoring

All prescribed fires will be monitored on both a short and long term basis, in order to provide the following types of information: 1) **anticipated fire conditions** (including rate of spread, anticipated weather, threats to resources and/or safety, fuel load, etc.); 2) **observed ambient conditions** (including topographic influences, current weather conditions, drought index, fire and smoke behavior, etc.); and 3) **assessment of post-fire effects** (including fuel reduction, vegetative change, etc.). Collection of all three types of information is necessary in order to help ensure adherence to prescription, accomplishment of management objectives, and establishment of baseline data. Complexity, frequency, and duration of monitoring activity will be dictated by burn objectives and will be specified by the prescribed fire plan. Objectives and guidelines for monitoring procedures at YUCH are further specified in Chapter VIII.

## 5. Documentation

The Ak Eastern Area FMO or Agency Administrator will ensure that each prescribed fire is documented with the following items:

- Approved prescribed fire plan.
- Environmental and cultural compliance documents.

- Map of project and surrounding area.
- Monitoring data (including weather, fire behavior, and fire effects observations).
- Smoke dispersal information.
- DI-1202

## **6. Reporting Requirements**

The AK Eastern Area FMO or Agency Administrator will report the intent to conduct a prescribed fire to the ARO Fire Management Office by 3:00 p.m. the day before a prescribed fire. The AK Eastern Area FMO will also notify the Upper Yukon Zone Dispatch (UYT) and the Alaska Interagency Coordination Center (AICC) the day prior to the burn and again immediately upon its completion.

## **7. Prescribed Fire Critiques**

Immediately following the prescribed burn, the Burn Boss will conduct a review of the prescribed burn operation. The review will be attended by the overhead staff, crewmembers, Chief of Resource Management, Resource Specialists, and the AK Eastern Area FMO or Agency Administrator. Items for discussion will include safety, accomplishment of objectives, fire behavior and effects, and effectiveness of operations.

## **V. ORGANIZATIONAL AND BUDGETARY PARAMETERS**

The Preserve Superintendent or the Chief of Resources is responsible to periodically access and certifies, by signature, that the continued appropriate wildland fire response is acceptable. The Superintendent under certain conditions may delegate this responsibility to another organizational level. The preserve superintendent will meet the performance requirements stated in the *Interagency Standards for Fire and Fire Aviation Operations*.

The Preserve FMO will work with the regional FMO to remain current on funding sources and procedures and to ensure that appropriate budget accounts are utilized on YUCH incidents. Guidelines for funding and financial tracking of fire management programs and activities for individual parks are contained within Reference Manual-18. (On the internet go to [http://www.nps.gov/fire/download/fir\\_wil\\_rm18.pdf](http://www.nps.gov/fire/download/fir_wil_rm18.pdf) ; click on **table of contents**, then click Chapter 15 **fire financial program**.)

## A. Organizational Structure

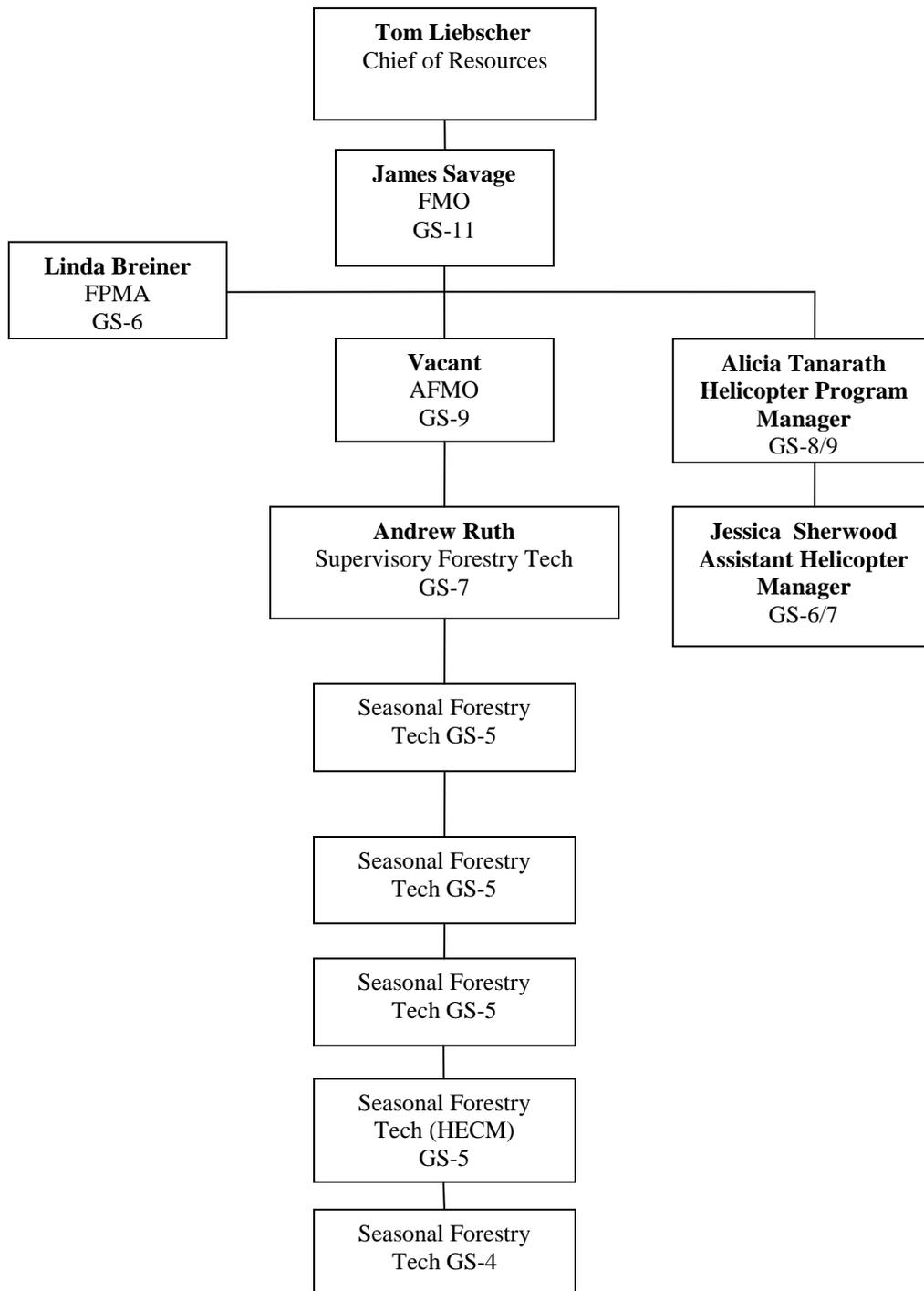


Figure 13: YUCH Fire Staff Organization Chart

## 1. Cooperation with Alaska Fire Service

In order to ensure safe and efficient operations, a basic understanding of the cooperative relationship between the Preserve's fire management program and the BLM-Alaska Fire Service (AFS) is imperative for all Preserve personnel. As specified in the Alaska Interagency Wildland Fire Management Plan, the **Alaska Fire Service** is responsible for providing fire management suppression services on all wildland fires occurring within the Preserve. The management and staff of **Yukon-Charley Rivers National Preserve**, in turn, will ensure that all suppression services contribute to the achievement of the management goals of the Preserve and the National Park Service.

## 2. Additional Resources

Yukon-Charley National Preserve may use personnel to assist in information collection above and beyond the information provided by the AFS. These personnel may work directly for the AK Eastern Area FMO or Agency Administrator or, when an Incident Commander (IC) is assigned, directly for the IC. The AK Eastern Area FMO and the UYD FMO will work together to determine the chain of command for these individuals.

## 3. Agency Administrator

An Agency Administrator will be designated for each incident at Yukon-Charley. The Agency Administrator will function as the direct representative of the Preserve Superintendent and as such will be responsible for the identification and accomplishment of YUCH and NPS resource management goals. The Agency Administrator will prepare, in consultation with the UYD FMO, and sign key decision-making and validation documents. The Agency Administrator may also request that additional personnel be ordered to assist specifically with the accomplishment of YUCH and/or NPS goals (e.g., resource advisors, monitors, fire behavior analysts, etc.). For most wildland fire activities the AK Eastern Area FMO will assume the role of Agency Administrator.

## 4. Incident Command Structure

For incidents at Yukon-Charley, resource advisors will report to the Planning Section Chief as per NWCG specifications for Incident Command structure. Other personnel requested specifically to assist with the accomplishment of agency or Preserve resource management goals (e.g. monitors, fire behavior analysts, fire-use module personnel, etc.) will normally report to the Ak Eastern Area FMO. Affected personnel will be briefed on contingent procedures and alternative chain of command for situations in which the AK Eastern Area FMO departs the incident or falls out of regular contact.

In summary, NPS personnel may participate in fire management operations within the Preserve in two distinct ways:

- a) **Monitoring:** NPS employees may work to help ensure the achievement of Preserve management goals under the supervision of the AK Eastern Area FMO (For example, an NPS employee working as a monitor in support of the wildland fire validation process would typically report to the AK Eastern Area FMO.) A YUCH staff member directly assigned to the incident would report to the Planning Section Chief of the Incident Command Team managing the incident.

b) **Suppression:** NPS employees may serve directly with operational forces (or other branches of command) assigned by AICC under supervisors provided by the AFS or ordered through the Resource Ordering and Status System (ROSS). (For instance, a YUCH employee assigned to assist smokejumpers during line construction on a small wildland fire might report directly to a jumper-in-charge dispatched from Fairbanks.)

YUCH employees dispatched directly by the Preserve may occasionally serve as interim Incident Commanders, as qualified, on YUCH incidents. These rare instances will be in consultation with the UYD FMO. In most cases, however, operations will be conducted from the outset by AFS, with YUCH managers focusing on the identification and achievement of resource management goals and the conduction of monitoring efforts when necessary.

## **5. Fire Management Responsibilities for YUCH Personnel**

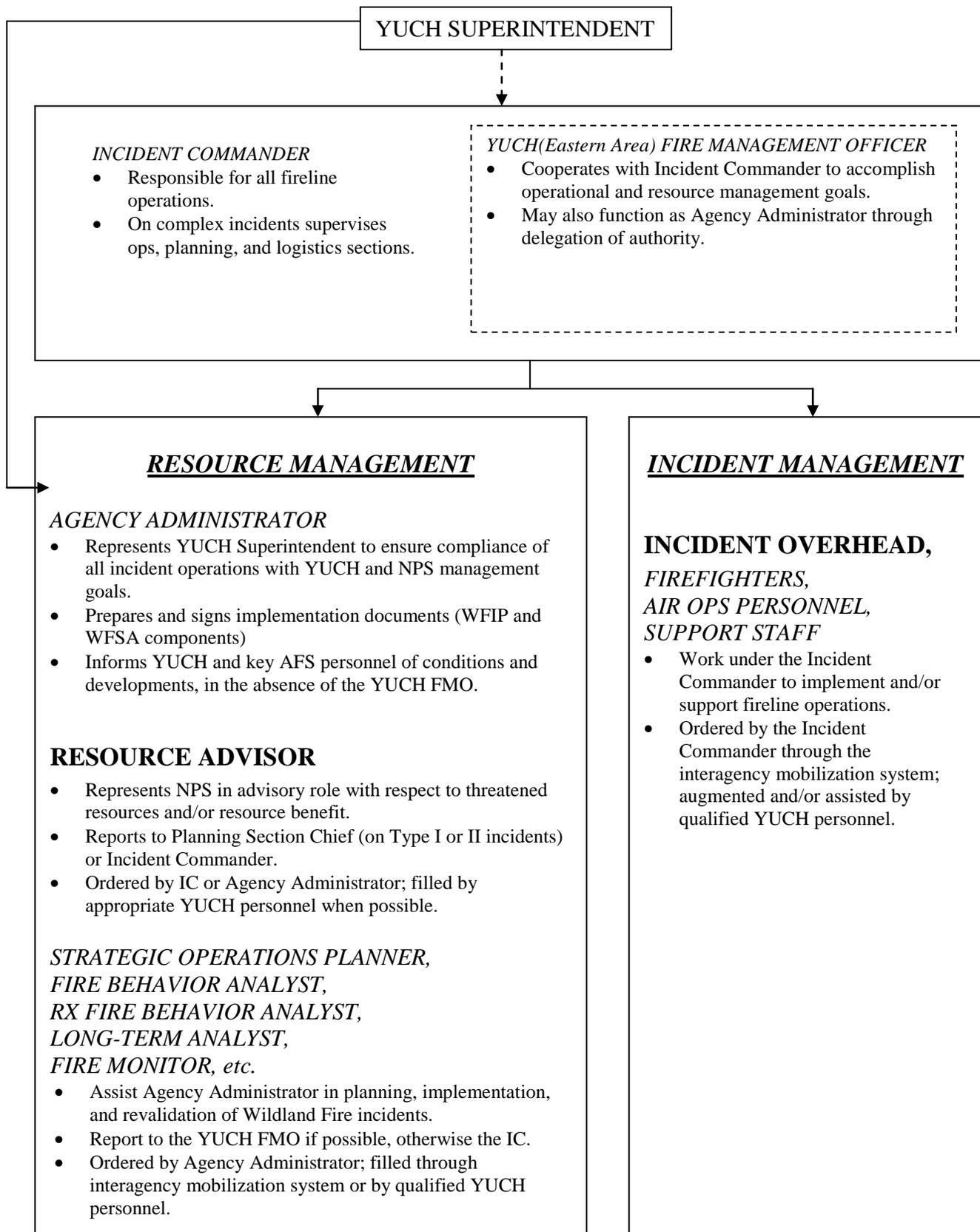
In light of the interagency nature of fire management actions at YUCH as well as the co-lateral nature of the Preserve's assigned FMO and fire crew, fire management responsibilities for individual Preserve employees are best explained in two steps. All personnel at YUCH have predetermined responsibilities within the Preserve's fire management program; these fixed responsibilities are shown in Table 14, below. For specific incidents, however, specific functions will be filled by any one of several appropriate personnel. These incident specific functions, their organizational structure, and lists of personnel who may perform them are shown in Figure 13.

<b>Position</b>	<b>Superintendent</b>
<b>Fire management role</b>	The Superintendent of Yukon-Charley Rivers National Preserve is responsible for the planning and direction of all Preserve activities and programs and as such is ultimately responsible for any wildland fire operation at YUCH. The Superintendent may, however, choose to delegate any or all fire management responsibilities to appropriate personnel (e.g., Fire Management Officer, Chief of Resource Management, etc.).
<b>Specific responsibilities</b>	<ul style="list-style-type: none"> <li>• Approves Limited Delegation of Authority and provides briefing and evaluation of Incident Management Teams.</li> <li>• Approves Wildland Fire decision documents (or delegate's responsibility for approval to an appropriate individual).</li> <li>• Approves prescribed fire plans.</li> <li>• Approves mechanical hazard fuel reduction plans.</li> <li>• Approves use of retardant and/or heavy equipment in non life-threatening wildland fire situations.</li> <li>• Participates in all official fire reviews.</li> <li>• Participates in NWCG functions as qualified.</li> </ul>
<b>Position</b>	<b>Fire Management Officer</b>
<b>Fire management role</b>	The Eastern Area FMO oversees and coordinates the Preserve's fire management program. The Eastern Area FMO is currently based at the Fairbanks Administrative Office and supervises the YUCH fire management program. Responsibilities listed below may be delegated to appropriate personnel (YUCH fire staff, or DENA FMO).
<b>Specific responsibilities</b>	<ul style="list-style-type: none"> <li>• Cooperates with Incident Commander under Unified Command.</li> <li>• Serves as Agency Administrator for YUCH incidents when feasible.</li> <li>• Ensures that YUCH Superintendent/staff and key AFS personnel are informed of pertinent conditions and/or situations.</li> <li>• Works with YUCH staff and AFS zone managers to determine and adjust boundaries and strategies for YUCH FMUs.</li> <li>• Prepares Prescribed Fire Plans.</li> <li>• Prepares Mechanical Fuel Reduction Plans.</li> <li>• Represents Region and Preserve on taskforces and in agency and interagency training.</li> <li>• Ensures the education of Preserve staff on fire management issues.</li> <li>• Participates in all official fire reviews.</li> <li>• Prepares and maintains fire records and reports.</li> <li>• Prepares funding proposals and manages the Preserve's fire account.</li> <li>• Manages the Preserve's fire cache and coordinates acquisition of supplies.</li> <li>• Ensures qualifications of staff.</li> <li>• Serves as liaison with regional office staff.</li> <li>• Ensures Federal Fire Policy is followed.</li> <li>• Participates in NWCG functions as qualified.</li> </ul>
<b>Position</b>	<b>Chief of Resource Management</b>
<b>Fire management role</b>	The YUCH Chief of Resource Management functions as the primary resource advisor for all fire management activities at the Preserve.
<b>Specific responsibilities</b>	<ul style="list-style-type: none"> <li>• Advises YUCH Superintendent on approval of prescribed fire and mechanical reduction plans.</li> <li>• Advises Agency Administrator on wildland fire managed for resource benefit.</li> <li>• Advises Agency Administrator and Incident Commander/overhead team of location and sensitivity of significant resources during wildland fire incidents.</li> <li>• Participates in all official fire reviews.</li> <li>• Assists with the development of fire management objectives.</li> <li>• Participates in NWCG functions as qualified.</li> </ul>
<b>Position</b>	<b>Interpretive Specialist</b>
<b>Fire management role</b>	The YUCH Interpretive Specialist is responsible for informing and educating media, visitors, and residents within and around the Preserve about all fire management goals, objectives, and actions.
<b>Specific responsibilities</b>	<ul style="list-style-type: none"> <li>• Develops and coordinates on-going programs for educating the public about the area's fire ecology and the Preserve's fire management program.</li> <li>• Develops and coordinates a "step-up staffing plan" for disseminating information</li> </ul>

	<p>during large or complex incidents.</p> <ul style="list-style-type: none"> <li>• Informs public of current fire situation.</li> <li>• Participates in NWCG functions as qualified.</li> </ul>
<b>Position</b>	Fire Staff
<b>Fire management role</b>	The Fire staff is based at the National Park Service Administrative Office in Fairbanks and also work at YUCH to help plan and implement fire management activities within the Preserve.
<b>Specific responsibilities</b>	<ul style="list-style-type: none"> <li>• May serve as Agency Administrator in the absence of the Eastern Area FMO, as qualified.</li> <li>• Serves as helicopter manager and/or crewmember during fire management and other resource management activities.</li> <li>• Serves as crew boss, etc. as qualified.</li> <li>• Supervises and assists with gathering and processing of data for use in long-term and incident-specific fire management planning.</li> <li>• Plans and implements hazard fuel reduction projects.</li> <li>• Assists with planning and supervision of prescribed fires.</li> <li>• Supervises and/or performs various resource management projects throughout the Preserve.</li> <li>• Participates in NWCG functions as qualified.</li> </ul>
<b>Position</b>	<b>Other YUCH Employees</b>
<b>Fire management role</b>	Any YUCH employee may be assigned to assist with fire management activities as environmental and/or cultural specialists, logistical advisors, firefighters, support personnel, law enforcement officers, etc., depending on qualifications, skills, and regular duties.
<b>Specific responsibilities</b>	<ul style="list-style-type: none"> <li>• Advising Eastern Area FMO or Agency Administrator during planning of fire management activities.</li> <li>• Gathering and processing of data for use in long-term and incident-specific fire management planning</li> <li>• Reports ignitions to the Preserve.</li> <li>• Firefighting.</li> <li>• Logistical support.</li> <li>• Law enforcement.</li> <li>• Participate in NWCG functions as qualified.</li> </ul>

**Table 15: Predetermined Fire Management Responsibilities**

**Figure 13: Incident – Specific Fire Management Functions at YUCH**



## **B. Relationship of Fire Management Program to YUCH Organization**

As indicated in Section A, the YUCH/AK Eastern Area Fire Management Program is coordinated by a co-lateral duty FMO based at the Fairbanks Administrative Center. With respect to Yukon-Charley fire management issues and activities within the Preserve, however, the AK Eastern Area FMO reports directly to the Chief of Resources.

## **C. Periodic Assessment of Wildland Fire Incident**

The YUCH Superintendent is ultimately responsible for the re-certification of wildland fire incidents through the signature of periodic assessments of suitability.

## **D Interagency Contacts**

Pertinent interagency contacts include dispatch personnel at the Alaska Interagency Coordination Center as well as operational and dispatch personnel at the AFS Upper Yukon fire management zone office. Current phone numbers for these positions are listed in Appendix E.2.

## **E. Fire-Related Agreements**

The cooperative arrangement between the NPS Alaskan Region and the BLM's Alaska Fire Service is discussed in the Alaska Interagency Wildland Fire Management Plan and is further specified in a memorandum of agreement. A copy of the NPS/BLM fire management agreement is contained in [Appendix E](#).

## **F. Reporting of New Ignitions**

YUCH personnel with phone access should report undetected wildland fire (either possible or confirmed) directly to the Upper Yukon Fire Management Zone (see Appendix E for phone number) and should be prepared to provide as much basic information as possible (size, fuel type, topography, fire behavior, current whether, probable cause, values at risk, etc.). When phone access is not available personnel should report wildland fire to YUCH dispatch or UYT dispatch (available by radio twenty-four hours a day).

## **G. Limited Delegation of Authority for Incident Management Teams**

Type I and II Incident Management Teams ordered for and/or assigned to incidents at Yukon-Charley will operate under a written Limited Delegation of Authority, prepared, in consultation with the UYD FMO, and signed by the Preserve Superintendent or designee. The Limited Delegation of Authority will specify pertinent priorities, concerns, and constraints for the incident in progress and will be treated as Preserve policy until the conclusion of the incident or the Superintendent's amendment of the original Delegation statement through a subsequent signed statement. Examples of Limited Delegation of Authority and Amendment to Delegation of Authority statements are contained in [Appendix H](#).

## VI. MONITORING AND EVALUATION

### **A. Past and Ongoing Fire Effects Monitoring & Inventories**

NPS fire management needs to be driven and supported by scientific information in order to facilitate an adaptive management cycle, which should result in the implementation of safe and effective fire management strategies. The purpose of the National Park Service Alaska Region Fire Ecology program is to provide effective evaluation of Alaska park lands' fire management program and understand the ecological effects of fire on the landscape, as well as to document any unexpected consequences of wildland fire occurrences. The focus of the Fire Monitoring Program is to assess the condition of vegetation and fuels, and how they are affected by wildland fire, prescribed fire or mechanical treatments. Fire monitoring is an essential component of the fire management program. Monitoring efforts are aimed at providing information to guide management decisions as well as to assess the effectiveness of the Fire Management Program.

Informal fire effects studies began as early as the 1980s at Yukon-Charley Rivers National Preserve. A few other fire effects studies were started during the 1990s. In 2002, a Regional Fire Ecologist was hired for the Alaska Region parks. The fire ecologist is responsible for coordinating monitoring efforts and maintaining fire effects data. The following is a brief description of fire effects and fuels monitoring or inventories that have been completed by NPS fire and/or resource staff in Yukon-Charley Rivers National Preserve since 1983. Table 18 lists the number of plots and related information each project described below. Overview maps of the fire effects plots are provided in Figure 15.

#### ***Fire Effects Paired Plots – YUCH-PP (1983-current)***

The fire effects paired plot project began in 1983 under the direction of Gary Ahlstrand, NPS Alaska Regional Research Ecologist. The purpose of the project was to assess vegetation change and succession as a result of fire and to determine fire history. Fire staff established paired vegetation 15-m x 30-m plots in burned and representative unburned habitat adjacent to the burned areas of varying ages. Burned sites were identified and selected for the study from historic fire reports, 1:63,360 color infrared aerial photography, and aerial reconnaissance. Some plots were established in front of active wildfires and control plots were not established. Between 1983 and 1988, at least 525 plots were installed across 9 different parks in Alaska. A total of 52 plots were established in YUCH. Most of the plot locations were not permanently marked, however at least 8 plots in YUCH were permanent. Plot data that was collected included: photographic slides of plot, tree density by species and diameter size class on 15-m x 30-m quadrats, vegetation cover class for 30 Daubenmire frames (20 x 50 cm), tree cores/cookies, fuels and soils data (on some plots), and general plot site descriptions.

Up until 2008 most of the data was only available in paper format, except for the vegetation cover data was in a TWINSPAN text format. Between 2003 and 2008, paired plot data for all the parks was entered into an Access database and plot locations were digitized off topographic maps and aerial photos. The Access database was converted to FFI V1.02 database through a contract with SEM in 2008. Original copies of data and photos are archived at the Alaska Regional Office. Scanned copies of data and photos are stored at the regional office and with the Regional Fire Ecologist in Fairbanks. A draft report for Yukon-Charley River's plots was written by Gary Ahlstrand in 1990, and is available in the NPS fire office in Fairbanks YUGA.

Data from this project can be used to determine the vegetative and structural components that have changed over time since fire. Currently the data is being utilized to develop fire successional models to update land cover vegetation maps and fuels maps utilized by the fire management program. In 2005, five plots were re-measured (ECA-1, ECA-2, ECA-3, ECA-5,

CCPB-1), 3 of which were burned twice in the last 20 years. This information is being used to understand the potential impacts of shortened fire return intervals and future climate warming.

### ***1999 Fire Effects Plots – YUCH-1999***

During the 1999 fire season approximately 75,000 acres within Yukon-Charley Rivers National Preserve were burned by wildfires. To evaluate the long-term impacts of these fires on the preserve, 15 randomly located permanent plots were established in September 1999 within the burned black spruce woodland of the Yukon River Corridor between Nation Bluff and 4 miles east of Kathul Mountain. Study plots were established in the 1999 Witch Fire (B242), some reports and documents in association with this project have called it the ‘Nation Fire’ erroneously. The goal of this study was to document post fire changes in vegetation composition of boreal forest habitats along the Yukon River within the Preserve. This project was designed as a long-term study in order to fulfill the following objectives: 1) to monitor vegetation re-colonization rates and succession; 2) to evaluate fire fuel types and quantity for fire management purposes; and 3) to determine post fire changes in permafrost depth. The plots were 20-m diameter circular plots, marked with blue colored conduit in the center and the four end-points of two 20-m perpendicular transects that bi-sect the circular plot. The following information was collected at each plot: 1) Four photo points are taken at the “corner” markers of each plot and aimed at the plot center; 2) Vegetation cover using vegetation point intercept sampled every 20 cm along two 20-m transects for a total of 100 points; 3) Active layer depth measured at each point intercept point; and 4) Tree density by species and size class.

Plots were monitored in 1999 and 2000. Plots were attempted to be re-located in 2007, however due to difficulty in terrain and GPS coordinate datum miss-match the plots were not measured in the exact location. Data has been entered into excel data sheets.

### ***Yukon-Charley Burn Severity Assessment – YUCH-CBI***

Burn severity strongly influences post-fire vegetation succession, soil erosion, and wildlife populations in the fire-adapted boreal forest and tundra ecosystems of Alaska. Satellite-derived measures of burn severity using the differenced Normalized Burn Ratio (dNBR) calculated from pre- and post-fire Landsat TM/ETM+ data were compared with ground based burn severity measurements in Alaska national parks between 2001 and 2003 (Allen and Sorbel 2008). In 2001, 119 Composite Burn Index (CBI) plots were measured within three 1999 Yukon-Charley River fires (B242, B248 and B260) to compare to satellite-derived measures of burn severity.

Data from this project are stored in an Access database. Original hard copies of data sheets and digital photos are stored at the NPS Regional Office with the Fire-GIS Specialist. Plot locations were collected with GPS units, but plots were not permanently marked. No further monitoring of these plots has occurred.

The results of this study are summarized in a paper in the International Journal of Wildland Fire (Allen and Sorbel 2008). Currently, burn severity maps are used to refine and improve final fire perimeters by fire management. Burn severity maps have also been used to determine whether study sites within a fire perimeter have burned and to what degree of impact. Fire staff is utilizing burn severity maps to update land cover vegetation and fuels maps to reflect changes from recent fires.

### ***Woodchopper 2004 Fire Effects Plots – YUCH-WDC***

The large fires in Yukon-Charley Rivers NP in 2004 provided the back drop to study how fire burned through varying vegetation types and the effects of fire on vegetation and permafrost. A pilot study was initiated to determine the feasibility of installing fire effects plots in front of an

active fire in order to document the pre and post condition of the vegetation and fuels. Seven plots were established in the 2004 Woodchopper Creek Fire (A5ZE) near the NPS summer operations base camp of Coal Creek in 2004 and 2005. Four plots were established in woodland black spruce (*Picea mariana*) forests (two of which were installed pre-fire), and three plots were established in closed paper birch (*Betula papyrifera*) forests. Methods used were developed by the AK Regional Fire Ecologist and the Alaska Wildland Fire Coordinating Group – Fire Effects Task Group. Plots are 30-m x 1-m belt transects and are marked with rebar at the beginning and end of the transect. Plot data collected includes: 1) Ocular estimates of vascular and non-vascular species cover, 2) Point intercept with 60 points along a 30-m transect (includes ground cover, vascular and non-vascular plants), 3) Tree density by species and diameter size class within 30-m<sup>2</sup> area, 4) Thaw depth measurements (10 per plot), 5) Burn severity at 10 points along transect, and 6) General site descriptions and photo points. Plots have been measured in 2004, 2005, 2006 (black spruce plots only), and 2008.

Data has been entered or converted into the national fire effects database program, Feat-Firemon Integrated (FFI). Original hard copies of data sheets and digital photos are stored at the NPS Fairbanks Administrative Center with the Regional Fire Ecologist.

Information from this study has been limited due to the small number of plots. However the data is being utilized along with other plots to develop fire successional models to update land cover vegetation maps and fuels maps utilized by the fire management program.

#### ***Cabin Hazard Fuels Treatment Assessment – YUCH-HZF***

The primary goal of the fire management program for Yukon-Charley Rivers National Preserve, as stated in the Fire Management Plan, is “the protection of human life, property, and irreplaceable natural and cultural resources”. Over the last decade, fire staff has implemented hazard fuels reduction projects around historic and public use structures within the preserve, with the objective of reducing the risk of wildland fire. In order to determine that these fuel treatments are effective, this one year study was designed to revisit some of these sites in order to 1) assess the effectiveness of fuels treatments on fire behavior and vegetation and 2) determine what type of return interval is needed for hazard fuels reduction. Seven cabin sites with prior hazard fuels thinning were assessed during 2005. At each cabin site 3 control and 3 treatment plots were established; 42 plots were measured. Methods used were developed by the AK Regional Fire Ecologist. Plots are 16-m diameter circular plots. Plot data collected includes: 1) Ocular estimates of vascular and non-vascular species cover, 2) Point intercept with 32 points along one 16-m transect (includes ground cover, vascular and non-vascular plants), 3) Tree density by species and diameter size class within circular plot area (0.02 hectare), 4) Thaw depth measurements (10 per plot), and 5) General site descriptions and photo points. Plots have not been re-measured since 2005 and are not permanently marked.

Data from this project are stored in an Access database. Original hard copies of data sheets and digital photos are stored at the NPS Fairbanks Administrative Center with the Regional Fire Ecologist.

The study found that within white spruce-deciduous forests there was a significant increase in grass cover in treated areas, when compared to control areas adjacent to thinning. This information has been presented to the area FMOs and has been used to guide hazard thinning projects within this forest type.

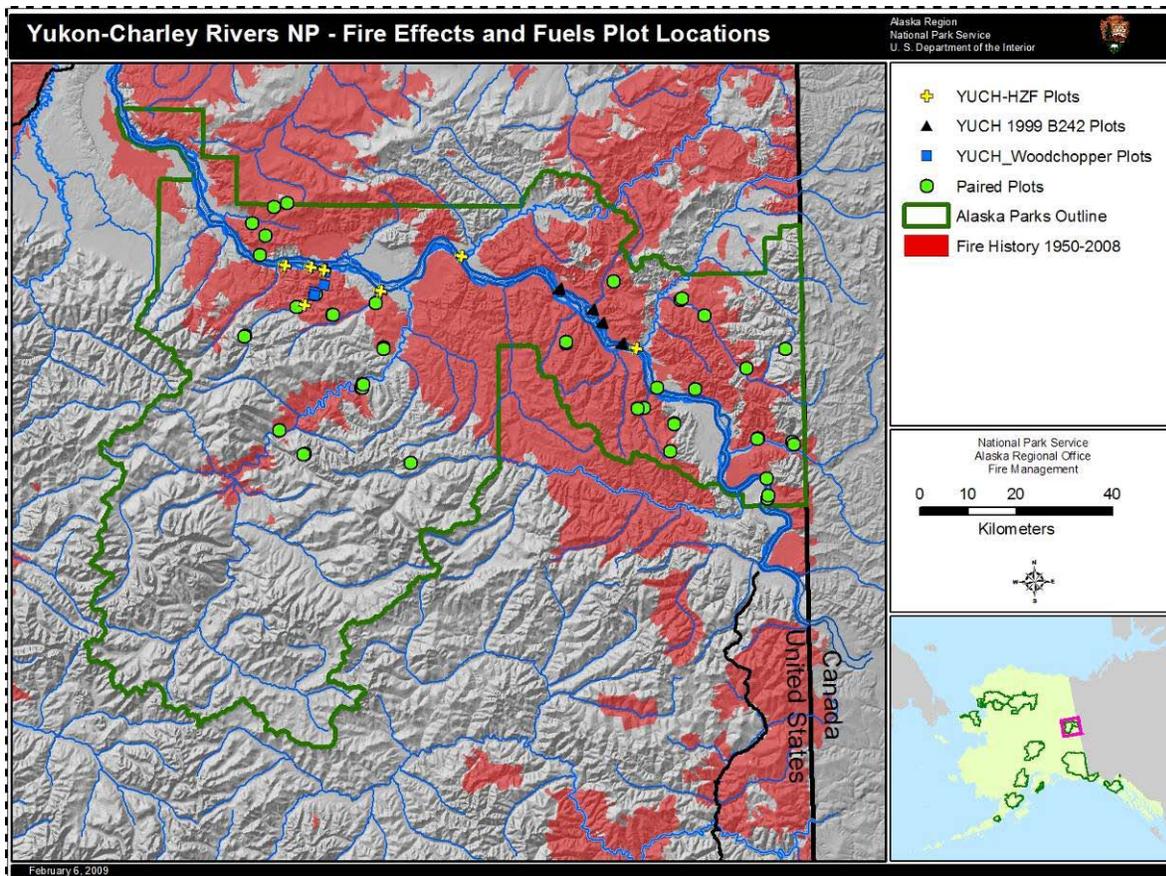
#### ***Fire Behavior Monitoring - Woodchopper 2 Fire 2007***

The Woodchopper 2 Fire (#222, DHQ5) started on June 6<sup>th</sup>, 2007 on a ridge above the Yukon River inside Yukon-Charley Rivers National Preserve. This fire was selected to monitor on the

ground fire behavior by park fire management staff. The monitoring operation began on June 15 and went until June 19, when fire behavior became too extreme to continue safe on the ground operations. The objective of the study was to create data for calibration of the fire behavior fuel models and validation of the Canadian Forest Fire Danger Rating System. In order to do this the following characteristics were measured: standard fireline weather observations, slope, aspect, cloud cover, flame length, rate of spread, spread/wind/slope diagram, burn depth, burn severity, and ocular estimation of species cover. Data from this project is currently in hard copy format at the NPS Fairbanks Administrative Center, with the AK Eastern Area Assistant Fire Management Officer.

Title	Project ID	Purpose	Year Started	Last Monitored	# Plots Total	Database
YUCH Paired Plots	YUCH-PP	Succession, fire effects, 2005 - 5 plots re-measured	1983-1986	2005	52 (5 re-measured)	FFI and Access Database
YUCH 1999 Fire Effects - B242	YUCH-1999	Fire succession, fire effects on fuels, vegetation, and permafrost	1999	2007	15	Excel
YUCH, CBI Burn Severity	YUCH-CBI	Assess remote sensed dNBR severity	2001	non-monitoring	119	Access
YUCH pre/post fire effects	YUCH-WDC	Fire succession, fire effects on fuels, vegetation, and permafrost	2004	2008	7	FFI
YUCH hazard fuels plots	YUCH-HZF	Effectiveness and effects of fuels thinning	2005	non-monitoring	42	Access

**Table 16: List of past and Ongoing Fire Effects and Fuels Projects in YUCH**



**Figure 14: Locations of Fire Effects and Hazard Fuel Assessment Plots in YUCH**  
Burn severity CBI and fire behavior plots not shown.

## B. Monitoring Plan

A detailed Fire Monitoring Plan for YUCH is provided in [Appendix G](#). Guidelines for monitoring wildland fires, prescribed fires and mechanical treatments within YUCH were developed in consultation with the Interagency Alaska Fire Effects Task Group (FETG), NPS Fire Monitoring Handbook (FMH 2001), and NPS Alaska Regional Fire Ecologist. These guidelines provide recommendations for minimum variables to monitor fire or treatment effects within a framework of three monitoring intensities (Level 1 – 3). Brief descriptions of the three monitoring levels are provided below:

*Level 1, Surveillance Monitoring* - This level provides a basic overview of the baseline data that is required to be collected for all wildland or prescribed fires, some variables are required for mechanical treatments. Information at this level includes such items as RAWS weather data, general description of the fire environment (i.e. topography and fuel types), and fire location or perimeter. Information collected at this level precludes the necessity for on the ground measurements and can be done from remote sensing or an aerial platform. Data necessary to satisfactorily complete a Wildland Fire Report.

*Level 2, Moderate Intensity Monitoring* - This level of monitoring documents fire behavior observations (not addressed in this document), fuels, and general effects of wildland fires, prescribed fires or mechanical treatments on vegetation. Information at this level includes characteristics of the fire, such as rate of spread, fire behavior, and burn severity, as well as current weather conditions. Fuel conditions would be assessed by determining the fuels array, composition, and dominant vegetation within the burn area, in addition to using vegetation and fuels maps to predict potential fire spread. Information to assess pre and post fire or treatment effects would include duff depth and moisture measurements, photo points, vegetation cover, and tree parameters. This level of monitoring is recommended for wildland for resource benefits and prescribed fires, but is dependent on the objectives of the burn and the resources of concern. Some of the variables monitored at this level would require on the ground measurements of specific sites.

*Level 3, Comprehensive Monitoring (Short or Long-term Fire Effects)* – This level would be used to monitor the effects of prescribed or wildland fires in greater depth, it may also be used for mechanical treatments. Level 3 monitoring requires collecting information on fuel reduction, vegetative changes, and soil parameter changes. This level of monitoring may also include wildlife utilization techniques. The number of variables monitored increases and the techniques are more rigorous. Information collected at this level is based upon management objectives and the resources of concern. Variables monitored at this level would require the establishment of ground based plots.

Fire and mechanical treatment monitoring should be designed to meet the objectives of each project and therefore the components of monitoring should be developed based on the project objectives. Suggested monitoring variables for Level 1 through 3 are provided in Table 19. Level 1 variables are recommended minimums for all wildland fires. The implementation of variables at Level 2 and Level 3 would depend on the objectives of the fire/treatment and the resources of concern, and would remain up to the discretion of the FMO, fuels specialists, resource staff, and fire ecologist. The difference between Level 2 and Level 3 monitoring will often be the nature of data gathered for the same variable (qualitative vs. quantitative) or the number of plots, which may determine the statistical significance of findings.

Monitoring Level	Monitoring Variable	Wildland Fire	Prescribed Fire	Mechanical Treatment
1	Perimeter (> 100 acre fire) or Point Location	R	R	R
1	Fuel types	R	R	R
1	Site description	R	R	R
1	Weather (RAWS)	R	R	O
1	Fire Danger Indices	R	R	N/A
1	FRCC	R	R	R
1	Burn severity maps (> 300 acres)	R	R	N/A
2	Photos of burn or treatment area	O	O	O
2	Photo Points	O	R	O
2	Fire behavior	O	R	N/A
2	Smoke	O	R	N/A
2	Duff/fuel bed depths	O	O	O
2	Duff moisture	O	O	O
3	Duff consumption (pins)	O	O	N/A
2	Burn severity assessment	O	O	N/A
2	Vegetation class (pre & post)	O	O	O
2	Vegetation cover/ composition (Level 2 - quantitative)	O	O	O
2	Tree density by species and size class	O	O	O
2	Tree canopy cover	O	O	O
3	Tree heights, diameters	O	O	O
3	Ladder fuel heights	O	O	O
3	Active layer depth	O	O	O
3	Soil parameters	O	O	O
3	Tree ring disks/cores	O	O	O
3	Shrub or species specific densities	O	O	O
3	Coarse woody debris (Brown's transects)	O	O	O
3	Herbivory	O	O	O

**Table 10: Recommended Monitoring Variables for the Three Major Fire Management Activities**  
**R= Required, O= Optional, N/A= Not Applicable**

## **VII. FIRE RESEARCH**

The implementation of the YUCH Fire Management Plan will not be predicated upon the prior completion of fire research. Whenever possible, however, fire management actions at the Preserve will incorporate and facilitate research activities designed to increase understanding of local fire ecology and effects.

### **A. Summary of Existing Fire Research**

Some of the studies described in the monitoring section of this document could also be considered fire research. Additional research studies pertaining to YUCH are described below.

#### ***Future Fire Regime and Climate Modeling***

A CESU agreement was developed with Dr. Scott Rupp at the University of Alaska-Fairbanks to assess how different climate scenarios may impact the fire regimes and vegetation within several parks over the next 100 years. The landscape dynamics model, Boreal ALFRESCO, will be used to simulate the potential response of vegetation and fire regimes to likely scenarios of future climate change using IPCC models. Results of this study will be presented to Park Service personnel and a final report will be prepared in 2009. The following parks were selected for analysis: Denali, Yukon-Charley Rivers, Gates of the Arctic, Bering Land Bridge, and Wrangell-St. Elias.

#### ***Refinement and Development of Fire Management Decision Support Models Through Field Assessment of Relationships Among Stand Characteristics, Fire Behavior and Burn Severity.*** *JFSP Project # 04-2-1-96*

This study was conducted as part of Joint Fire Science Program project funded in 2004 and completed in 2007. A final report has been submitted by Ann E. Camp (P.I.) – Yale University, Philip N. Omi (P.I.) – Colorado State University, Mary Huffman – Colorado State University, and James B. Cronan - Yale University. The study is prepared in two parts. Part I was conducted by Yale University and investigates the relationship between stand age and fire behavior in black spruce forests of interior Alaska. Part II was conducted by Colorado State University and examines the utility of two fire behavior prediction models, BehavePlus and the Canadian Forest Fire Danger Rating System's (CFFDRS) Fire Behavior Prediction (FBP) System, in the boreal forests of Alaska. Videography was used to sample fire behavior on six wildland fires in black spruce forests of Interior Alaska. Some of the study sites were conducted near YUCH, along the Taylor Highway. Information gained from this study should inform fire management on fire behavior in black spruce and the relationship to stand age and flammability. The final report is available at the following web site: [http://www.firescience.gov/projects/04-2-1-96/project/04-2-1-96\\_final\\_report.pdf](http://www.firescience.gov/projects/04-2-1-96/project/04-2-1-96_final_report.pdf)

### **B. Fire Research Needs**

- Facilitate the prediction of fire behavior and fire effects at Yukon-Charley through the establishment of vegetation and/or soils plots in front of the line of fire and the evaluation of intensity and pattern of fire after burn-over.
- Create and update fuels maps.
- Determine the applicability and effectiveness of the Canadian Forest Fire Danger Rating System to Yukon-Charley River fire operations.

- Determine the effects of fire on known archeological sites and cultural landscapes.
- Determine the cumulative effects of fire on subsistence activities dependent upon wildlife distributions and other resources.
- Calibrate existing model or develop a model for predicting fire spread specific to hardwood areas.

## **VIII. PUBLIC SAFETY**

### **A. Safety Issues at YUCH**

Fire management safety concerns at Yukon-Charley include threats posed by fire and smoke to visitors, local residents, employees and wildland firefighters.

### **B. Mitigation of Safety Issues**

#### **1. Operational safety**

All personnel engaged in fire management activities within the preserve will remain aware of the standard fire orders and “situations that shout watch out”; each employee will work to ensure constant implementation of LCES (effective use of lookouts, communication, escape routes, and safety zones).

#### **2. Visitor safety**

Visitor use will not be allowed near fire perimeters. An attempt will be made to inform all visitors of any known wildland fire activity within the Preserve, and signs will be posted on nearby roads and departure points if smoke produced during wildland and prescribed fire creates a safety concern. The Superintendent may initiate a temporary closure of some or all of the Preserve if large or erratic fire behavior endangers visitor and employee safety to a significant degree. Closures may also apply to airspace.

#### **3. Evacuation procedures**

Either the YUCH Superintendent or the YUCH Agency Administrator may request the Alaska Division of Emergency Services (ADES) to implement evacuation procedures for the Preserve or for adjacent communities

## IX. PUBLIC INFORMATION AND EDUCATION

*Yukon-Charley Rivers National Park and Preserve* is committed to providing high-quality, proactive and coordinated fire communication and education to target audiences (listed below). Park staff, Eastern Area Fire Management Program, the Regional Fire Communication and Education Program (RFC&E) and the Regional Fire Management Program, in concert will fulfill the plan outlined below in order to increase internal and external awareness and support. Fire management spans a broad spectrum of programmatic areas including operations, ecology, prevention, GIS, predictive services, fuels, leadership, etc. Based on evolving programs and situations, the park can determine the focus area as appropriate.

### **A. Vision**

Recognition, acceptance and support of the role of fire in ecosystems and the management of fire and fuels in the National Park Service (NPS).

### **Mission**

To pro-actively support the Alaska NPS Wildland Fire Management Program through a comprehensive communication and education program that emphasizes wildland fire management and the role of fire in ecosystems.

### **Goals**

- Internal and external audiences understand and support the role of fire in ecosystems and the management of fuels and fire.
- As an integral part of the NPS, the Alaska Fire Management Program collaborates with all disciplines.
- Provide accurate and timely fire information for local, regional, and national fire operations as needed.
- Coordinate and collaborate with stakeholders, partners and peers for maximum efficiency and effect.
- Facilitate an effective, two-way dialogue about fire in national parks in order to build trust and understanding with internal and external audiences.

### **Guiding Documents**

- The *NPS Wildland Fire Management Strategic Plan* represents input from all levels and disciplines within the NPS Wildland Fire Management Program, from parks to the national office, as well as the NPS Natural Resource Program and our interagency partners. It is intended to establish key strategies that should be applied at all levels of the NPS Wildland Fire Management Program to achieve critical management objectives in support of the mission. This plan is current through 2012; view the plan at [http://www.nps.gov/fire/download/fir\\_wil\\_strategic\\_plan\\_2008-2012.pdf](http://www.nps.gov/fire/download/fir_wil_strategic_plan_2008-2012.pdf).
- The *NPS Wildland Fire Management Communication Plan*. In coordination with the 20<sup>th</sup> anniversary of the 1988 fires in Yellowstone National Park and the Northern Rockies, the NPS Division of Fire and Aviation Management has developed a communications initiative to reach internal and external audiences with a clear, consistent message about the role of wildland fire management in NPS units and surrounding communities. The purpose of this initiative is to reinforce the National Park Service's position as a resource for fire management information and to better inform internal and external audiences about the role of wildland fire and the role of NPS Fire and Aviation in managing it. A subsequent goal is to reinforce the cultural significance of the NPS and its historical leadership in land management. View this plan at <http://inside.nps.gov/waso/custommenu.cfm?lv=3&prg=777&id=8080>.

- The draft *Alaska Region Fire Communication Strategy and Guide* introduces the duties and responsibilities of the NPS Alaska Regional PIO and is located at [www.nps.gov/akso/Fire/firehome.htm](http://www.nps.gov/akso/Fire/firehome.htm).
- *NPS Social Media Handbook*. The National Park Service, Alaska Region (NPS-AKR) Social Media Handbook provides guidance to parks and programs in the use of Social web including multimedia sharing websites, blogs and microblogs, social networking websites, document sharing repositories and third party widgets. The handbook describes many types of technologies but does not provide an endorsement for their usage. Available on the NPS SharePoint site located at <http://inpakroms16sp:37964/AKRWM/Shared%20Documents/Forms/AllItems.aspx>.

The *Yukon-Charley Rivers National Park and Preserve* Fire Communication and Education (FC&E) Program, while tailored to the local level, complements the aforementioned plans in its vision, mission, and goals.

### **Other Important Fire Information References**

While these documents provide the philosophy and general direction for the FC&E Program, there are two other important references for fire information work. Specific operational procedures (checklists, fax numbers, email lists, community contacts, etc) are outlined in *Standard Operating Procedures: Fire Communication and Education*. The Information Officer Step-Up-Plan, provides Public Information Officer (PIO) recommendations during a park fire incident.

### **Staffing**

The RFC&E Specialist steers the Alaska NPS Fire Communication and Education Program and serves as a resource to parks by coordinating all matters related to the program. The specialist assists parks in using ongoing communication and education strategies, consultation and collaboration to enhance fire management programs. When a fire incident occurs, regardless of the different scenarios that might unfold, the Eastern Area Fire Management Officer will contact the designated park Public Information Officer (PIO) and the RFC&E Specialist. The RFC&E Specialist then collaborates with the park's PIO through the duration of the incident. If the need arises, the PIO and/or the RFC&E Specialist will recruit personnel for specific duties or outside resources will be requested through dispatch procedures. For further information, review the Information Officer Step-Up Plan (Appendix F). Park staff and Alaska NPS Regional and Eastern Area Fire Management Program staff actively participates in and supports the FC&E program.

If an incident management team deploys to manage a fire that affects *Yukon-Charley Rivers National Park and Preserve*, park staff will interact with and support the team's PIO. Park staff and/ or the RFC&E specialist will share NPS messages with the IMT team for inclusion into information dissemination.

## **B. Key Messages**

The cornerstone of any communication effort is a set of consistent, compelling messages for use in all proactive and reactive communication. Messages should be actionable where appropriate so that, in addition to educating, they will motivate the audiences to act on what they have learned. They help the communicator move beyond the facts and tell the fire story.

Key messages are general concepts that can be incorporated into discussions, print materials, and other resources used in communication, education, information, and prevention efforts. Key messages are umbrella statements that require additional supporting points and examples for context. These messages are not meant as a script; however they are intended to provide a foundation for crafting comments in response to inquiries from the public and media. It may also

be helpful to review the National Interagency Fire Center (NIFC) themes, as these messages are updated on an annual basis to include pertinent, emerging topics. These themes are part of the PIO toolkit and can be located at [http://www.nifc.gov/PIO\\_bb.html](http://www.nifc.gov/PIO_bb.html).

The NPS Wildland Fire Management Program key messages are listed below. Details on the messages can be found in the NPS Wildland Fire Management Communication Plan. These messages and the Alaska wildland fire key messages are designed to meet the following criteria:

- **Coincide with and not contradict interagency messages.** It is critical that the wildland fire community speak with one voice to the public. The NPS wildland fire messages are designed to complement the interagency messages listed below. The NPS wildland fire messages also are designed to be fluid. These messages do not address specific policy issues. NPS staff will rely on policy-related messages as they are revised.
- **Allow for customization.** These messages are a guide, not a script. Users are encouraged to provide additional, local detail to ensure the messages touch audiences in a relevant, credible way.
- **Include a call to action.** In addition to educating, messages should motivate the audiences to act on what they have learned.
- **Answer the questions what, why, and how.** Categorizing messages in this way will help users recall the messages during appropriate situations.

### NPS Wildland Fire Key Messages

- |             |   |   |
|-------------|---|---|
| <i>What</i> | { | <ol style="list-style-type: none"><li>1. The NPS is a leader in the wildland fire community.</li><li>2. The NPS Wildland Fire Management Program is committed to safety, science, and stewardship.</li></ol>  |
| <i>Why</i>  | { | <ol style="list-style-type: none"><li>3. Wildland fire is an essential, natural process.</li><li>4. <i>Science tells the story:</i> Today's environment includes hotter, drier, and longer fire seasons. Research also indicates poor ecosystem health and an increasing number of homes in fire prone areas.</li></ol> |
| <i>How</i>  | { | <ol style="list-style-type: none"><li>5. The NPS works with our neighbors and other partners to preserve and protect park resources and mitigate wildfire risk in the wildland-urban interface (WUI).</li></ol>   |

The Alaska Wildland Fire Coordinating Group, Wildland Fire Education and Prevention Committee developed Alaska interagency key messages and can be viewed at <http://fire.ak.blm.gov/administration/awfcg.php>

#### Alaska Key Messages

1. Public and firefighter safety is our first priority.
2. Wildland fire happens, be ready.
3. Wildland fire is an essential, natural process.
4. Alaskans work together to manage wildland fire.
5. Managing wildland fire in Alaska balances risks and benefits in an ever changing environment.

A key message specific to *Yukon-Charley Rivers National Park and Preserve* includes,

1. Communicating fire information to local communities is vitally important.

### C. Target Audiences

The park has identified twelve target audiences for fire key messages.

1. **Park Visitors** – In-park visitors and special groups

2. **Virtual Visitors** – Website visitors and those who utilize social web such as Twitter for information sharing
3. **Park Employees** - NPS, Alaska Geographic, concessions, and volunteers
4. **Local Communities** – Residents and property owners such as Alaska Native corporations, businesses inside or near the park, and special interests such as city councils or advocacy groups.
5. **Student/Teachers** – K-12 students and teachers, college/graduate school students, and elder hostel groups
6. **Professional Peers/Partners** – Federal, state and local agencies, professional associations, and academics
7. **Tourism Related Groups** (including Holland America)
8. **Commercial Use Authorizations** – Businesses that operate in the park such as flight services, guide services including hunting and fishing guides, and boat charters that are based in communities used to access the preserve.
9. **Elected Officials** – Federal, state and local
10. **Media** – Print, television, radio, film, and web-based news publications
11. **Incident Management Teams (IMT)** – Type 1, 2, and 3 IMT teams that may be from Alaska or the Lower 48
12. **Visitor Centers:** Tok Visitor Center and Fairbanks Public Lands Information Center:

### ***D. Communication Methods***

The following methods will be used to communicate with the target audiences listed above. There are both personal and non-personal methods which will facilitate reaching the largest number of people. The park will continue to improve and expand this list.

#### **Personal**

1. **Interpretive Programs** – Park staff will integrate fire messages into the variety of programs offered by the interpretative division.
2. **Education Programs** – Park staff, Regional and Eastern Area Fire Management staff will incorporate fire ecology concepts into curriculum-based education programs, student field research experiences and in-class programs.
3. **Employee Training** – Eastern Area Fire Management Program and park staff will coordinate employee training sessions to improve staff understanding of the fire management program.
4. **Presentations** – Regional and Eastern Area Fire Management staff will give peer presentations at conferences about current fire research, planning, or operations.
5. **Special Events** – Park staff, Regional and Eastern Area Fire Management staff will participate in local events (festivals, July 4<sup>th</sup> celebrations) to promote the fire management program.
6. **Public Meetings** – As needed, regional and Eastern Area Fire Management staff will conduct special public meetings related to a specific fire event, planning effort or to share general program information.
7. **Workshops** – With help from interagency and educational partners, RFC&E Specialist and the park staff will offer in teacher workshops that incorporate fire ecology and management issues. Regional and Eastern Area Fire Management staff and park staff will participate as needed.
8. **Media Interviews** – Park PIO and/or RFC&E Specialist will complete in-person or phone interviews for print, radio, and television outlets. When necessary the RFC&E Specialist will facilitate special media projects (books, documentaries etc.) by guiding research, scheduling interviews with appropriate staff, and coordinating filming schedules.
9. **Fire Interest List** – RFC&E Specialist maintains a listserv of individuals interested in receiving e-mails on all aspects of wildland fire.
  10. **Recorded Phone Message** – Park PIO and/or RFC&E Specialist will maintain a recorded “Fire Information” message.
11. **Social Web** – Currently, Twitter is the main social web tool utilized by parks in Alaska. Park PIO (or designee) will update the YUCH Twitter page as necessary and the RFC&E Specialist will

update the Alaska NPS Twitter page. Maintained year-round, these “tweets” will serve as brief updates on park information including fire. The RFC&E will coordinate with the park designee to disseminate information as necessary. This method of communication is two-way, allowing both the park and the public to make comments on the park page and providing the opportunity for the park to respond.

12. **Annual Operating Plan** – Currently a draft plan, this document can be reviewed in the spring to help inform park staff on expected fire management operations. A final version will be complete in late 2010.

#### **Non-Personal**

1. **Webpage** – Park staff will maintain a fire management webpage that is linked to the main park webpage. RFC&E Specialist can assist as needed.
2. **Fire News, Inciweb** – Eastern Area Fire Management staff, park PIO, and/or park staff with support from RFC&E Specialist will update Fire News throughout the duration of an incident. Update InciWeb as an incident warrants.
3. **AK 2day and Inside NPS** - Park PIO and/or RFC&E Specialist will submit information regarding fire management activities on these internal websites.
4. **Press Releases/ Updates** – Park PIO and/or RFC&E Specialist will use email, fax, and bulletin boards to distribute press releases/updates, photos and public fire maps for all target audiences as needed.
5. **Public Fire Maps** – Eastern Area Fire Management staff will produce internal and external fire incident maps. Regional Fire staff may provide some assistance.
6. **Press Kit** – RFC&E Specialist and park PIO will compile and annually update a fire information press kit.
7. **Fire Education Trunks** – RFC&E Specialist will supply the park with fire educational materials. Park staff, with assistance from the RFC&E Specialist, will resupply the materials as needed.
8. **Visitor Center Exhibits, Wayside Exhibits, Bulletin Boards, and Displays** – Park staff will maintain and update the interpretive information in visitor centers and wayside exhibits on fire management. RFC&E Specialist will provide support as needed.
9. **Portable Displays and Banner Stands** – RFC&E Specialist will store and organize several portable displays and banner stands for use at trainings, internal meetings, public events and conferences. These portable displays are either kept in an area cache or can be shipped from the Anchorage office as needed.
10. **PIO Supplies** – Fire information banners, nametags, and vehicle magnets are available at the regional office and area program.
11. **Publications** – Park staff will include fire management information in regular park publications. Eastern Area Fire Management Program will engage with the park staff in development of park publications. RFC&E Specialist and/or Eastern Area Fire Management staff with park support will research, write, and design additional handouts specifically about fire management such as newspapers, fire stories, brochures, posters, and templates. The area fire management program and RFC&E Specialist maintain a variety of fire brochures available for the park.
12. **Scientific Papers** – Park researchers and/or Regional and Eastern Area Fire Management staff will publish park papers in scientific journals and/or periodicals regarding new information from the park’s fire management program.

### ***E. Emerging Tools***

This plan provides recommendations for regional and park level fire communication and education programs. Digital communication tools will continue to emerge. It is important to stay abreast of new technology in order to relay the NPS safety and educational messages about wildland fire. Currently, Twitter is the main social web tool used in parks; it is very likely that this will evolve and more tools will be used in the near future.

## ***F. Evaluation***

To maintain a successful program, the NPS Wildland Fire Management Program will seek evaluation opportunities such as independent surveys of visitors/residents/employees. Staff will conduct program reviews for the regional and park fire management programs. After action reviews are a part of the fire culture and will be used as appropriate.

## ***G. Education Annual Plan by Season***

The table describes the FC&E education annual plan which gives year-round direction for the FC&E program. Depending on the season, certain educational elements are emphasized. The table highlights these emphasis areas and links them to communication methods and target audiences. It is important to remember that this plan is general and will not prevent the program from engaging in new, innovative methods in the future.

**Table 18: Communication/ Education Annual Plan by Season (recommended guidelines): YUCH (Yukon-Charley Rivers National Park and Preserve)**

Season	Communication/ Education Emphasis	Communication Methods	Target Audiences										
			Park Visitors	Virtual Visitors	Park Employees	Local Communities	Students /Teachers	Professional Peers	Tourism Groups	Commercial Use Authorizations	Elected Officials	Media	Incident Management Teams
Spring	Pre-Season Information	Interagency meetings Fire interest lists Social web Webpage Press releases /updates Portable displays Publications Brochure distribution	*		*	*		*	*			*	*
	Key messages	Employee training Special events/ public meetings Interagency meetings Media interviews/ press kit Social web Webpage Portable displays Publications	*	*	*	*	*	*	*	*	*	*	*
	Student/ Teacher Education	Education programs Workshops					*						
	Employee Education	Employee training Presentations Special events/ public meetings Fire interest lists AK 2day and Inside NPS			*								
	Restock Comm. Ed Cache	Publications			*								
	Interagency Cooperation	Presentations Interagency meetings Fire interest lists Scientific papers			*			*					*
	Recruitment	Interagency meetings Fire interest lists Webpage			*	*	*						*

Season	Communication/ Education Emphasis	Communication Methods	Target Audiences										
			Park Visitors	Virtual Visitors	Park Employees	Local Communities	Students /Teachers	Professional Peers	Tourism Groups	Commercial Use Authorizations	Elected Officials	Media	Incident Management Teams
Summer	Incident Information Key messages	Special events / public meetings Media interviews/ Press kit Recorded phone messages Social web Webpage Fire News/ Inciweb Press releases / updates Public fire maps Exhibits/ bulletin boards Portable displays/ banner stands Special events/ public meetings Media interviews Social web Webpage Press kit Portable displays Publications	*	*	*	*	*	*	*	*	*	*	*
	Interpretation	Interpretative programs Fire education trunks Exhibits/ displays	*			*						*	
	Employee Education	Fire interest lists AK 2day and Inside NPS Presentations Scientific papers			*								
	Interagency Cooperation	Fire interest list Press releases / updates Fire News/ Inciweb			*		*						*
Fall	Post-Season Information	Special events / public meetings Media interviews Webpage Press releases / updates Publications	*		*	*	*	*	*			*	*
	Employee Education	AK 2day and Inside NPS Publications/ scientific papers			*								
	Interagency Cooperation	Interagency meetings Fire interest lists Press releases / updates Publications/ scientific papers			*		*						*
	Student/ Teacher Education	Education programs					*						
Winter	Post-Season Information	Webpage Publications	*	*	*	*							
	Development of New Materials	Exhibits/ displays Portable displays Printed publications Publications/ brochures	*		*	*	*	*				*	*
	Key message review	Employee training Interagency meetings			*		*						*
	Restock Comm. Ed cache	Publications											
	Employee Education	AK Today and Inside NPS Publications/ scientific papers			*								
	Interagency Cooperation	Presentations Interagency meetings Fire interest list					*						*
	Student/ Teacher Education	Education programs				*							

## **X. PROTECTION OF SENSITIVE RESOURCES**

### **A. Archeological / Cultural / Historic Resources**

If historic fire activity is any indication, one may presume that wildland fire has, at some point, affected virtually every prehistoric site within the preserve, and perhaps even many of the historic sites. Wildland fire effects on the types of materials commonly found in these sites will tend to be minimal. Thus, the Fire Management Plan will have no immediate impact on the majority of archeological and non-structural historical resources within the preserve.

Where wildland fire activity threatens cultural sites which have been designated Full or Critical protection status, the Ak Eastern Area FMO will immediately contact the park Cultural Resource Specialist for consultation, particularly if ground disturbing activities are required for protection or fire suppression. The Ak Eastern Area FMO will also contact the Cultural Resource Specialist if fire suppression activities for the protection of inholdings might affect sites on surrounding preserve lands. Proactive measures will be taken to protect select structures within the preserve. The following discussion provides background and criteria associated with the selection process.

Because the protection of every known cabin site within the preserve is not feasible, criteria have been established to provide cultural resource specialists and park management with a sound methodology for determining which key sites will be afforded special protections from wildland fire. The criteria are as follows and may be updated or improved upon should new information come to light.

#### **1. Fire Protection Categories**

##### **a. Critical:**

###### **i. Definition**

Fires occurring immediately threatening this designation will receive highest priority for protection from wildland fires by immediate and continuing aggressive actions dependent upon the availability of suppression resources.

###### **ii. Objectives**

Protect human life, inhabited property and designated physical developments without compromising fire fighter safety. Protection of the aforementioned elements is the primary objective, not control of the wildland fire.

###### **iii. Recommended Criteria**

1. Year-round residence.
2. Structural resources designated as National Historic Landmarks. (At present, the preserve contains no National Historic Landmark properties.)

##### **b. Full**

###### **i. Definition**

Fires occurring immediately threatening this designation will receive aggressive initial attack dependent upon the availability of suppression resources.

## **ii. Objectives**

Protect sites designated as Full management from the spread of wildland fires burning in a lower priority management option. Minimize damage from wildland fires to the resources identified for protection commensurate with values at risk.

## **iii. Recommended Criteria**

1. Structural resources designated or eligible for inclusion on the National Register of Historic Places.
2. Structural resources that have received NPS funds for rehabilitation or restoration.
3. Structural resources vital to the NPS mission i.e. administrative sites.
4. Structural resources with a high degree of structural integrity which are also representative of historic themes established by the Preserve.

## **c. Non- Sensitive**

### **i. Definition**

Fires occurring immediately threatening this designation will be allowed to burn under the influence of natural forces within predetermined areas while continuing protection of human life. Generally this designation receives the lowest priority for allocations of initial attack resources.

### **ii. Objectives**

Within land manager policy constraints, accomplish land and resource management objectives through the use of wildland fire. Reduce overall suppression costs through minimum resource commitment without compromising firefighter safety.

### **iii. Recommended Criteria**

1. Trespass structures.
2. Abandoned structures that are not eligible for inclusion on the National Register of Historic Places.

## **d. Not Designated**

### **i. Definition**

These sites are managed by agencies other than the National Park Service. Fires occurring immediately threatening this designation will receive the management objective desired by the appropriate management agency.

### **ii. Objectives**

Within land manager constraints, accomplish land and resource management objectives by providing **Limited Response** actions commensurate with values at risk.

### **iii. Recommended Criteria**

1. Structures which reside on Native Cooperation Land
2. Structure which reside on Private, State or University Land.

## **2. Undetermined National Register Status Sites**

According to the Preserve's current Cabin Database, there are 146 sites remaining that have yet to be evaluated for National Register eligibility. Of those sites, 60% are either private or non-historic structures and the Determination of Eligibility does not apply. Visiting, documenting, and researching the remaining 40% of structural sites will be a monumental undertaking, particularly for a small staff of two to three Cultural Resource Specialists. In addition, it is likely that several of the sites reported to be in fair or good condition in the past are now completely overgrown, collapsed, or washed away by periodic riverbank flooding.

In order to approach the task of assessing each of these sites for eligibility, cultural resource staff has proposed working together with the AK Eastern Area FMO to determine areas in which conditions are most ripe for wildland fire activity. This information will be used to formulate a prioritized plan for systematic inventory and documentation of known, poorly documented sites, with the most threatened sites at the top of the list. Site proximity to areas of high human impact, in particular the Charley and Yukon River corridors will also factor in prioritization for site documentation and assessment. Coincidentally, both the Charley and Yukon Rivers contain the majority of complete and near-complete structures within the preserve. Any newly discovered sites will be incorporated into the assessment process. Some location data for cabin and other sites with structural components is rather dubious, making it difficult to locate sites and gather data. As yet, the time frame necessary for completion of this documentation and assessment project has not been determined and will depend greatly on the ability to access and locate sites.

### **3. Historic Structure Management Plan**

The Preserve is currently in the process of developing a Cabin Management Plan that will address a variety of concerns related to cabin sites. Utilizing existing data, cultural resource staff will outline documentation and survey needs within the preserve. Site eligibility for the National Register will be researched and nominations sent to the State Historic Preservation Officer.

In addition, recommendations for rehabilitation and stabilization projects will be made to the National Park Service Alaska Region Historian and Historic Architect. These recommendations will be based on careful consideration of site significance, condition, and relationship to established park historic themes. A draft version of the **Alaska NPS Structure Protection Procedures** is included in [Appendix H.3](#).

#### **B. Sensitive Natural Resources**

No threatened or endangered animal or plant species are known to be present at Yukon-Charley.

Certain fire suppression activities could, however, pose a threat to fragile soil layers and to other ecosystem components. This type of risk will be mitigated through the use of minimum impact suppression tactics, as specified by NPS policy.

#### **C. Developments and Inholdings**

Structures within the Preserve will be assigned to an appropriate AIWFMP protection category by the Preserve staff, as directed by the Recommended Criteria for Fire Protection of Structural Resources within YUCH. There are 2 sites that have been nominated for listing with the National Register of Historic Places. These properties are eligible for preservation and should be

protected from destruction or impairment. Determinations of Eligibility have been done on 47 other sites within YUCH and meet the National Register Criteria for Evaluation.

<b>NUMBER</b>	<b>SITE NAME</b>	<b>PROTECTION STATUS</b>	<b>Latitude</b>	<b>Longitude</b>
KARI-STR-004	Woodruff Cabin	Full	65.4581	-142.5546
COCR-STR-022	Coal Creek Camp	Full	65.3051	-143.1541
YURI-STR-045	Ray Bell Cabin	Full	65.4274	-143.5546
BECR-STR-RAWS	Ben Creek RAWS	Full	65.2964	-143.0724
BECR-STR-004	Ben Creek Cabin	Full	65.2853	-143.0316
FOJU-STR-001	Crowley Creek Cabin	Full	65.1377	-141.9177
FOJU-STR-002	Fourth of July Cabin	Full	65.1348	-141.9861
SACR-STR-001	Sam Creek	Full	65.311	-142.8726
YURI-STR-013	Nation Bluff Cabin	Full	65.204	-141.739
COCR-STR-003	Frank Hall's Cabin	Full	65.2931	-143.1706
COCR-STR-023	Cheese Creek	Full	65.2843	-143.2088
COALCP83	Coal Creek Dredge	Full	65.3338	-143.1116
YURI-STR-040	Slavens Roadhouse	Full	65.351	-143.1202
YURI-STR-023	Glenn Creek Cabin	Full	65.3021	-142.0902
KARI-STR-009	Kandik Mouth	Full	65.3766	-142.5155
YURI-STR-063	Slavens Public Use Cabin	Full	65.3508	-143.1206
WOCR-STR-001	Woodchopper's Site	Full	65.2944	-143.4125

**Table 19: Protection Sites**

# Yukon-Charley Rivers National Park and Preserve Fire Protection Points

Alaska Region  
National Park Service  
U. S. Department of the Interior

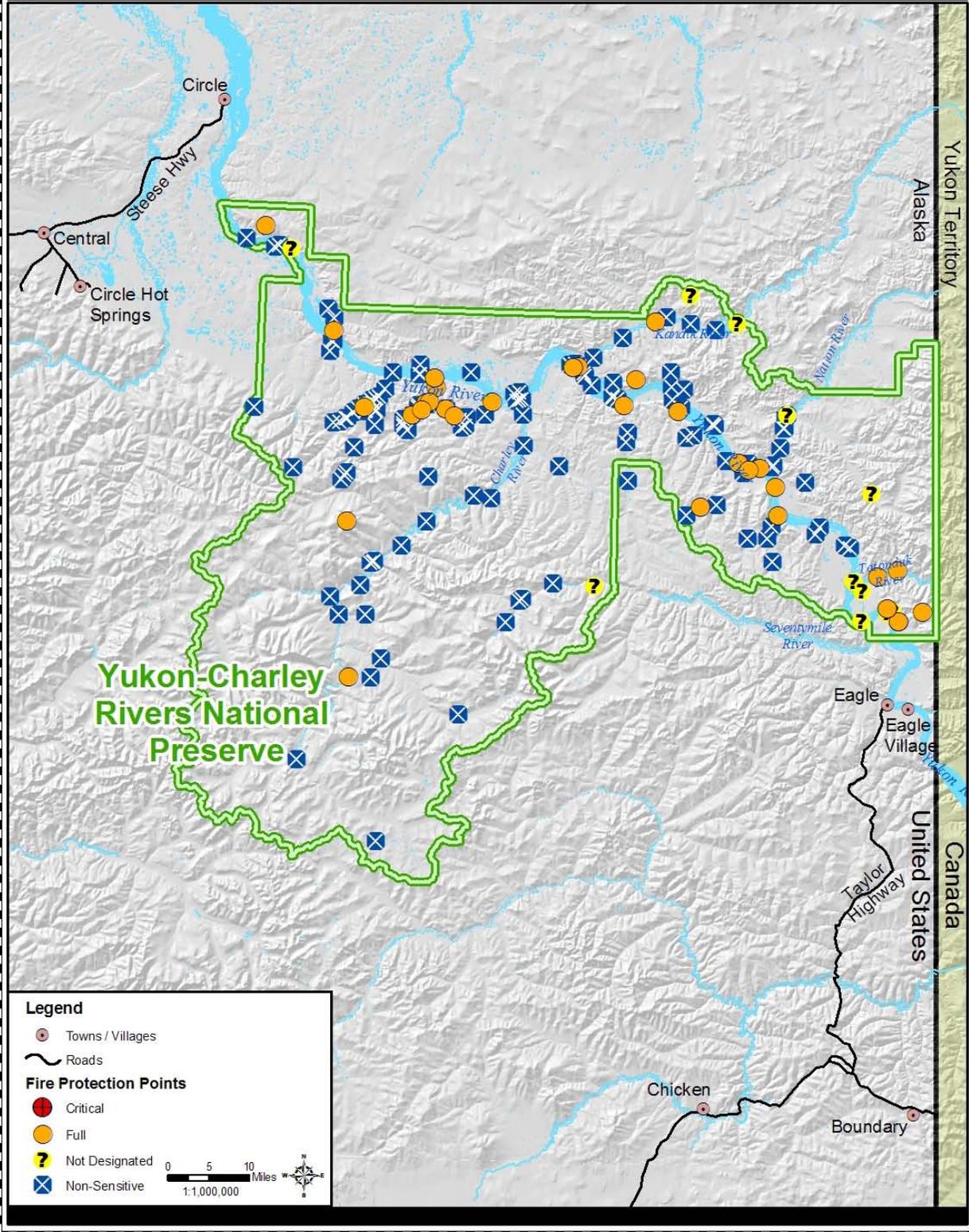


Figure 15: Fire Protection Points

## **XI. REVIEWS OF FIRE MANAGEMENT PROGRAMS, PROGRAM COMPONENTS, WILDLAND FIRES AND THE FIRE MANAGEMENT PLAN**

### **A. Preserve-level Incident Reviews**

All wildland fire incidents within the Preserve will be reviewed and prescribed fires implemented within the Preserve will be reviewed as appropriate. The nature and scope of such reviews will vary in accordance with the complexity of the incident at hand, as follows:

#### **1. Single-shift incidents:**

For incidents within the Preserve lasting no more than one operational period, a critique will be conducted as quickly as practical upon completion of control and mop-up. As many personnel involved in the incident as possible will participate in the critique; the Incident Commander or Burn Boss will relay any special concerns or problems identified during the critique to the Chief of Resources.

#### **2. Low-complexity multi-shift incidents:**

For simple incidents lasting longer than one operational period, a critique will be conducted within three days of completion of mop-up by the Chief of Resource Management, the YUCH Fire Management Officer, and any others with special knowledge of or interest in the incident in question. The objective of the critique will be to determine the effectiveness of the YUCH fire management program; procedures for such critiques are outlined in NPS-18, Section III, Chapter 9, Exhibit 2.

#### **3. Higher-complexity multi-shift incidents:**

The AFS will conduct a close-out meeting with the Incident Management Team at the conclusion of each type I or II incident to ensure the successful transition of the incident back to the Preserve and to identify any incomplete fire business. Refer to Chapter 13, Exhibit 1 of Reference Manual 18 for a sample.

#### **4. Periodic Assessments for ongoing incidents:**

Currently, the recommended direction is that all incidents in Response Levels 2 and 3 have Periodic Assessments done. A Periodic Assessment reviews the objectives, response levels, and accomplishments of an incident and reassesses the objectives to determine the appropriate Response Level. If an incident spans more than one burn period and a pre-planned response is not identified, a change in Response Level will occur. The WFDSS Response Level will rise when the Agency Administrator determines that resources are inadequate to accomplish the currently identified objectives of an incident. The Incident Commander, in conjunction with the AK Eastern Area FMO or the Agency Administrator, will review all ongoing YUCH incidents until the incident is declared out. More information on Response Levels can be found in Section IV, Part D. and Appendix H.

### **B. Regional and National-level Incident Reviews**

A regional or national-level incident review may be conducted under any of the following circumstances:

- Fire crosses the Preserve's boundaries into another jurisdiction without the approval of the landowner or agency.
- An incident results in adverse media attention.
- An incident involves death, serious injury or significant property damage, or exhibits potential to do so.
- An incident results in controversy involving another agency.

Refer to Chapter 13, Reference Manual 18 for distinction between regional and national-level reviews and for examples of each.

### **C. Entrapment and Fire Shelter Deployment Reviews**

Fire shelter deployment is defined as the use of a fire shelter for its intended purpose in any situation other than training. All entrapments and fire shelter deployments will be reported to the AK Regional Fire Management Officer, who will in turn develop a review team in cooperation with the Fire Management Program Center. The team leader will obtain reporting information from the YUCH Superintendent, and the review will be conducted in accordance with the guidelines presented in Chapter 3 of Reference Manual 18 (see Exhibits 4 and 5).

### **D. Program and Plan Reviews**

An informal fire management review will be conducted annually to evaluate current procedures and to identify any needed changes to the Preserve's FMP. A formal internal fire management review will be conducted every five years.

Authority to make minor changes to the AK Eastern Area FMP including changes in procedure, delegations, corrections and additions reside with the AK Eastern Area FMO. The Superintendent, however, must approve significant changes to the body of the Fire Management Plan.

## **XII. CONSULTATION AND COORDINATION**

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## APPENDIX A: REFERENCES

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Alaska Interagency Fire Effects Task Group 2007. Fire Effects Monitoring Protocol (version 1.0).

Editors: J. Allen, K. Murphy and R. Jandt. , 43 pp. Available from:

[http://depts.washington.edu/nwfire/publication/AK\\_Fire\\_Effects\\_Monitoring\\_Protocol\\_2007.pdf](http://depts.washington.edu/nwfire/publication/AK_Fire_Effects_Monitoring_Protocol_2007.pdf) OR

<http://fire.ak.blm.gov/administration/awfcg.php>

Alaska Interagency Wildland Fire Management Plan. Copies can be found at the Yukon-Charley Rivers National Preserve Headquarters in Eagle, Alaska or on line at

<http://forestry.alaska.gov/pdfs/98AIFMP.pdf>.

Alaska Land Managers Cooperative Task Force. 1979. Fortymile Interim Fire Management Plan.

Alaska Wildland Fire Coordinating Group. 1998. Alaska Interagency Wildland Fire Management Plan.

Bevins, Collin D. 1984. Historical fire occurrence in aspen stands of the Intermountain West. Missoula, MT: Systems for Environmental Management. Cooperative Agreement 22-C-4-INT-31. 23 p.

Bliss, L. C. and R. W. Wein. 1972. Plant community responses to disturbance in the western Canadian Arctic. *Canadian Journal of Botany* 50:1097–1109.

Bradley, Anne F.; Noste, Nonan V.; Fischer, William C. 1992. Fire ecology of forests and woodlands of Utah. Gen. Tech. Rep. INT-287. Ogden, UT: U.S. Department of Agriculture, Forest Service, Intermountain

Brinkman, Kenneth A. 1974. *Betula L. birch*. In: Schopmeyer, C. S., technical coordinator. Seeds of woody plants in the United States. Agric. Handb. 450. Washington, DC: U.S. Department of Agriculture, Forest Service: 252-257. [46]

Brown, James K.; Smith, Jane K., eds. 2000. Wildland fire in ecosystems: effects of fire on flora. Gen. Tech. Rep. RMRS-GTR-42-vol. 2. Ogden, UT: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 257 p

Brown, James K. 1974. Handbook for inventorying downed woody material. USDA Forest Service Gen. Tech. Rep. INT-16. Intermountain Forest and Range Experiment Station. Ogden, UT. 24 p.

Brown, R. J. E. 1983. Effects of fire on the permafrost ground thermal regime *in*: The Role of Fire in Northern Circumpolar Ecosystems, John Wiley & Sons; New York. pp.97-110.

Brown, R. J. E. 1971. Some effects of a forest fire on a permafrost active layer at Inuvik, N.W.T. Proceedings: Seminar on permafrost active layer. Tech. Memo 103. Canadian Natural Research Council, Association Geotechnical Research: 31-36.

Brown, James K.; Smith, Jane K., eds. 2000. Wildland fire in ecosystems: effects of fire on flora. Gen. Tech. Rep. RMRS-GTR-42-vol. 2. Ogden, UT: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 257 p

Burgan, Robert E. and Rothermel, Richard C. Behave: Behavior Prediction and Fuel Modeling System. U.S. Forest Service. General Tech Report INT-167. 1984.

Cahoon, D.R., B.J. Stocks, J.S. Levine, W.R. Cofer, and J.M. Pierson, Satellite analysis of the severe 1987 forest fires in northern China and southeastern Siberia, *J. Geophys. Res.*, **99** (D9), 18627-18638, 1994.

Cook, M.B., C.A. Roland, and P.A. Loomis. 2007. An Inventory of the Vascular Flora of Wrangell-St. Elias National Park and Preserve, Alaska. Natural Resource Technical Report NPS/CAKN/NRTR-2007/067. National Park Service, Fort Collins, Colorado.

Day, R. J.; Harvey, E. M. 1981. Forest dynamics in boreal mixedwood. In: Whitney, R. D.; McClain, K. M., compilers. Boreal mixedwood: Proceedings of a symposium; [Date of conference unknown]; [Location of conference unknown]. COJFRC Symp. Proc. O-P-9. Sault Ste. Marie, ON: Environment Canada, Canadian Forestry Service, Great Lakes Forestry Research Centre: 29-41.

Dickmann, Donald I.; Stuart, Katherine W. 1983. The culture of poplars in eastern North America. East Lansing, MI: Michigan State University, Department of Forestry. 168 p. [6317]

Downing, G.L. 1957. The recent history of destructive forest insect activity in Alaska. Proc. 8th Alaska Science Conference, Anchorage, Alaska. 6 p.

Elzinga, C.L., Daniel Salzer, and John W. Willoughby. 1998. BLM/RS/ST-98/005+1730. BLM Technical Reference 1730-1. U.S. Department of the Interior, Bureau of Land Management. National Business Center, Denver, CO. 475.

Flannigan, M. D. and Harrington, J. B.: 1988. A study of the relation of meteorological variables to monthly provincial area burned by wildfire in Canada (195301980). *Journal of Applied Meteorology* 27: 441-452.

Fechner, Gilbert H.; Barrows, Jack S. 1976. Aspen stands as wildfire fuel breaks. Eisenhower Consortium Bulletin 4. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Forest and Range Experiment Station. 26 p. In cooperation with: Eisenhower Consortium for Western Environmental Forestry Research

Foote, M. Joan. 1983. Classification, description, and dynamics of plant communities after fire in the taiga of interior Alaska. Res. Pap. PNW-307. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Forest and Range Experiment Station. 108 p.

Interagency Fire Regime Condition Class Guidebook (FRCC). Version 1.3.0. June 2008. Fire Research And Management Exchange System (FRAMES), University of Idaho. [Internet]. Moscow, ID. [Cited March 2010]. Available from: <http://frames.nbii.gov/>

FMH USDI National Park Service. 2003. Fire Monitoring Handbook. Boise (ID): Fire Management Program Center, National Interagency Fire Center. 274 p.

Haeussler, S.; Coates, D. 1986. Autecological characteristics of selected species that compete with conifers in British Columbia: a literature review. Land Management Report No. 33. Victoria, BC: Ministry of Forests, Information Services Branch. 180 p. [1055]

Index of Species Information SPECIES: *Picea mariana* Introductory Distribution and Occurrence Management Considerations Botanical and Ecological Characteristics Fire Ecology Fire Effects Fire Case Studies References

<http://www.fs.fed.us/database/feis/plants/tree/picmar/introductory.html>

Index of Species Information SPECIES: *Betula papyrifera* Introductory Distribution and Occurrence Management Considerations Botanical and Ecological Characteristics Fire Ecology Fire Effects References

<http://www.fs.fed.us/database/feis/plants/tree/betpap/introductory.html>

Index of Species Information SPECIES: *Populus tremuloides* Introductory Distribution and Occurrence Management Considerations Botanical and Ecological Characteristics Fire Ecology Fire Effects Fire Case Studies

<http://www.fs.fed.us/database/feis/plants/tree/poptre/introductory.html>

Index of Species Information SPECIES: *Populus balsamifera* subsp. *balsamifera* Introductory Distribution and Occurrence Management Considerations Botanical and Ecological Characteristics Fire Ecology Fire Effects

<http://www.fs.fed.us/database/feis/plants/tree/popbalb/introductory.html>

Index of Species Information SPECIES: *Larix laricina* Introductory Distribution and Occurrence Management Considerations Botanical and Ecological Characteristics Fire Ecology Fire Effects References Introductory

<http://www.fs.fed.us/database/feis/plants/tree/larlar/introductory.htm>

Index of Species Information SPECIES: *Picea glauca* Introductory Distribution and Occurrence Management Considerations Botanical and Ecological Characteristics Fire Ecology Fire Effects References Introductory

<http://www.fs.fed.us/database/feis/plants/tree/picgla/introductory.html>

Jandt, R.R., J.L. Allen, and E. Horschel. 2005. Forest floor moisture content and fire danger indices in Alaska. BLM/AK/ST-05/009+9218+313. Alaska Technical Report 54. U. S. Department of the Interior, Bureau of Land Management. Anchorage, Alaska. 30 p.

Keith, Lloyd B.; Surrendi, Dennis C. 1971. Effects of fire on a snowshoe hare population. *Journal of Wildlife Management*. 35(1): 16-26. [124]

Key, C.H. and Benson, N. 2005. Landscape Assessment (LA) Sampling and Analysis Methods (Version 5.0); USDA Forest Service Gen. Tech. Rep. RMRS-GTR-164-CD. 2006

Krasny, Marianne E.; Vogt, Kristiina A.; Zasada, John C. 1988. Establishment of four Salicaceae species on river bars in interior Alaska. *Holarctic Ecology*. 11: 210-219. [10558]

Lutes, Duncan C., Robert E. Keane, John F. Caratti, Carl H. Key, Nathan C. Benson, Steve Sutherland, and Larry J. Gangi. 2006. FIREMON: Fire effects monitoring and inventory system. Gen. Tech. Rep. RMRS-GTR-164-CD. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 1 CD.

Lutz, H. J. 1956. Ecological effects of forest fires in the interior of Alaska. U.S. Dept. Agr. Tech. BuIL 1133. 121 pp.

Maini, J. S. 1968. Silvics and ecology of Populus in Canada. In: Maini, J. S.; Cayford, J. H., eds. Growth and utilization of poplars in Canada. Departmental Publication No. 1205. Ottawa, ON: Department of Forestry and Rural Development

Maini, J. S. 1968. Silvics and ecology of Populus in Canada. In: Maini, J. S.; Cayford, J. H., eds. Growth and utilization of poplars in Canada. Departmental Publication No. 1205. Ottawa, ON: Department of Forestry and Rural Development: 20-69

Managing the Impact of Wildfires on Communities and the Environment. A Report to the President In Response to the Wildfires of 2000. Secretaries Babbitt and Glickman. September 8, 2000.

Mann, D.H., Plug, L.J., 1999. Vegetation and soil development at an upland taiga site, Alaska. *Ecoscience* 6 (2), 272–285.

Mann, D.H., Fastie, C.L., Rowland, E.L., Bigelow, N.H., 1995. Spruce succession, disturbance, and geomorphology on the Tanana River floodplain, Alaska. *Ecoscience* 2 (2), 184–199.

Protecting People and Sustaining Resources in Fire Adapted Ecosystems: A Cohesive Strategy. The Forest Service Management Response to the General Accounting Office Report GAO/RCED-99-65 October 13, 2000

National Wildland Fire Coordinating Group. 1993. Prescribed Fire Complexity Rating System Guide.

National Wildland Fire Coordinating Group. 1996. Wildland Fire Qualification Guide.

National Park Service. 1998. Director's Order No. 18: Fire Management.

National Park Service. 1985. General Management Plan, Yukon-Charley Rivers National Preserve.

National Park Service. 2008. Reference Manual No. 18: Fire Management.

National Park Service. 1994. Resource Management Plan, Yukon-Charley Rivers National Preserve.

National Park Service. 1990. NPS-18 Guideline: Wildland Fire Management.

Peck, V. Ross. 1988. Fire and elk in northeastern British Columbia: the historical context. In: Feller, M.C.; Thomson, S.M., eds. Wildlife and range prescribed burning workshop proceedings; 1987 October 27-28; Richmond, BC. Vancouver, BC: The University of British Columbia, Faculty

Perala, D. A. 1990. Populus tremuloides Michx. quaking aspen. In: Burns, Russell M.; Honkala, Barbara H., technical coordinators. Silvics of North America: Volume 2, Hardwoods. Agriculture Handbook 654 Washington, DC: U.S. Department of Agriculture, Forest Service: 555-569

Pyne, S.J. 1982. Fire in America: a cultural history of wildland and rural fire. Princeton, N.J. Princeton University Press.

Pyne, S.J. 1984. Introduction to wildland fire, fire management in the United States. New York: John Wiley and Sons.

- Schimmel, J. & Granstrom, A. 1996. Fire severity and vegetation response in the boreal Swedish forest. *Ecology* 77: 1436-1450.
- Stocks, B.J. 1993. Global warming and forest fires in Canada. *For. Chron.* 69(3), 290-293.
- United States Congress. 1969. National Environmental Policy Act.
- U.S. Departments of Agriculture and Interior. 1999. Wildland and Prescribed Fire Management Policy, Implementation Procedures Reference Guide.
- U.S. Department of Interior. 1998. Departmental Manual, Part 620, Chapter 2: General Policies and Procedures—Alaska.
- U.S. Department of Interior. Bureau of Land Management September 2002. [Yukon-Charley/Black River/Fortymile Earth Cover Classification. Bureau of Land Management, National Park Service, and Ducks Unlimited, Inc. Technical Report 48](#). 40 pages.
- U.S. Forest Service, Department of Agriculture. 1999. Ogden, Utah. Fire Effects Information System.
- USDA Forest Service Gen. Tech. Rep. RMRS-GTR-42-vol. 2. 2000: 121-203
- Van Hees, W. W. S. and E. H. Holsten. 1994. Characteristics of a spruce beetle infestation through the use of a point-in-time extensive forest inventory, Kenai Peninsula, Alaska. *Canadian Journal of Forestry Research*. 24: 233-239.
- Van Wagner, C. E. (1983) Fire behaviour in northern conifer forests and shrublands *In: The Role of Fire in Northern Circumpolar Ecosystems*, John Wiley & Sons; New York . pp.65-80.
- Viereck, Leslie A. 1975. Forest ecology of the Alaska taiga. In: Proceedings of the circumpolar conference on northern ecology; 1975 September 15-18; Ottawa, ON. Washington, DC: U.S. Department of Agriculture, Forest Service: 1-22.
- Viereck, L.A., C.T. Dyrness, A.R. Batten, and K.J. Wenzlick. 1992. The Alaska Vegetation Classification. General Technical Report PNW-GTR-286. Portland, OR, USA. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 278 p.
- Viereck, Leslie A.; Schandelmeier, Linda A. 1980. Effects of fire in Alaska and adjacent Canada--a literature review. BLM-Alaska Tech. Rep.6. Anchorage, AK: U.S. Department of the Interior, Bureau of Land Mangement, Alaska State Office. 124 p.
- Viereck L. A. 1983. The effects of fire in black spruce ecosystems of Alaska and northern Canada. In: Wein, R.W.; D.A MacLean, (eds.) The role of fire in northern circumpolar ecosystems. New York: John Wiley & Sons Ltd.: 201-220. Chapter 11.
- Wildland Fires: Forest Service and BLM Need Better Information and a Systematic Approach for Assessing the Risks of Environmental Effects. 2004. Report to Congressional Requesters. GAO-04-705 Environmental Effects of Wildland Fire. United States General Accounting Office.
- Wilmore, B. 2000. Fuel moisture sampling in boreal forest duff. Unpublished report, U.S. Bureau of Land Management, Alaska Fire Service. 12 p

[Yukon-Charley/Black River/Fortymile Earth Cover Classification. Bureau of Land Management, National Park Service, and Ducks Unlimited, Inc. \*\*Technical Report 48\*\*](#). Bureau of Land Management, Anchorage, Alaska. September 2002. 40 pages.

## **APPENDIX B: DEFINITIONS AND ACRONYMS**

**Agency Administrator:** An incident-specific position filled by any qualified YUCH staff member as designated by the Preserve FMO or Chief of Operations. The Agency Administrator represents the YUCH Superintendent and works with the incident command team to ensure the compliance of wildland fire operations with Preserve and NPS resource management policy.

**AFS: Alaska Fire Service**

**AICC: Alaska Interagency Coordination Center**

**AIWFMP: Alaska Interagency WildFire Management Plan**

**ADES: Alaska Division of Homeland Security & Emergency Management**

**ANILCA: Alaska National Interest Lands Conservation Act**

**BEHAVE:** A system of interactive computer programs used for formulating fuel models based and predicting fire behavior.

**BUI:** Build Up Index used with CFFDRS

**CBI:** Composite Burn Index

**CFFDRS:** Canadian forest fire Danger Rating System. A system that is used to rate the risk of forest fires. It is comprised of two subsystems: The Forest Fire Weather Index (FWI) and the Forest Fire Behavior Prediction System (FBP). This system was adopted from Canada and used in Alaska since 1992. [http://cwfis.cfs.nrcan.gc.ca/en\\_CA/background](http://cwfis.cfs.nrcan.gc.ca/en_CA/background)

**Clean Air Act, 42 U.S.C. 7418:** The law that defines EPA's responsibilities for protecting and improving the nation's air quality and the stratospheric ozone layer. The last major change in the law, the Clean Air Act Amendments of 1990, was enacted by Congress in 1990. Legislation passed since then has made several minor changes. Further information available at: <http://www.epa.gov/air/caa/>

**DEC:** Department of Environmental Conservation

**Director's Order 18 (DO-18):** A comprehensive statement of National Park Service wildland fire management policy.

**DC:** Drought Code used with CFFDRS.

**DMC:** Duff Moisture Code used with CFFDRS

**EA:** Environmental Assessment

**Extended Attack:** Any wildland fire suppression action which lasts beyond one operational period.

**Fire Management Officer (FMO):** A permanent position with responsibility for the planning and coordination of fire management programs. A co-lateral duty area FMO stationed at Wrangell-St. Elias National Park and Preserve serves YUCH.

**FFMC:** Fine Fuel Moisture Code used with CFFDRS

**FMU:** Fire Management Unit

**Fuel Loading:** Amount of live and dead organic matter present at a particular site.

**Fuel Model:** A simulated fuel complex based on representative descriptors; used to estimate rate of spread and other fire behavior indices.

**GIS:** Geospatial Information System. Utilized to create maps and analyze data.

**GMP:** General Management Plan

**Initial Attack:** A wildland fire suppression action lasting no more than one operational period.

**Interagency Fire Regime Condition Class Guidebook (FRCC).** FRCC is a tool that categorizes a landscape's potential degree of departure from its reference condition. The FRCC system uses two sets of descriptors that, when combined, can be used to diagnose fire regime condition class. The first set of factors measures vegetation composition and structure changes. The second set measures possible changes in fire frequency and severity. FRCC also uses a fire regime classification system of five broadly defined fire regimes. More information available at: <http://frames.nbii.gov/>

**ISI:** Initial Spread Index used with CFFDRS

**JHA=**Job Hazard Analysis. Required for every work activity and are used to anticipate hazards associated with the type of work.

**LAL=**Lightning Activity Level. A measure of the amount of lightning activity.

**Limited Response:** Any action taken by fire managers which is intended to enhance resource benefits of the fire. Suppression actions may be included around resources that have been determined to have high value while the rest of the fire is allowed to burn.

**LCES=**Lookout,Communications,Escape Route and Safety Zones

**MAC =**Multi-Agency Coordination Group. Provides a forum to discuss actions to be taken to ensure that an adequate number of resources are available to meet anticipated needs and to allocate those resources most efficiently during periods of shortage.  
<http://fire.ak.blm.gov/administration>

**National Environmental Policy Act (NEPA)**

<http://www.epa.gov/compliance/nepa/>

**NFES**=National Fire Education System

**National Historic Preservation Act (NHPA)**= the National Historic Preservation Act of 1966 (amended through 1992) Section 110(b) of the National Historic Preservation Plan.

<http://www.nps.gov/history/nr/> or for Alaska see <http://dnr.alaska.gov/parks/oha/>.

**NIFC**: National Interagency Fire Center. Located in Boise, Idaho. The nation's support center for wildland firefighting. [www.nifc.gov/](http://www.nifc.gov/)

**NWCG**: National Wildland Fire Coordinating Group. Coordinate programs of the participating wildfire management agencies. [www.nwcg.gov/](http://www.nwcg.gov/)

**Prescribed Fire Use**: Planned implementation of fire within a pre-determined area and under pre-determined conditions, for the accomplishment of resource management objectives and/or hazard fuel mitigation.

**RAVAR**: It is the primary economics tool used in WFDSS. It identifies the primary resource values threatened by wildfire events. [http://www.fs.fed.us/rm/wfdss\\_ravar/](http://www.fs.fed.us/rm/wfdss_ravar/)

**Reference Manual 18 (RM-18)**: A detailed set of guidelines for the operational implementation of the wildland fire management policies specified in DO-18. RM-18 consists of a continuously evolving on-line document.

**Response to Wildland Fire**: Fire, as a critical natural process, will be integrated into land, Resource Management Plans and activities on a landscape scale, across bureau boundaries. Response to wildland fires is based on ecological, social, and legal consequences of the fire. The circumstances under which a fire occurs, and the likely consequences on firefighter and public safety and welfare, natural and cultural resources, and values to be protected, dictate the appropriate response to the fire.

**SLC**: State Logistics Center. State of Alaska's SLC is located in Fairbanks, AK.

**Wild Land Fire Decision Support System (WFDSS)**: A web based decision process which will utilize analysis programs such as Rapid Assessment of Values at Risk (RAVAR), Fire Spread Probability Model (FSPro) and Farsite. This system replaces WFIP and WFSa support systems.

**Wildland Fire**: Any occurrence of wildland fire not planned and ignited by management.

**Wildland Fire Suppression**: Any management action based on protection goals rather than resource management concerns.



## **APPENDIX C. SPECIES LIST**

Species lists and information for Yukon Charley Rivers Preserve can be found on the **NPSpecies** database. This database is a compilation of existing species lists and evidence records (vouchers, scientific documents, and observation records that support the species occurrences) for vertebrates and vascular plants in parks with significant natural resources. This site can be accessed at: <http://science.nature.nps.gov/im/apps/npspp/>

Other sources of information include:

<http://nrinfo.nps.gov/> , <http://science.nature.nps.gov/im/tracking/>

**APPENDIX D.1: ENVIRONMENTAL ASSESSMENT**

ENVIRONMENTAL ASSESSMENT  
FIRE MANAGEMENT PLAN  
FOR  
YUKON-CHARLEY RIVERS NATIONAL PRESERVE

PREPARED BY  
NATIONAL PARK SERVICE  
YUKON-CHARLEY RIVERS NATIONAL PRESERVE

February 8, 2000

## ENVIRONMENTAL ASSESSMENT

### Fire Management Plan for Yukon-Charley Rivers National Preserve

#### I. INTRODUCTION

##### **A. Purpose and Need**

The National Park Service proposes implementing National Park Service Director's Order 18 (1998) by establishing a fire management plan for Yukon-Charley Rivers National Preserve. This fire management plan is a comprehensive document and outlines Yukon-Charley Rivers National Preserve fire management goals and describes the policies and actions by which these goals will be realized. The plan will formalize the fire management decision-making process and the procedures that have been in place for over 15 years, redefine fire management strategies, establish the park's fire management organization and responsibilities, and relate resource management goals to fire management strategies. With the implementation of the proposed action, fire management within Yukon-Charley Rivers National Preserve will remain status quo and the on-the-ground application of the fire management strategies will continue as in the past.

This plan is necessary for the management of wildland fire at Yukon-Charley Rivers National Preserve which is potentially complex. Fire poses a potential threat to life and property as well as cultural and historic resources in and around the Preserve. At the same time, however, fire has long been an integral component of the area's ecosystems and is critical for the maintenance of virtually all indigenous conditions, from plant and animal populations to soil and permafrost layers. Accordingly, the scope of the proposed action and other considered alternatives entails the planning and implementation of policies and practices flexible enough to allow the simultaneous pursuit of protection and resource management goals.

This environmental assessment (EA) has been prepared in accordance with the National Environmental Policy Act of 1969 and the regulations of the Council of Environmental Quality (40 CFR 1508.9). It evaluates the potential impacts to cultural and natural resource values which could result from implementing the Yukon-Charley Rivers National Preserve Fire Management Plan. The environmental assessment is intended to facilitate decision-making based on an understanding of the environmental consequences of the proposal and determine whether preparation of an environmental impact statement is required.

##### **B. Background**

In 1983 the National Park Service cooperated with Bureau of Land Management, Alaska Department of Natural Resources, Alaska Department of Fish and Game, US Forest Service, US Fish and Wildlife Service, Bureau of Indian Affairs, and Native Regional and Village Corporations to produce an Interagency Fire Management Plan for the Fortymile Planning Area. This plan provided direction for fire management activity in Yukon-Charley Rivers National Preserve until 1998, when a variety of documents, including 13 local planning area Fire

Management Plans (FMP) of which the Fortymile Plan was one, were consolidated and approved as the **Alaska Interagency Wildland Fire Management Plan (AIWFMP)**. Under the AIWFMP, fire protection needs are determined through annual land owner/manager reviews and lands are then placed under **Critical, Full, Modified** or **Limited** protection categories, with categorization based on presence and/or proximity of values to be protected as well as the resource management objectives of the pertinent land-management agency (see Table 20 for description of categories). Each reported wildland fire is managed in accordance with the categorization of the sub-unit in which it occurs, with responses ranging from rapid and aggressive attack by all available forces in the case of fires detected in Critical Protection areas to periodic surveillance for certain fires detected in Limited Protection areas (see Figure 16 for map of Preserve units).

PROTECTION CATEGORY	INTENT	POLICY
CRITICAL	Prioritization of suppression actions for wildland fires threatening human life, inhabited property, and/or other designated structures. Complete protection of designated sites.	Aggressive suppression of fires within or threatening designated areas. Highest priority for available resources.
FULL	Protection of uninhabited cultural and historical sites, private property, and high-value natural resources.	Aggressive suppression of fires within or threatening designated areas, depending upon availability of resources.
MODIFIED	Greater flexibility in selection of suppression strategies when chance of spread is high (e.g., indirect attack). Reduced commitment of resources when risk is low. Balancing of acres burned with suppression costs and with accomplishment of resource management objectives.	Fires in designated areas receive initial attack depending on availability of resources, unless land manager chooses otherwise and documents with WFSAs. After designated <b>conversion date</b> , operational response to Modified protection zones is identical to that of Limited zones.
LIMITED	Reduction of long-term costs and risks through reduced frequency of large fires. Reduction of immediate suppression costs. Facilitation of bio-diversity and ecological health	Wildland fires allowed to burn within predetermined areas. Continued protection of human life and site-specific values. Surveillance.

**Table 20: Alaska Interagency Wildland Fire Management Plan Options**

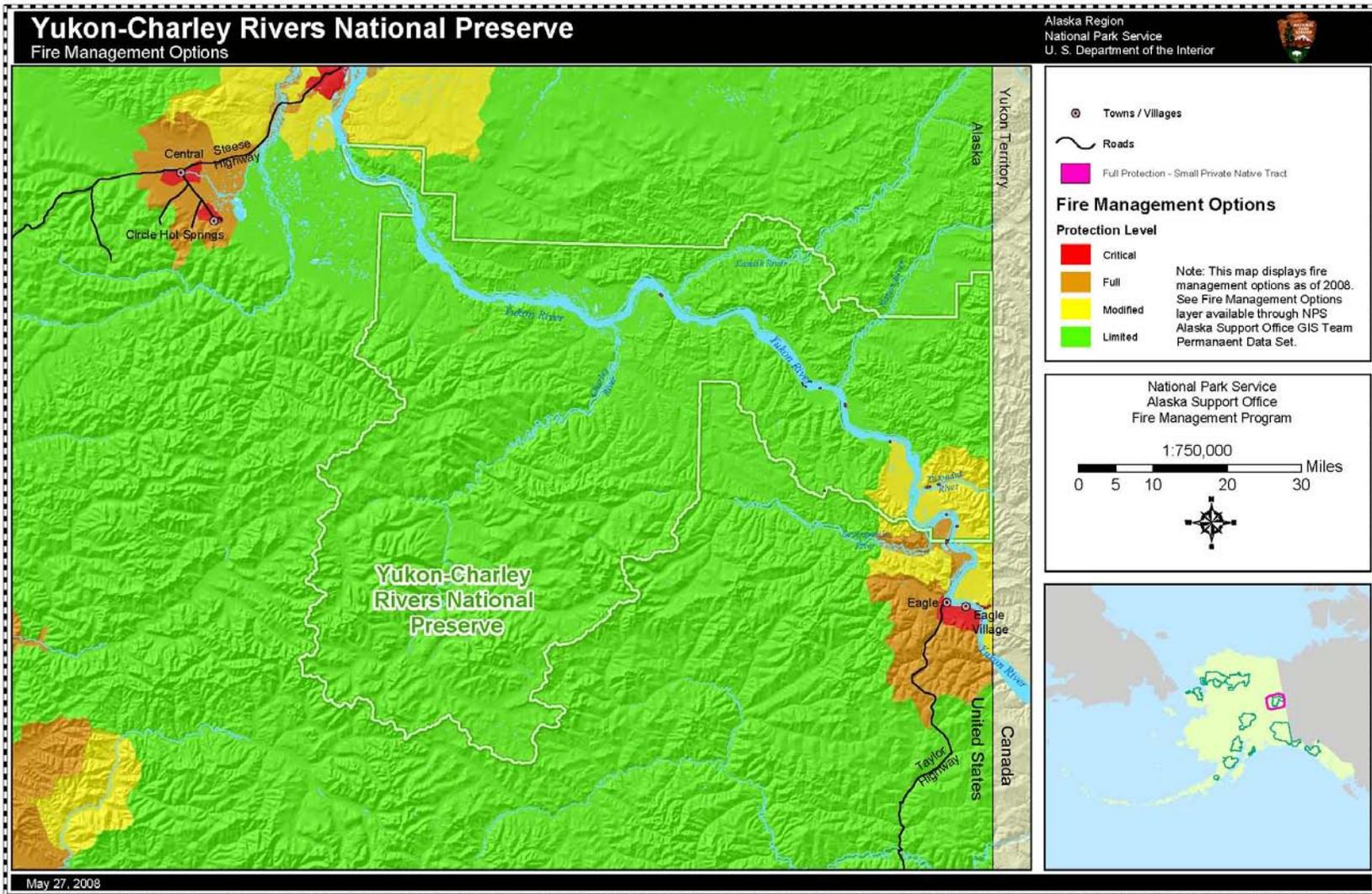


Figure 16: Fire Protection Boundaries

All of the alternatives discussed here, including the proposed action, would entail continued compliance with the AIWFMP while at the same time bringing the Preserve's fire management program into compliance with recently developed National Park Service directives. **NPS Director's Order 18** (January 16, 2008)

**Wildland Fire:** is defined as any ignition or fire occurring in YUCH that was not planned and ignited by management. Following both the DO-18 and the AIWFMP, wildland fires may be managed for the accomplishment of resource management objectives.

All **wildland fires** will be effectively managed through application of the appropriate strategic and tactical management options. Those options will be selected after comprehensive consideration of firefighter and public safety, the resource values to be protected and costs.

**Prescribed fires** are planned fires ignited by preserve managers to achieve resource management and fuel treatment objectives. Prescribed fire activities will include effective communication on prescribed fire activity in the park and local community and the monitoring programs that provide information on whether specific objectives are being met. In conformance with the preserve's fire management plan, a systematic decision-making process will be used to determine the most appropriate management strategies for wildland fire that are no longer meeting resource management objectives

The Yukon-Charley Rivers National Preserve Resource Management Plan (1994) specifies three objectives directly relevant to the Preserve's fire management program: 1) the maintenance of natural processes, including fire, to the greatest degree possible while protecting human life, private property, cultural sites, critical habitat, and endangered species; 2) the minimization of human disturbances, such as the manipulation of habitat or wildlife populations, except in extreme cases; and 3) the stabilization and restoration of significant historical structures and districts. Each of the alternatives presented in this Environmental Assessment comprises a particular combination of the various management strategies permitted under NPS Director's Order 18. These alternatives have been evaluated for their ability to contribute to the accomplishment of the resource management objectives described above.

### **C. Impact Topics Addressed and Analyzed**

Impact topics were identified to focus the analysis of alternatives on the most relevant subject matter and resources of concern. A brief rationale for each impact topic follows, as well as the reasons for dismissing specific topics from further analysis.

Vegetation and Bio-diversity. The National Environmental Policy Act (1969) requires analysis of impacts on all affected components of the ecosystem, including biotic communities of plants and animals. NPS Management Policies (1988) requires maintenance of these communities, including their natural abundance, diversity and ecological integrity. Fire plays an important role in changes to vegetative cover, which in turn affects habitat and overall ecological health; therefore, effects on vegetation and bio-diversity are analyzed as an impact topic.

Cultural Resources. The National Historic Preservation Act, as amended in 1992 (16 USC 470 *et seq.*); the National Environmental Policy Act; and the NPS Cultural Resource Management Guideline (1994), and Management Policies (1988) require the consideration of impacts on cultural resources listed on or eligible for listing on the National Register of Historic Places. The undertakings described in this document are also subject to section 106 of the National Historic Preservation Act, under the terms of the 1995 Programmatic Agreement among the NPS, the Advisory Council on Historic Preservation, and the National Conference of State Historic Preservation Officers. Impacts to cultural resources (archeological, historic, and paleontological) are therefore analyzed in this environmental assessment.

Aesthetics and Recreation. The mission of the NPS, as described by its Organic Act of 1916, defines the purpose of all parks is to "...conserve the natural and historic objects and the wildlife therein and to provide for the enjoyment of the same...". Yukon-Charley Rivers National Preserve was established to "maintain the environmental integrity of the entire Charley River basin...in its undeveloped natural condition for public benefit and scientific study...". Scenic visual values, recreational activities, and general visitation within and around fire-treated areas may be temporarily impacted, thus visitor use will be considered as an impact topic.

Local Economy. The National Environmental Policy Act (NEPA) considers "impacts to the human environment" to include any effects of federal actions on the social and economic well being of communities and individuals. Impacts to the local economy are therefore analyzed in this environmental assessment.

Wetlands and Floodplains. NPS guidelines and policies require consideration of impacts on floodplains and wetlands (Executive Orders 11988 and 1190). Impacts to wetlands and floodplains are therefore analyzed in this environmental assessment.

Subsistence Use and Wildlife Habitat. Title VIII, Section 810 of the Alaska National Interest Lands Conservation Act (ANILCA) states "In determining whether to withdraw, reserve, lease, or otherwise permit the use, occupancy, or disposition of public lands...the head of the federal agency...over such lands...shall evaluate the effect of such use, occupancy, or disposition on subsistence uses and needs...". Subsistence use may be temporarily impacted, thus subsistence use will be considered as an impact topic.

Air Quality. The 1963 federal Clean Air Act (42 U.S.C. 7401 *et seq.* as amended), stipulates that federal land managers have an affirmative responsibility to protect a park's air quality related values (including visibility, plants, animals, soils, water quality, cultural resources, and visitor health) from adverse air pollution impacts. The Preserve is designated as a federal "Class II" air shed. Air quality would be affected in the short-term during any type of ignition event; therefore, it is analyzed as a relevant impact topic.

Water Quality and Fisheries. National Park Service policies require protection of water resources consistent with the Clean Water Act. Increased erosion following a fire may affect water quality and is therefore considered a relevant impact topic.

#### **D. Impact Topics Considered and Dismissed**

Threatened and/or Endangered Species. The Endangered Species Act (1973) requires disclosure of impacts on all federally threatened or endangered species. NPS policy also requires analysis of effects on federal species, as well as state-listed threatened, endangered, candidate, rare, declining and sensitive species. There are no species of special concern within Yukon-Charley Rivers National Preserve, therefore this topic is not addressed further.

## **II. RANGE OF ALTERNATIVES**

### **A. Introduction**

Each alternative consists of a different combination of the fire management strategies as mandated by NPS Director's Order 18, with each alternative representing a different application of fire as a management tool. Under each of the considered alternatives all unplanned human-caused ignitions would be suppressed in the safest, most cost effective, and least damaging manner possible. The considered alternatives differ in their respective approaches to the management of naturally caused ignitions and in their allowance or preclusion of prescribed fire.

### **B. Actions Common to all Alternatives**

Under each alternative, mechanical fuel reduction may be used to mitigate hazard fuel buildup or recreate historical landscape/conditions in areas where prescribed fire or wildland fire would pose an unreasonable threat to property or resources.

All fire management actions at Yukon-Charley Rivers National Preserve will be conducted in full compliance with local, state, and interstate air pollution control regulations as required by the Clean Air Act, 42 U.S.C. 7418. No local or interstate air pollution control regulations exist in Alaska.

The Preserve will employ three primary strategies in order to protect archeological, cultural, and historic sites from damage by fire or fire suppression activities: First, culturally significant structures will be assigned **Critical** or **Full** Protection status, as dictated by the Recommended Criteria for Fire Protection of Structural Resources within YUCH. Second, personnel conducting detection and/or reconnaissance flights within the Preserve will be directed to remain alert for the presence of any undiscovered cultural sites or structures and to report their presence to the Preserve FMO. And third, designated Incident Commanders will consult with resource appropriate resource advisors regarding the identification and sensitivity of previously unknown sites and will cooperate with the Agency Advisor to mitigate any damage to such sites when possible.

Certain fire suppression activities could pose a threat to fragile soil layers and to other ecosystem components. This type of risk will be mitigated through the use of minimum impact suppression tactics, as specified by NPS policy.

### **C. Alternatives**

### **Alternative 1: Combination of Prescribed Fire Use and Wildland Fire Suppression:**

Under this alternative the effects of natural wildland fire would be simulated through the use of planned ignitions conducted by park personnel in defined zones. Such fires would be ignited under predetermined fuel and weather conditions; control problems would thereby be minimal. Prescribed fires would be conducted in order to achieve specific management objectives. Under this alternative, all wildland fires would be suppressed.

### **Alternative 2: Combination of Limited Response and Wildland Fire Suppression:**

Natural ignitions occurring in certain areas and under predetermined conditions would be managed for the accomplishment of resource management goals, including the preservation of fire in its natural role and the reduction of burnable vegetation. Unplanned human-caused fires would be aggressively suppressed, as would any fire posing a threat to life or property. Prescribed fires would not be implemented.

### **Alternative 3: Combination of Prescribed Fire Use, Limited Response, and Wildland Fire Suppression (Proposed Action):**

All three of the major management actions described under DO-18 would be allowed, as determined by a combination of pre-established and incident-specific decision-making criteria. Naturally occurring wildland fires which do not pose a threat to life, property, or significant resources would be managed for the accomplishment of resource management goals, including the preservation of fire in its natural role and the reduction of burnable vegetation. Prescribed fire would be implemented, in certain cases, under the direction of National Park Service personnel for the purpose of reducing hazardous fuel loads or restoring historic landscapes and/or conditions. Suppression would continue in or near developed areas, near Preserve boundaries with administrative units having different fire management objectives, in areas known to contain sensitive cultural and/or archeological resources, or whenever insufficient resources are available to ensure the effective, long-term management of wildland fire to meet resource management objectives. **This action would be a continuation of the fire management strategies as seen in the Preserve for the past 24 years.**

## **D. Alternatives Considered but Rejected**

### **Full Wildland Fire Suppression:**

All ignitions, including those of natural origin, would be suppressed and no prescribed fire would be implemented. Reduction of flammable vegetation would be accomplished strictly by mechanical means (e.g. through the use of chain saws or other tools). Mechanical reduction would be limited primarily to the protection of historic and/or archeological sites and Preserve boundary areas. In some cases, however, mechanical reduction could be used to restore selected landscapes to historic conditions.

This alternative is rejected for the following reasons: the increased risk of catastrophic wildland fire which would result from the exclusion of the area's natural burn cycle and the prohibitively high cost of large-scale mechanical fuel reduction.

### **III. AFFECTED ENVIRONMENT**

#### **A. Introduction**

Yukon-Charley Rivers National Preserve encompasses 2.52 million acres, of which the federal government holds 84%. Much of the remaining land belongs to Doyon, Ltd., the regional native corporation; other ownership categories include Village Corporation tracts, Native allotments, and patented/unpatented mining claims. Located in the eastern interior of Alaska and bordering the Yukon Territory, Canada, the Preserve is bracketed by the small, road-connected communities of Eagle and Eagle Village to the east and Circle City, Central, and Circle Hot Springs to the northwest. The large and historically significant Yukon River and nearly undisturbed Charley River provide access to the Preserve's roadless interior.

#### **B. Natural Environment**

The Yukon River valley is composed of low, rounded benches and ridges trending southwest to northeast. The valley region rises noticeably south of the Yukon River and gives way to the mountainous region of the Yukon-Tanana uplands. Elevations become progressively higher moving east from Circle, at 600 feet above sea level, to the U.S.-Canadian border, where mountains reach 6,000 feet. YUCH lies within a climatic region known as the interior basin. Mountains to the north and south tend to block moderating oceanic air masses, resulting in extremely low temperatures and low-level inversions in the winter and high temperatures and low precipitation in the summer.

The Yukon-Charley region lies within a greater ecological zone known as the Taiga, or northern boreal forest, an area extending from the Alaskan interior east into Canada and dominated by spruce and several species of deciduous hardwoods. In the Preserve, as elsewhere in the Taiga, lowlands and drainages are often heavily forested. Uplands become more thinly forested with increasing elevation, with most areas above 2,000 feet consisting of treeless shrub tundra. Tundra dominated by tussock-forming sedges occurs at lower elevation sites where poor drainage precludes the presence of black spruce stands. Much of the preserve is underlain by permafrost as much as several hundred feet thick, with the top of the permafrost layer often lying as little as 2 or 3 feet below the surface at the peak of summer. Permafrost hinders subsurface drainage, causing unstable soil conditions on sloping surfaces; consequently when surfaces are disturbed and permafrost is allowed to melt, soils often collapse.

The Preserve is home to Dall sheep, moose, caribou, grizzly and black bear, wolves, and various small-mammal species; to eighteen species of fish; and to 159 species of birds, including twenty different species of raptor.

#### **C. Cultural Environment**

The history of the Yukon-Charley Rivers area includes occupations by Athabaskan peoples as well as by non-Native participants in the turn-of-the-century gold rush. To date, over 160 structures have been located within the Preserve, consisting for the most part of cabins, roadhouses, check dams, caches, and diversion ditches.

## **D. Historical Role of Fire**

Fire has been an inextricable component of the ecosystems of the Yukon-Charley area for thousands of years, with periodic fires having served throughout the centuries to select plants and animals that are adapted to fire-caused change. Black spruce is at least partially dependent upon stand-replacement fire, in that its seeds become ready for germination at the peak of the Alaskan interior fire season and are released when its semi-serotinous cones are opened by canopy fire. Even more fundamentally, fire plays a key role in the regulation of the permafrost table throughout all the ecosystems of the Alaskan interior. Without fire, organic matter accumulates, the permafrost table rises, and ecosystem productivity declines. Vegetation communities become much less diverse, and wildlife habitat decreases. Fire rejuvenates these systems. It removes some of the insulating organic matter and elicits a warming of the soil. Nutrients are added both as a result of combustion and by increased decomposition rates.

The impact of aggressive suppression on the Alaskan interior at large and the Yukon-Charley area in particular is difficult to assess. Organized suppression has occurred on a large scale in Alaska since 1939, the effects of this activity, however, are not yet clear. Alaskan fire management personnel feel that the fire ecology of the road less portions of the Yukon-Charley area may be relatively unchanged from its condition prior to the arrival of whites and the subsequent development of organized suppression efforts.

## **E. Wildland Fire Management Situation**

The seasonal fire cycle in the Alaskan interior consists of four “micro” seasons or phases, each varying with the changing weather patterns and the stages of vegetation development for the growing season.

The first begins in late April or early May with the loss of snow cover, and ends in late May or early June when green-up begins. During the transition from 100% winter-cured fuels to green-up, human-caused fires occur frequently; these fires are usually relatively easy to suppress. Spring fires that are not suppressed, however, often grow later in the season as fuels become dryer.

The second and third fire-cycle phases are primarily lightning driven. Suppression of such fires is harder. Fires occurring in June, the second period, usually do not develop the intensity of later summer fires; during hot, dry, and windy conditions, however, June wildland ignitions can result in extreme fire behavior.

The third period of fire activity begins in mid-July and runs through the first part of August. This is the period of maximum fire activity.

The final micro-season runs from late August into early September. These fires are generally easy to control except during particularly dry autumn weather.

## **IV. ENVIRONMENTAL CONSEQUENCES**

## **A. Impacts of Alternatives**

### **1. Alternative 1. Prescribed Fire Use and Wildland Fire Suppression**

#### **a. Vegetation and Bio-diversity:**

This alternative would have the greatest impact of a gradual loss of bio-diversity as the size and remoteness of the Preserve prohibit the implementation of prescribed fire on a scale sufficient to keep up with the natural accumulation of burnable vegetation. As such, management under the first alternative would eventually result in various disruptions of the area's natural components, including depth and thickness of permafrost layer and reduction of the bio-diversity of plant communities. The exclusion of routine, relatively low-intensity wildland fires would result in the periodic eruption of catastrophic fire events.

#### **b. Cultural Resources**

Under this alternative the short-term protection of registered and unregistered cultural resources would increase with the suppression of fires and the use of prescribed fire to reduce the vegetation accumulation surrounding these resources. The size and remoteness of the Preserve prohibit the implementation of prescribed fire on a scale sufficient to keep up with the natural accumulation of burnable vegetation. Therefore, long-term protection of these resources would diminish in that the exclusion of routine, relatively low-intensity fires would result in the periodic eruption of catastrophic fire events.

#### **c. Aesthetics and Recreation**

There would be a moderate impact under this alternative with occasional closures of specific areas due to fire suppression operations or prescribed fire operations to ensure the public's safety. There would also be a gradual degradation of sight lines and backcountry access as vegetation was not reduced because the size and remoteness of the Preserve prohibits the implementation of prescribed fire on a scale sufficient to keep up with the natural accumulation of burnable vegetation.

#### **d. Local Economy**

There would be a slight influx of revenue from occasional suppression operations. However, the exclusion of routine, relatively low-intensity wildland fires would result in the periodic eruption of catastrophic fire events causing a reduction of tourist activity thus resulting in a reduction of revenue.

#### **e. Wetlands and Floodplains**

Under this alternative there would be moderate impact due to the loss of bio-diversity in the fire-dependent tussock communities. Without fire, organic matter accumulates, the permafrost table rises, and ecosystem productivity declines. The size and remoteness of the Preserve prohibit the

implementation of prescribed fire on a scale sufficient to keep up with the natural accumulation of burnable vegetation. Fire suppression operations may disrupt these communities through the construction of fireline.

#### **f. Subsistence Use and Wildlife Habitat**

This alternative would have a long-term effect on hunting, trapping, and gathering through the gradual deterioration of fire-dependent habitat communities. The exclusion of routine, relatively low-intensity wildland fires would result in various disruptions of the area's natural components, including depth and thickness of permafrost layers and productivity of wildlife habitat.

#### **g. Air Quality**

There would be short-term improvements through the elimination of fire use, which can allow fire to burn for many months. If detected quickly enough, new ignitions within the Yukon-Charley area can generally be suppressed before substantial growth; prescribed fires, in turn, could be executed under conditions favorable to the effective dispersion of smoke. But this alternative would result in a long-term degradation through increased occurrence of catastrophic fire due to the increase in accumulation of burnable vegetation.

#### **h. Water Quality and Fisheries**

The exclusion of routine, relatively low-intensity wildland fires would result in the periodic eruption of catastrophic fire events which may include greater erosion potential along streams and rivers. This may have short-term effects on fisheries in the clear water streams.

### **2. Alternative 2. Combination of Limited Response and Wildland Fire Suppression**

#### **a. Vegetation and Bio-diversity**

There would be minimal impacts with the use of this alternative. Certain naturally ignited wildland fires would be managed for the accomplishment of resource management goals, including the preservation of fire in its natural role and the reduction of burnable vegetation. However, in the **Critical** and **Full** Protection Units the exclusion of prescribed fire may result in an unacceptable increase in vegetation thereby increasing the threat to the resources found within these units.

#### **b. Cultural Resources**

Under this alternative, the prohibition of prescribed fire could hamper the protection of historic and/or archeological resources and the restoration and/or protection of historic landscapes and conditions. Mechanical techniques employed in place of prescribed fire would tend to be more expensive and in some cases might not sufficiently mimic the effects of fire. However, certain wildland fires would be managed for the accomplishment of resource management goals

including the reduction of burnable vegetation thereby better protecting the cultural resources from catastrophic fire.

#### **c. Aesthetics and Recreation**

Under this alternative the only impact would be the occasional closure of specific areas due to fire activity for the safety of visitors.

#### **d. Local Economy**

There would be a slight influx of revenue from occasional suppression operations with this alternative.

#### **e. Wetlands and Floodplains**

There would be a minimal risk of disruption to these communities due to fire suppression operations. There may be impacts due to erosion after fire has burned through the wetlands or floodplain.

#### **f. Subsistence Use and Wildlife Habitat**

There would be a short-term impact on game species and plants in specific areas due to the decrease of vegetation within the burned areas. However, this alternative would more adequately facilitate the long-term preservation of the area's natural processes by allowing fire to play its natural role in the ecosystem.

#### **g. Air Quality**

Under this alternative, smoke would be monitored for trajectory, mixing height, and impact to overall air quality. Certain naturally ignited wildland fires would be managed for the accomplishment of resource management goals, including the preservation of fire in its natural role and the reduction of burnable vegetation. This would reduce the possibility of catastrophic fire thereby reducing long-term, intense reduction of air quality.

#### **h. Water Quality and Fisheries**

Under this alternative certain naturally ignited wildland fires would be managed for the accomplishment of resource management goals including the preservation of fire in its natural role and the reduction of burnable vegetation. This would allow more low-intensity wildland fires that would reduce the erosion along streams.

### **3. Alternative 3. Prescribed Fire Use, Limited Response and Wildland Fire Suppression (Proposed Action)**

#### **a. Vegetation and Bio-diversity**

This alternative would have the least impact with the maximum potential for diversity through the careful implementation of prescribed fire in areas ill-suited to **Limited Response**. Wildland fire posing a potential threat to life, property, or sensitive resources would be suppressed, while continued implementation of **Limited Response** in remote portions of the Preserve would ensure the cost-effective preservation of the area's natural fire ecology as well as the reduction of potentially dangerous fuel loads.

#### **b. Cultural Resources**

Under this alternative there would be improved long-term protection of registered and unregistered cultural resources with the use of fire near and surrounding cultural resources. The occasional use of prescribed fire would allow a relatively cost-effective means of reducing fuel loads and preserving historic landscapes and conditions where the presence of values to be protected prohibits the implementation of **Limited Response**.

#### **c. Aesthetics and Recreation**

The impacts would be similar to Alternative 2 with the addition of the occasional use of prescribed fire that would allow a relatively cost-effective means of reducing fuel loads where the presence of values to be protected prohibits the implementation of **Limited Response**.

#### **d. Local Economy**

The impacts would be similar to Alternative 2 with the addition of the occasional use of prescribed fire that would allow a relatively cost-effective means of reducing fuel loads where the presence of values to be protected prohibits the implementation of **Limited Response**.

#### **e. Wetlands and Floodplains**

The impacts would be similar to Alternative 2 with the addition of the occasional use of prescribed fire that would allow a relatively cost-effective means of reducing fuel loads where the presence of values to be protected prohibits the implementation of **Limited Response**.

#### **f. Subsistence Use and Wildlife Habitat**

The impacts would be similar to Alternative 2 with the addition of the occasional use of prescribed fire that would allow a relatively cost-effective means of reducing fuel loads where the presence of values to be protected prohibits the implementation of **Limited Response**.

#### **g. Air Quality**

The impacts would be similar to Alternative 2 with the addition of the occasional use of prescribed fire that would allow a relatively cost-effective means of reducing fuel loads where the presence of values to be protected prohibits the implementation of **Limited Response**.

#### **h. Water Quality and Fisheries**

The impacts would be similar to Alternative 2 with the addition of the occasional use of prescribed fire that would allow a relatively cost-effective means of reducing fuel loads where the presence of values to be protected prohibits the implementation of **Limited Response**.

## **B. Cumulative Impact Mitigation**

The Council on Environmental Quality (CEQ) regulations implementing the National Environmental Policy Act requires assessment of cumulative impacts in the decision-making process for federal projects. Cumulative impacts are defined by CEQ as “the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions” (40 CFR 1508.7). The on-going and future activity that would have a cumulative effect on resources of concern within and outside of the Preserve’s boundaries analyzed in this Environmental Assessment is the adjacent landowners’ fire management plans. All public land management agencies in Alaska are signatories of the Alaska Interagency Fire Management Plan, which allows for fire to burn on the landscape in **Limited Protection FMUs**. Much of the public lands surrounding the Preserve is in a **Limited Protection FMU** and may result in multiple large fires. The results of these multiple fires may be greater than fires managed just within the Preserve boundary. These impacts are mitigated by the convening of a Multi-Agency Coordinating (MAC) group. As directed in the Alaska Interagency Fire Management Plan, “A statewide Multi-Agency Coordinating (MAC) group may be convened to implement a temporary change from the selected management options for a specific geographic area(s) during periods of unusual fire conditions (e.g., numerous fires, predicted drying trends, smoke problems, unusually wet conditions or suppression resource shortages).”

### C. Impacts of Alternatives Summary

	<b>Alternative 1: Prescribed Fire and Wildland Fire Suppression</b>	<b>Alternative 2: Limited Response and Wildland Fire Suppression</b>	<b>Alternative 3 proposed: Prescribed Fire Use, Limited Response, and Wildland Fire Suppression</b>
Vegetation and Bio-diversity	Greatest impact: gradual loss of bio-diversity through accumulation of organic matter, encroachment of species, etc.	Minimal impact: continued potential for minimal loss of diversity through fire exclusion in or near <b>Critical</b> and <b>Full</b> Protection Units and sites.	Least impact: maximum potential for diversity through careful implementation of prescribed fire in areas ill-suited to wildland fire use.
Cultural Resources	Improved short-term protection of registered and unregistered historic and/or archeological sites.	Minimal impact.	Improved long-term protection of registered and unregistered historic and/or archeological sites; improved maintenance of historical landscapes and conditions.
Aesthetics and Recreation	Moderate impact: occasional closures of specific areas and gradual degradation of sight lines, backcountry access, etc.	Minimal impact: occasional closures of specific areas; vegetation burned may decrease aesthetics.	Minimal impact: occasional closures of specific areas; vegetation burned may decrease aesthetics.
Local Economy	Slight influx of revenue from occasional suppression operations; greater potential for long-term disruption of tourist activity from catastrophic fire.	Minimal impact	Minimal impact
Wetlands and Floodplains	Moderate impact: loss of bio-diversity in fire-dependent tussock communities; risk of disruption by suppression activity.	Minimal impact: may be some erosion until vegetation returns.	Minimal impact; may be some erosion until vegetation returns.
Subsistence Use and Wildlife Habitat	Long-term degradation of hunting through gradual deterioration of fire-dependent habitat communities.	No long-term impact; some potential for short-term displacement of game from specific areas.	No long-term impact; some potential for short-term displacement of game from specific areas.
Water Quality and Fisheries	Increased erosion potential due to catastrophic fire	No long-term impact; some short-term erosion.	No long-term impact; some short-term erosion.
Air Quality	Short-term improvements through elimination of fire use; long-term degradation through increased occurrence of catastrophic fire.	No impact.	Minimal impact.

**Table 20: Impacts of Alternatives Summary**

## **V. COORDINATION AND CONSULTATION**

Brad Cella, Fire Management Officer, Alaska Region, National Park Service  
Marsha Lutz, Area Fire Management Officer, Wrangell-St. Elias National Park and Preserve

### **LITERATURE CITED**

Alaska Land Managers Cooperative Task Force. 1979. Fortymile Interim Fire Management Plan.

Alaska Wildland Fire Coordinating Group. 1998. Alaska Interagency Wildland Fire Management Plan.

National Park Service. 1998. Director's Order 18: Fire Management.

National Park Service. 1994. Resource Management Plan Yukon-Charley Rivers National Preserve.

### **PREPARER**

Chuck Sheaffer, Biological Technician, Wrangell-St. Elias National Park and Preserve

### **EDITED BY**

Joseph P O'Brien, Assistant Fire Management Officer, Upper Yukon Zone, Alaska Fire Service  
2009

## APPENDIX D.2 ANILCA

This section was prepared to comply with Title VIII, Section 810 of the Alaska National Interest Lands Conservation Act (ANILCA). It summarizes the evaluations of potential restrictions to subsistence activities which could result from the implementation of the proposed fire management plan and the actions described therein.

### II. EVALUATION PROCESS

Section 810(a) of ANILCA states:

“In determining whether to withdraw, reserve, lease, or otherwise permit the use, occupancy, or disposition of public lands...the head of the federal agency...over such lands...shall evaluate the effect of such use, occupancy, or disposition on subsistence uses and needs, the availability of other lands for the purposes sought to be achieved, and other alternatives which would reduce or eliminate the use, occupancy, or disposition of public lands needed for subsistence purposes. No such withdrawal, reservation, lease, permit, or other use, occupancy or disposition of such lands which would significantly restrict subsistence uses shall be affected until the head of such Federal agency—

- (1) gives notice to the appropriate State agency and the appropriate local committees and regional councils established pursuant to section 805;
- (2) gives notice of, and holds, a hearing in the vicinity of the area involved;  
and
- (3) Determines the (A) such a significant restriction of subsistence uses is necessary, consistent with sound management principles for the utilization of the public lands, (B) the proposed activity will involve the minimal amount of public lands necessary to accomplish the purposes of such use, occupancy, or other disposition, and (C) reasonable steps will be taken to minimize adverse impacts upon subsistence uses and resources resulting from such actions.”

ANILCA created new units and additions to existing units of the national park system in Alaska. Yukon-Charley National Preserve was created by ANILCA Section 201[10] in order to “maintain the environmental integrity of the entire Charley River basin...in its undeveloped natural condition for public benefit and scientific study; to protect habitat for, and populations of, fish and wildlife, including but not limited to the peregrine falcons and other raptorial birds, caribou, moose, Dall sheep, grizzly bears and wolves; and in a manner consistent with the foregoing, to protect and interpret historical sites and events associated with the gold rush on the Yukon River and the geological and paleontological history and cultural prehistory of the area...”

The act also states that “Subsistence uses by local residents shall be permitted in the park where such uses are traditional, in accordance with the provisions of title VIII.”

The potential for significant restriction must be evaluated for the proposed action's effect upon "...subsistence uses and needs, the availability of other lands for the purposes sought to be achieved and other alternatives which would reduce or eliminate them.

### III. PROPOSED ACTION ON FEDERAL LANDS

The National Park Service specifies that every administrative unit with burnable vegetation develop a fire management plan—a unit-specific document outlining fire management goals and describing the policies and actions by which these goals will be realized (Director's Order 18). Since 1983, the Preserve's fire management program has operated under the auspices of various state-wide interagency documents, including most recently the **Alaska Interagency Wildland Fire Management Plan**, or **AIWFMP** (1998). Under the AIWFMP, fire protection needs at Yukon-Charley are determined by NPS and BLM managers; lands within the Preserve are then placed within **critical, full, modified, or limited** protection categories, depending on the proximity of values to be protected and on overall resource management objectives.

The proposed action entails the establishment of a Fire Management Plan for Yukon-Charley Rivers National Preserve. Both the preferred alternative and the other considered alternatives allow for continued adherence to the AIWFMP while at the same time bringing the Preserve's fire management program into compliance with recently developed National Park Service directives. Specifically, NPS Director's Order 18 mandates a distinction between **prescribed fire** (planned and implemented by management) and **wildland fire** (unplanned, whether naturally ignited or human-caused), with wildland fire incidents further categorized, in turn, as either wildland **fire use** or wildland fire **suppression**. Each of the considered alternatives mandates a specific configuration of DO-18 management options and relates these options to the policies and procedures outlined in the AIWFMP.

The preferred alternative calls for the continued management of wildland fire at Yukon-Charley Rivers National Preserve through a combination of wildland fire suppression, wildland fire use, and prescribed fire use. This statement of Summary Evaluations and Findings addresses the impact of these fire management policies and actions on subsistence activities within the Preserve.

(See the Fire Management Plan and the accompanying Environmental Assessment for further discussion of fire management policies and actions.)

### IV. AFFECTED ENVIRONMENT

As mandated by ANILCA section 1313, the entirety of Yukon-Charley Rivers National Preserve will be managed so as to allow for subsistence trapping as well as hunting and fishing for either sport or subsistence under applicable state and federal regulations. The area of concentrated subsistence use within the Preserve extends along the Yukon River as well as lower stretches of the Charley, Kandik and Nation Rivers. Along the Yukon, residents of Central (population 52), Circle City (population 73), Eagle (population 168) and Eagle Village (population 35) engage in

subsistence activities during a five-month ice-free period. As many as fifteen individuals reside along rivers within the Preserve; subsistence use by these individuals tends to be restricted to their immediate environs.

Caribou, moose, salmon, black bear, marten, and lynx are the most important species for subsistence users in and around the Preserve. These species are supplemented by waterfowl, snowshoe hares, grouse, ptarmigan, wolves, beaver, and various species of resident fish. In addition to fish and game species, bark, firewood, berries and other plant materials are harvested. Subsistence hunting activities are concentrated in the spring and fall months, fishing and plant gathering in summer and fall, and trapping in mid-winter. Subsistence harvests vary considerably each year because of weather, migration patterns, and population cycles.

The majority of subsistence use occurring at Yukon-Charley takes place within the Preserve's Limited Protection fire management unit, with most of the remaining subsistence use occurring in the Preserve's Modified Protection fire management unit. Under the proposed action, certain natural ignitions occurring within these areas would be managed for the accomplishment of resource management goals, including the preservation of fire within its natural role and the perpetuation, in turn, of healthy and biologically diverse plant communities and fish and game habitat.

## **V. SUBSISTENCE USES AND NEEDS EVALUATION**

To determine the potential impact on existing subsistence activities, three evaluation criteria were analyzed relative to existing subsistence resources that could be impacted.

The evaluation criteria are:

- the potential to reduce important subsistence fish and wildlife populations by (a) reductions in numbers; (b) redistribution of subsistence resources; or (c) habitat losses;
- what effect the action might have on subsistence fisherman or hunter access;
- potential for the action to increase fisherman or hunter competition for subsistence resources.
- 

### **A. The potential to reduce populations:**

The National Park Service has generally found populations of plants and animals important to subsistence activities to be healthy. Because site-specific information on population, distribution, and harvest is lacking for many of these species, is lacking, however, recognition of declining populations has been difficult.

The Preserve's Resource Management Plan (1995) identifies several potential threats to the continuation of traditional and customary subsistence lifestyles, including, specifically, any activity that impairs the overall health of the ecosystem through the disruption of the natural fire regime.

The actions which would be implemented under the preferred alternative would be aimed directly at the safe and cost-effective preservation of the area's indigenous fire ecology. As such, the Preserve's enactment of the preferred alternative would have a beneficial effect on the long-term viability of plant and animal populations pertinent to subsistence use within the Preserve. The occasional displacement of plant and animal populations from specific locales by wildland fire is a natural and inevitable occurrence within the fire-dependent ecosystems of the Yukon-Charley area. Under the proposed action, however, potential losses to subsistence users could be mitigated through consideration of hunting and trapping activities by land managers in the planning and implementation of wildland fire use and prescribed fire use incidents. There are a few users who have permits for use of public structures within the Preserve. These structures are protected under Critical Suppression as noted in Section XVI. Protection of Sensitive Resources. In the event of loss or damage of this structure, the Superintendent of the Preserve may permit reconstruction of this structure. The long-term benefits of fire to the wildlife habitats of the Yukon-Charley area outweigh any short-term losses by subsistence users and therefore will not be the sole reason for suppressing a wildland fire. However, subsistence use is an important factor in the determination of prescribed fire within the Preserve.

#### **B. Restriction of Access:**

Occasional restriction of access to local areas by subsistence users because of fire behavior and/or fire management practices is inevitable. Under the proposed action, such restrictions would be minimized in the long run through the reduced possibility of widespread, catastrophic fire.

#### **C. Increase in Competition:**

The enactment of the preferred alternative would not significantly increase competition for the use of subsistence resources. Displacement of plant and animal populations from specific sites would be short-term, and in fact in most cases the long-term viability of the populations in question depends directly on the natural processes which the proposed plan would be intended to safely perpetuate.

### **VI. AVAILABILITY OF OTHER LANDS**

As stated earlier, wildland fire is an inevitable component of the plant and animal communities of the Yukon-Charley area. Consequently, the availability of other lands is not a pertinent consideration in this particular case.

With respect to the question of subsistence use, the scope and intensity of wildland fire incidents managed for resource benefit (i.e., fire use incidents) will generally be of small significance

when considered within the context of overall available acreage. Prescribed fires will be planned and managed so as to avoid any significant hardship to subsistence users.

## **VII. ALTERNATIVES CONSIDERED**

This section discusses the considered alternatives with respect to their respective reduction or elimination of the need to use public lands necessary for subsistence purposes.

Alternative one (combination of prescribed fire use and wildland fire suppression) would perhaps result in the least short-term disruption of subsistence activities, with suppression responses preventing the spread of many wildland fire ignitions. The long-term impacts of this alternative, however, would be negative, with the exclusion of wildland fire leading to the gradual decline of bio-diversity and viable habitat throughout all areas within the Preserve utilized by subsistence hunters and trappers.

Alternative two (combination of wildland fire use and wildland fire suppression) would not significantly differ from the preferred alternative with respect to the reduction or elimination of the need to use public lands for the accomplishment of fire management goals.

The preferred alternative would yield the same favorable long-term effects on lands used for subsistence activities as alternative two, while allowing more effective protection and restoration of significant fire-sensitive sites and/or landscapes.

## **VIII. FINDINGS**

This analysis concludes that the proposed action will not result in a significant restriction of subsistence uses.

## **APPENDIX E.1: INTERAGENCY AGREEMENTS**

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The Alaska Interagency Agreement and Alaska Annual Operating Plan are available on the web at:

<http://fire.ak.blm.gov/logdisp/asma.php>

**APPENDIX E.2: INTERAGENCY CONTACTS****Alaska Interagency Coordination Center**

Center Manager	Dave Curry	356-5677
Initial Attack Coordinator	John Greg	356-5670

**Alaska Fire Service - Upper Yukon Fire Management Zone**

UYD FMO	Steve Theisen	356-5558
UYD Assistant FMO	Pat O'Brien	356-5550
Fuels Management Spec.	Kato Howard	356-5561
Upper Yukon Tanana Dispatch Coordinator	VACANT	356-5555
Assistant Upper Yukon Tanana Dispatch Coordinator	Ted Pierce	356-5554

## APPENDIX F: INFORMATION OFFICER STEP UP PLAN

**National Park Service  
U.S. Department of the Interior**

**Alaska Wildland Fire  
Management Program**

**Fire Communications  
and Education  
240 West 5<sup>th</sup> Ave  
Anchorage , AK 99501  
907-644-3478 phone  
907-644-3809 fax**

In many Alaskan towns and villages, residents are more familiar with wildland fire than with NPS employees. Some AK NPS employees are not familiar with wildland fire and park staff may not have experienced wildland fire events during their tenure in Alaska. Furthermore, Information Officers may be unfamiliar with Alaska wildland fire behavior and management and may require some assistance from AK NPS Fire Management staff. It is of utmost importance to keep these factors in mind while assessing the need for an Information Officer.

A wildland fire ignites on National Park Service land and AK NPS Fire Management and suppression organizations initiate the appropriate response based upon the Alaska Interagency and park Wildland Fire Management Plans and NPS policy. During this process, AK NPS Fire Management and park staff must anticipate fire and smoke events and distribute information to internal and external audiences before the events impact them. Consider Information Officer (PIO) assistance when:

### Sizing Up the Fire

- Fire threatens structures
- Many large or small fires throughout the area
- Fire or smoke visible from town
- Fire moves towards a town or village
- Smoke impacts health or transportation in town, village or throughout the area
- Fire triggers media interest

### Evaluating AK NPS Fire Management

- Fire Management staff anticipate not being able to, or cannot accomplish all outreach tasks.
- Internal and external communication methods such as local NPS Fire News updates (via Lotus Notes) and national NPS Fire News (located on the internet at [http://www.nps.gov/fire/public/pub\\_firenews.cfm](http://www.nps.gov/fire/public/pub_firenews.cfm)) no longer fulfill the needs of the incident.
- AK NPS Fire Management staff receives more calls or comments of concern regarding the management of the fire than they can sufficiently handle.

### Evaluating AK NPS Employees

- NPS staff receives more calls or comments of concern regarding management of the fire than they can sufficiently handle.
- NPS staff cannot adequately respond to the number of information requests from local residents, visitors, and other park staff.
- NPS staff cannot fulfill fire related outreach needs.
- NPS staff voice concern about wildland fire management.
- A number of NPS employees or in particular, key staff members, are unfamiliar with AK wildland fire management and wildland fire in the boreal ecosystem.

### Evaluating the Community

- Community vocalizes concern about the management of the fire.

- An incident of this nature has not recently occurred in this area.
- Community (at large) is unfamiliar with wildland fire and smoke thus reacts to it in either a negative or positive manner.
- Fire management activities or smoke impacts the community for more than a few days.
- Incident affects the economic viability of the community.
- Community has negative opinions about the NPS or government.
- Similar incidents occurred in the area and community members were affected in a negative way and still harbor and vocalize those emotions.
- Health impacts occur and/or evacuations are planned for or initiated.
- Incident directly affects the community.
- Threat or perceived threat to personal property or welfare
- Impacts planned events or historical happenings

### **Creates Resource Management Issues**

- Their quality of life
- Effects on their value systems
  - Incident will impact the common thread that holds this community together.
- Such as...
- Hunting grounds, berry picking opportunities, recreational areas, natural beauty of the surrounding areas

During a fire incident that warrants a PIO, things AK NPS Fire Management, PIO and park staff must do in order to be successful...

- Listen, listen, listen to internal and external audiences.
- Make personnel available to answer questions.
- Actively seek out leaders in the community such as Village Councils, Tribal Council, Community Elders to communicate with.
- Always try to make sure the community hears it from NPS or involved agency first.
- Evaluate the most effective means of communicating to town or village residents and residents in the surrounding areas, for example, local radio station, local newspaper, Alaska Rural Communication System.
- Involve community members when giving out information.
- Continually assess community information needs.
- Work closely with all affected agencies (other land managers and suppression organizations).

A PIO can be informally requested or resource ordered. Situations that may warrant an informal request include:

- AK NPS employee where incident occurs is available and the workload does not warrant a full time PIO.
- AK NPS Regional Fire Communication and Education Specialist is available because this person is considered a local NPS resource.

Situations that may warrant a resource order include:

- FMO must look for assistance outside of park/preserve experiencing fire incident

- Workload demands a full time PIO be present.
- Size or complexity of the incident exceeds the experience, training or capabilities of the local PIO.
- Size of the information staff needed exceeds the capabilities of the local PIO.
- When local conditions (political or social) indicate that a non-local PIO may have more success in delivering pertinent fire related messages.

If and when it is determined that a PIO is needed, there are several potential candidates to choose from. A suggested prioritization of available PIOs is listed here:

1. AK NPS employee where incident occurs
2. AK NPS employees
3. AK NPS Regional Fire Communication and Education Specialist
4. AK agency employees and/or residents
5. NPS or other agency employees

\*Please note the AK NPS Regional Fire Communication and Education Specialist maintains a list of AK NPS PIO contacts.\*

The AK NPS Fire Management Officer has the discretion to select an PIO1, 2, PIOF, or trainee for the fire incident. The size and complexity of the fire incident often foretells what type of PIO is needed

Once the PIO arrives, encourage him/her to seek out support from local NPS employees, other local agency employees and community members. AK NPS Fire Management staff should continue to provide information about the fire to the best of their ability and as needed by the PIO in order to fulfill the information needs of the community, visitors, and park/preserve staff. AK NPS employees should be strongly encouraged to participate in information activities as they are initiated by the PIO.

Updated February 6, 2009

## **APPENDIX G: FIRE MONITORING PLAN**

### **Appendix G.1. Fire Effects Paired Plot Protocol**

#### **Fire Effects Paired Plot Protocol**

#### **Alaska NPS Fire Ecology Program**

#### **Field Method Protocol 2005**

##### **Background: Fire Effects Paired Plots**

The fire effects paired plot project began in 1981 under the direction of Gary Ahlstrand, NPS Alaska Regional Research Ecologist. The purpose of the project was to assess vegetation change and succession as a result of fire and to determine fire history. Fire staff established paired vegetation 15-m x 30-m plots in burned and representative unburned habitat adjacent to the burned areas of varying ages. Burned sites were identified and selected for the study from historic fire reports, 1:63,360 color infrared aerial photography, and aerial reconnaissance. Some plots were established in front of active wildfires and control plots were not established. Between 1981 and 1988, at least 525 plots were installed across 9 different parks in Alaska. Plot data that was collected included: photographic slides of plot, tree density by species and diameter size class on 15-m x 30-m quadrats, vegetation cover class for 30 Daubenmire frames (20 x 50 cm), tree cores/cookies, fuels and soils data (on some plots), and general plot site descriptions.

Up until 2008 most of the data were only available in paper format, except for the vegetation cover data was in a TWINSpan text format. Between 2003 and 2008, paired plot data for all the parks was entered into an Access database and plot locations were digitized off topographic maps and aerial photos. The Access database was converted to Interagency Fire Ecology sequel server database called FFI V1.02 through a contract in 2008. Original copies of data and photos are archived at the Alaska Regional Office. Scanned copies of data and photos are stored at the regional office and with the Regional Fire Ecologist in Fairbanks.

Data from this project can be used to determine the vegetative and structural components that have changed over time since fire. Currently the data is being utilized to develop fire successional models to update landcover vegetation maps and fuels maps utilized by the fire management program. This information is being used to understand the potential impacts of shortened fire return intervals and future climate warming.

##### **Plot Locations and Layout: Fire Effects Paired Plots**

###### **Plot Locations**

Plots were located in an area of the stand free of ecotonal effects in which environment, overstory and understory were as homogenous as possible. Originally the plot locations were pin pricked on 1:63,000 aerial photography and marked on 1:63,360 topographic maps. Some of the plots have since been digitized, although they are not precise locations. For most of the permanently marked plots, there are written instructions with marker trees and azimuths to re-locate the plots. Plots that were permanently marked appear to have 4 corner markers of rebar or welding rod with aluminum cans. Use the photos, maps and written instructions to locate the plots. For all plots that are re-visited, GPS locations will be collected and recorded, corners will be re-established with re-bar.

###### **Plot Layout (See Figure 9)**

A 15-m x 30-m rectangle plot was laid out so that the long axis paralleled the contour of the slope. Use a 100-m tape to outline the 15-m x 30-m plot. Two 30-m vegetation transects are established within the 15 x 30-m rectangle, at 5-m and 10-m along the 15-m end of the rectangle (see plot layout Figure 1). To measure vegetation cover, thirty 20 x 50 cm microplots (Daubenmire frames) were placed every 2-m along the inside edges of the two vegetation transects (A and B). The central transects will be used for point intercept measurements, active layer depths and burn severity code scores if recently burned.

### **Plot Naming Convention**

The plots were named with a three letter acronym based on a physical feature or the fire name. In general plots ending in a “B” were burned plots and plots ending in an “A” were control plots. For example: plots were established near Trout Creek in Yukon-Charley Rivers. The burn plot was named TCB-1 and the control plot was TCA-1. However over the different years that plots were established and among the different parks the plot names often got duplicated. For example, YUCH also had plots established at Todd Cr and were also named TCA-1/TCB-1. Therefore it is recommended that the original plot designators utilize the park code first, and if repetitive names occur within the parks that an “a”, “b” or “c” be added to the end of the plot name to distinguish between different plots.

### **Data Collection: Fire Effects Paired Plots**

#### **Site and Photo Points**

General site information will be collected and recorded for each plot on the Site and General Description Datasheet. It is recommended that additional site location descriptions, diagrams of plots, and additional notes on the plot be written up on separate sheet. The definitions of the fields for the Site and Plot Description Datasheet are given below:

- **Land Unit** – land unit identifier or write out land unit name - (i.e. Steese White Mtns, Yukon-Charley NP) (NPS - four letter park acronym)
- **Project** – Description of project: PPF (pre/post fire), CBI (burn severity), HZF (for hazard fuels), PP (paired plots).
- **Plot ID** – Identifier for the plot within the project, i.e. ECA-1, TCB-1 etc
- **Fire Name and Fire Date** – Fire name/number or project location or cabin name and thinning date if hazard fuels
- **Fire Date** - Date of fire or fuels treatment (pre-treatment will be blank).
- **Field date** – Sample date
- **Field Crew** – Names of crew members
- **WP number and GPS number** – record the WP number of the collected point and the name or number of the GPS used.
- **Lat/Long** – Using a GPS (Garmin V recommended), collect a lat/long averaging the time of collection for 20 points. Record in Decimal Degrees - i.e. Lat: N 65.634891° Long: W 142.982340°
- **GPS Error** - Record the error EPE and units, this needs to be recorded before you save the waypoint in Garmin handhelds.
- **Datum** – GPS datum used for collecting and navigating to plots, use NAD-83 (this is the same as WGS-84).
- **Transect Azimuth** – record the azimuth of the transect facing from the zero end to the 30-m end.
- **Declination used** – record the declination setting used on your compass, for the initial reading, base your declination on the most recent topographic map. For future reading use the declination used in the original setup.
- **Transect slope** – record the slope looking down the transect
- **Slope** – Percent slope, use clinometer
- **Aspect** – Slope aspect (facing downhill) azimuth in degrees
- **Elevation** – Taken from GPS or maps in feet or meters (record units)
- **Viereck Class** – Using Viereck’s (1992) Alaska Vegetation Classification, determine the vegetation class to level IV, or if possible level V for the plot area. Either write it out: Open PICMAR/LEDGRO/HYSPLE or use numeric: I.A.2.f with Labrador tea.
- **Soil** – Estimate of soil drainage: wet, moist, dry.
- **Disturbance** – General note of disturbances, record date estimate if known. This is for the plot and general vicinity.
- **Evidence of fire**

- **Photo number, time and camera** – record the photo number in the digital camera or keep a photo log if standard camera, record the time of the photos (for digital cameras) and the camera used. At least four photos will be taken for each plot. The photos will be taken from each end of the vegetation sampling transect looking towards the plot center. Label a dry-erase board with the date, park, plot ID, transect letter (A or B), transect azimuth (direction facing) and designate as 0-m ---> 30-m and vice-versa. Hold the board to the edge of the photo view within the first 1.5 - 2 m of the transect. In addition, original photos that were taken at the plot will be duplicated as closely as possible.

### Map of Plot Layout

Record the latitude/longitude for all four corner markers. If corners cannot be relocated estimate using tapes and azimuths. Draw corner plot identification and direction of daubenmire frame readings or any other plot information pertinent to the plot.

### Vegetation and Ground Cover

**-Point-Intercept Vegetation Sampling-** Two 30-m point intercept transects will be established along the two transects A and B within the macroplot (see Figure 9). The zero end of the transect will be the start of the transect. Every 1-m along the 30-m transect, all plant species and forest floor surface cover (mosses, lichens, litter) that are intercepted at that point will be recorded. Using a ¼” diameter pole (6 ft fiberglass bike flag), gently lower the pole so that the rod is plumb to the ground (on slopes this will not be perpendicular to the ground). At each point intercept record the species that touch the pole from top to bottom, for example if black spruce was the tallest vegetation at that point hit it would be recorded first, similarly ground cover will always be last. Record the species code on the *POINT INTERCEPT* Data Sheet.

**-Vegetation Cover Class** - To estimate vegetation cover, thirty 20 x 50 cm microplots (Daubenmire frames) are placed every 2-m along two transects A and B, starting at the 1-m point and continuing with every odd meter. The long edge of the frame parallels the transect. Estimate canopy cover for each species of live shrub, herb, bryophyte, lichen and for tree species less than 1-m tall, that is rooted in the plot frame. The following cover classes are used: 0 = 0-5%; 1 = 5-25%; 2 = 25-50%; 4 = 50-75%; 5 = 75-95% ; 6 = 95-100% Record the cover estimate of each species for each frame, number 1 through 30. Frame 1 begins at the 1-m point on transect A, continuing to frame 16 -30 on transect B. (Note: the exact sequence of frames was not recorded in any of the plot methodologies written up for the plots in the 1980’s, the sequence shown was drawn for a plot in YUCH CCPB-1.)

### Active Layer Depths and Burn Severity

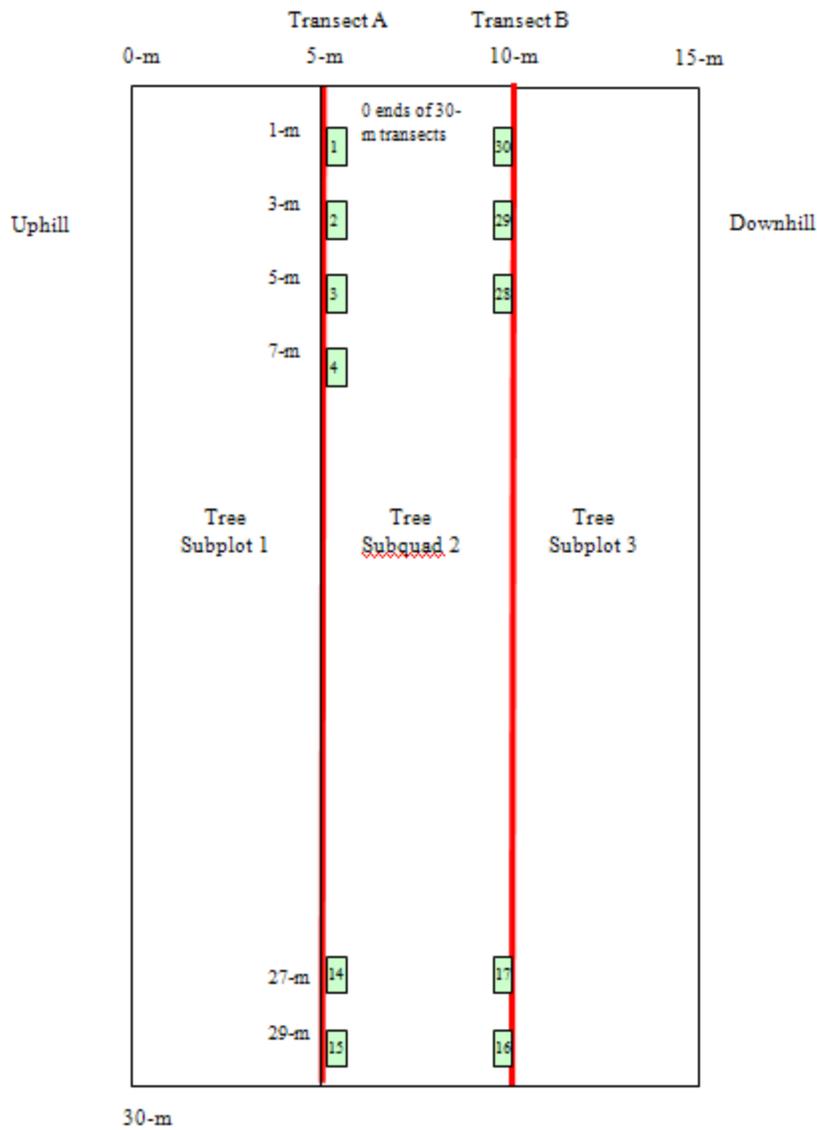
**-Active Layer Depths** - Ten active layer points are located along the two transects (A & B) at 3-m intervals, except last point is placed at 29-m. At each point measure the depth of the active layer with the bike flag rod and tape measure. Measure the depth in cm to the point of permafrost or bedrock. If it is possible to determine that depth is to rock, note this on the datasheet.

**-Burn Severity (1 yr post fire)** - Up to 1 yr postfire, at each active layer depth point determine burn severity code (BSC) as described in FMH 2003 for the substrate and vegetation at each active layer point, see Appendix for codes. Burn severity for the plot can be determined using the Composite Burn Index methodology (See FIREMON 2004).

### Forest Density

All live trees taller than 1 meter within the 15 x 30-m macroplot will be tallied by species and diameter size classes (< 5 cm, 5.1-10 cm, 10.1-15 cm, 15.1-20 cm, 20.1-25 cm, 25-30 cm, and > 30 cm DBH). To facilitate the counting of trees, tally each 5 x 30-m sub-plot separately – either use one data sheet for each sub-plot or label on the datasheet within each size class columns with 1, 2, and 3. This is also being done so that we can reduce the plot size to the central 5 x 30-m subplot for subsequent measurements. Label the subplot number on the plot map. Count all trees less than 1.4 m tall along two 1-m wide strips along the inner side of the central subplot (Note: its unclear in original documentation if the whole plot was tallied for seedlings/saplings or a sub-sample).

Figure 1: Plot Layout: Paired Plot Protocol



- = 15-m x 30-m tree density macroplot, 3 tree subplots 5-m x 30-m are numbered
- = Two 30-m transects, point intercepts every 1-m along transects A & B
- = Vegetation cover frames 20-m x 50-cm, every 2-m along transects

**Site and General Description-Paired Plots**

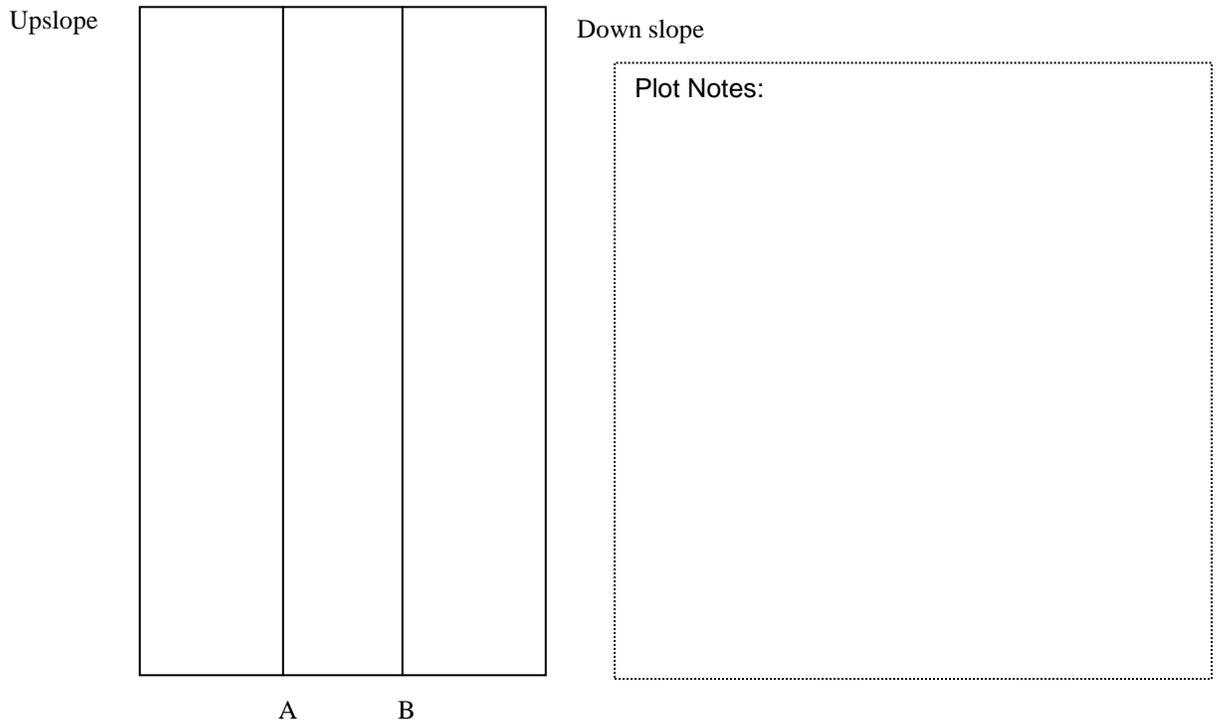
**Site Description**

Unit: \_\_\_\_\_ Project: \_\_\_\_\_ Plot ID: \_\_\_\_\_ Pre or Post \_\_\_ yrs  
 Field Date: \_\_\_\_\_ Field Crew: \_\_\_\_\_  
 Fire Number \_\_\_\_\_ Fire Date: \_\_\_\_\_ Fire Name: \_\_\_\_\_  
 Transect Azimuth: \_\_\_\_\_ Transect Slope: \_\_\_\_\_ Declination used: \_\_\_\_\_  
 Slope: \_\_\_\_\_% Aspect: \_\_\_\_\_ Elevation: \_\_\_\_\_ ft Viereck class: \_\_\_\_\_  
 Soil (circle): Wet Moist Dry Disturbance (circle): Fire Wind InsectOther: \_\_\_\_\_  
 Evidence of Fire/ Fire Indicators: Burn Snags Burned Stumps Fire Scars Charcoal (circle all that apply)  
 Photo numbers: \_\_\_\_\_ Time of photos: \_\_\_\_\_ Camera used: \_\_\_\_\_

**Latitude/Longitude**

GPS Type: \_\_\_\_\_ GPS Identification: \_\_\_\_\_ GPS Datum: \_\_\_\_\_  
**Mark all four corners of the 30-m x 15-m plot and record corner directions (N, S, E, W or NE, SW, SE etc.)**  
 Corner Direction: \_\_\_\_\_ WP No: \_\_\_\_\_ Latitude: N \_\_\_\_\_ Longitude: W \_\_\_\_\_ GPS Error: \_\_\_(m/ft)  
 Corner Direction: \_\_\_\_\_ WP No: \_\_\_\_\_ Latitude: N \_\_\_\_\_ Longitude: W \_\_\_\_\_ GPS Error: \_\_\_(m/ft)  
 Corner Direction: \_\_\_\_\_ WP No: \_\_\_\_\_ Latitude: N \_\_\_\_\_ Longitude: W \_\_\_\_\_ GPS Error: \_\_\_(m/ft)  
 Corner Direction: \_\_\_\_\_ WP No: \_\_\_\_\_ Latitude: N \_\_\_\_\_ Longitude: W \_\_\_\_\_ GPS Error: \_\_\_(m/ft)

**Map of Plot Layout** Label direction of daubenmire frames read, tree subplot #, and corner marker directions or numbers.  
 Provide notes on relocating or LZ, burn information and other plot notes as needed below.



**Vegetation Point Intercept- Paired Plots**

Park Unit: \_\_\_\_\_ Project: \_\_\_\_\_ Plot ID: \_\_\_\_\_ Pre or Post \_\_\_\_ yrs

Field Date: \_\_\_\_\_ Field Crew: \_\_\_\_\_ Control or Burn Plot

Record substrate and species codes of trees, shrubs, forbs and groundcover intercepted at each 1-m interval along the two 15-m transects (A and B), for a total of 60 pts. Record plants from tallest to lowest.

PNT	Meters	SPP	SPP	SPP	SPP	SPP	SPP
A 1	1						
2	2						
3	3						
4	4						
5	5						
6	6						
7	7						
8	8						
9	9						
10	10						
11	11						
12	12						
13	13						
14	14						
15	15						
16	16						
17	17						
18	18						
19	19						
20	20						
21	21						
22	22						
23	23						
24	24						
25	25						
26	26						
27	27						
28	28						
29	29						
30	30						
B 31	1b						
32	2b						

PNT	Meters	SPP	SPP	SPP	SPP	SPP	SPP
33	3b						
34	4b						
35	5b						
36	6b						
37	7b						
38	8b						
39	9b						
40	10b						
41	11b						
42	12b						
43	13b						
44	14b						
45	15b						
46	16b						
47	17b						
48	18b						
49	19b						
50	20b						
51	21b						
52	22b						
53	23b						
54	24b						
55	25b						
56	26b						
57	27b						
58	28b						
59	29b						
60	30b						



**Active Layer/Burn Severity-Paired Plots**

**Park Unit:** \_\_\_\_\_ **Project:** \_\_\_\_\_ **Plot ID:** \_\_\_\_\_

**Pre or Post** \_\_\_ yrs **Fire Name/Number:** \_\_\_\_\_ **Fire Date:** \_\_\_\_\_

**Field Date:** \_\_\_\_\_ **Field Crew:** \_\_\_\_\_

Record depth of active layer every 3-m along the transects A & B, for each point record if you hit permafrost (pf) or rock (r). If plot has burned within the last year record the burn severity code for the substrate and vegetation using the descriptions following this data sheet.

Transect A:

Point	Distance	Active Layer Depth (cm)	Burn Severity Code (Substrate)	Burn Severity Code (Vegetation)
1	3-m			
2	6-m			
3	9-m			
4	12-m			
5	15-m			
6	18-m			
7	21-m			
8	24-m			
9	27-m			
10	29-m			

Transect B:

Point	Distance	Active Layer Depth (cm)	Burn Severity Code (Substrate)	Burn Severity Code (Vegetation)
1	3-m			
2	6-m			
3	9-m			
4	12-m			
5	15-m			
6	18-m			
7	21-m			
8	24-m			
9	27-m			
10	29-m			

## Appendix G.2. AK NPS Regional Fire and Fuels Monitoring Protocol

### Alaska NPS Fire Ecology Program Field Method Protocol 2010

#### **Background: Fire and Fuels**

The Alaska NPS Fire and Fuels Ecology Program Monitoring Protocol (Fire and Fuels Protocol) was developed to establish fire and fuels (i.e. wildfire, prescribed fire and hazard fuels reduction treatments) monitoring protocols within Alaska National Park Service lands and as a guideline for examining relationships between fire, fuels, behavior, consumption and effects. This protocol is an NPS specific modification of the field-tested methods created by the Alaska Interagency Fire Effects Task Group (FETG) and compiled in the Fire Effects Monitoring Protocol (Allen et al, 2007).

***Pre- post fire effects protocol application:*** The Fire and Fuels Protocol may be utilized to facilitate the prediction of fire treatment effects. Project objectives may be met by establishing vegetation/soil plots in front of active fires and evaluating them prior to, during and after fire treatments. The full Fire and Fuels Protocol may be modified to meet the objectives of a wildfire monitoring project to meet the specific monitoring goals. The Fire and Fuels Protocol may be used in future fire effects monitoring projects in YUCH.

***Hazard fuels reduction protocol application:*** The protocol may be utilized to facilitate the prediction of hazard fuels reduction treatment effects. Project objectives may be met by establishing vegetation/soil plots prior to hazard fuels reduction treatments and evaluating them before and after hazard fuels treatments. The full Fire and Fuels Protocol may be modified to meet the objectives of a specific hazard fuels treatment project to meet specific monitoring goals. The AK Regional Fire Ecology program has modified the Alaska NPS Field Method Protocol to address specific monitoring questions associated with Hazard Fuels Reduction Projects.

***Prescribed fire effects protocol application:*** The Alaska Eastern Area Fire Management program may conduct prescribed fire treatments in the future which will require a monitoring effort by the Alaska Regional Fire Ecology program. The protocol may be modified to meet specific prescribed fire objectives.

#### **Purpose: Fire and Fuels**

The overarching purpose of these studies is to understand the natural variability related to wildland fire or fuels treatments in Alaska parklands. A baseline understanding of wildland fire or fuels treatment effects is necessary to identify potential abnormal or unusual effects which could be associated with long-term climate change or management activities. Varying treatment levels are correlated with levels of fire severity and the extent of hazard fuels reduction.

#### **Monitoring Goals: Fire and Fuels**

The studies which utilize the Fire and Fuels Protocol are implemented to meet the following project objectives:

- 1) Validate predictive fire models used by managers,
- 2) Identify vegetative and structural components that are important fire fuels,
- 3) Identify short and long-term fuels treatment effects for varying treatment levels.

Varying treatment levels may be associated with levels of fire severity and extent of hazard fuels reduction.

#### **Plot Protocol: Fire and Fuels Protocol**

The plot methods follow the same basic protocol as the Alaska Interagency Fire Effects Task Group (FETG) Fire Plots (2007). The methods from the FETG document have been included in this document. All or any combination of the protocol methods (i.e. point intercept, tree density, tree measurements etc.) may be used, depending on the objectives of the monitoring project.

**Plot Locations/Layout: Fire and Fuels**  
**Plot Layout**

**-Pre-Post Fire Plots:** For Pre- and Post-Fire plots, locations will be randomly established. Two methods for plot location selection are given below, either method may be used:

**Transect Method** – Using the fire perimeter map draw transects parallel to the head of the fire, flank of the fire, and rear of the fire. Mark 6 points that fit equally along the transect. For instance if the transect is 1-mile long, put a point every 1/6<sup>th</sup> of a mile. Fly the transect and determine if the points are in a vegetation type that should be sampled, if not fly to the next point.

**GIS Method** - In ArcMap use the buffer tool to create a buffer around the current fire perimeter of a distance safe for sampling based on the fire rate of spread. Generate a grid of the buffered fire perimeter. Using the FEAT database “Monitoring Unit” tool, bring in the fire grid, DEM and landcover layer. Select the monitoring unit based on the appropriate value of the buffer, vegetation type and elevation. In FEAT, generate random sample sites within the monitoring unit.

**-Hazard Fuels Plots:** Sample plots are randomly established within the treatment zones and control areas immediately adjacent to the treatment areas in stands representative of the pre-treatment forest. GIS layers of the treatment and control areas are utilized to select plot locations. A GIS random point generator and manual manipulation to spread plot distribution is used to establish plots in the treated areas and plots in a Control area. A 100 foot buffer around the thinning area was created using ArcGIS. The treatment plots are randomly selected using ArcGIS random point tool within the treatment area buffer polygon. Plots that fall within parking areas can be thrown out. The Control plots will be established 200m outside the treatment area.

**Plot Naming Convention**

The plot names will follow this naming convention: PARK- PPP-YEAR-LOCATION-###, where the first four letters (PARK) is the park identifier (i.e. DENA, YUCH), the next three letters (PPP) are the project identifier, the third letters (LOCATION) are the fire number or treatment level (e.g. A503 or Control), and the last three are plot identifiers. For the pre/post-fire plots project the three letter project identifier will be: PPF (pre-post-fire). For hazard fuels treatment plots the project identifier will be: HZDfuels (hazard fuels). The plot identifiers are numerical as established. EXAMPLES: YUCH-PPF-A503-003 or WRST-HZDfuels-09-C-03.

**Method Overview: Fire and Fuels**

The following section describes a set of Alaska field-tested methods used in a simple “Level 3” monitoring effort which employs permanent ground plots. For the full methodology each plot can be laid out and read by an experienced crew in less than 2 hours. Data can be entered easily into an Interagency Fire Ecology sequel server database called FFI V1.02 (FEAT FIREMON Integrated). Refer to the “FFI Data Entry Instructions for NPS Alaska Manual” (Mitchell and Barnes, 2009) for specific data entry protocols. FFI offers its own field datasheets which can be used, but the attached custom datasheets will expedite field data collection and already have names of common Alaska species filled in. This reference intentionally limits its scope to Alaska vegetation and field conditions. For simplicity, the myriad of options for modifying and customizing monitoring protocols or plot sizes, levels of monitoring intensity, deciding on the number of plots to use, placement of plots, other variables to include, etc. are not discussed here. It is recommended the user consult many other excellent references on setting up a monitoring study, including Elzinga et al. 1998 and the FFI user guide.

The following section provides an overview of the AK NPS Regional Fire and Fuels Protocol.

**PLOT LAYOUT** (See Figure 2)

- Set up a 30-m x 1-m transect plot based off a random point coordinate.
- Stake the zero end of a 30-m (or 100-ft) tape with chaining pins or conduit
- Drive spray painted 2.5-ft conduit into each end of the plot as marked on the figure.
- Mark each end with flagging and GPS a point at the zero end of the tape.

**PLOT DESCRIPTION** (Enter on *SITE AND GENERAL VEGETATION* datasheet)

- General plot description, direction to plots
- Lat/Long, datum, error
- General vegetation type/fuel model
- Photo information

**VEGETATION COVER** (Point Intercept) (Enter on *VEGETATION COVER-Point Intercept* datasheet)

- Point intercept 30-m transects (60 points, every 0.5-m along 30-m baseline).
- Stake with chaining pins or permanently stake both ends with PVC conduit, fiberglass survey stakes or buried rebar stakes.
- Record all trees, shrubs, herbaceous species, include substrate or groundcover hits at each point.
- Photograph both ends toward middle (FIREMON convention is a North and East photo only).
- Read on right, walk on left of baseline.

**TREE DENSITIES** (Enter on *TREE DENSITY TALLY* and *TREE MEASUREMENT* datasheets)

- 1-m x 30-m belt transect rectangle for all trees >4.5' (1.37 m) in height.
- Tally trees >4.5' in height by species and diameter size classes: (< 5 cm, 5.1-10 cm, 10.1-15 cm, 15.1-23 cm, >23 cm), and status (Live/Dead). (*TREE DENSITY TALLY* datasheet).
- Tally small trees (<4.5' tall) in 3 subplots, 1-m x 1-m located at 3, 15, & 27-m marks. (total "seedling" area of 3.0 m<sup>2</sup> or 0.00037 ac) (*TREE DENSITY TALLY* datasheet).
- For two trees of each species and size class record diameter (DBH), height, crown base height (CBH), ladder fuel heights, crown radius (see instructions *TREE MEASUREMENT* datasheet) (An *optional datasheet* with both tree density and measurements on one data sheet is provided)
- For all trees > 23 cm record species, DBH, height, crown base height (CBH), ladder fuel heights, crown radius (*TREE MEASUREMENT* datasheet).

**PERMAFROST DEPTH & BURN SEVERITY**

- Measure the depth of the active layer every 3 m beginning at 3-m mark, for 10 total points. (Enter on *PERMAFROST/BURN SEVERITY* datasheet).
- Post-burn: Record micro-site specific burn severity index, use FMH convention with 5-class severity codes for substrate and vegetation, every 3 m beginning at 3-m mark, for 10 total points. (Enter on *PERMAFROST/BURN SEVERITY* datasheet).

**Additional burn severity options:**

- Duff consumption pins (pre-burn) every 3-m, for a total of 10 points, co-located with FMH burn severity index). (Enter on *BURN SEVERITY/ACTIVE LAYER* Data sheet).
- CBI (Composite Burn Index) for overall burn severity score of plots, and for comparison to remote-sensed burn severity (dNBR normalized burn ratio). This can be determined using the Composite Burn Index methodology (See Lutes et. al. FIREMON 2006 for methods and for the Alaska-specific form).

DUFF & LITTER DEPTH AND MOISTURE

- Measure the depth of the forest floor surface material (live moss, dead moss, upper and lower duff layers) at two places displaced at least 1 m off the transect which appear similar with respect to forest floor characteristics along the transect. (Enter on *DOWN WOODY DEBRIS & DUFF DEPTHS* datasheet)
- Collect duff plugs for determination of fuel moisture (Enter on FUEL MOISTURE datasheet)

DOWN WOODY FUEL LOADING (optional)

- Brown's transect along baseline: 2m for 1-hr and 10-hr; 4m for 100-hr, and 30m for 1000-hr fuels. (6.6 ft, 13.1 ft, and 98 ft).
- If quantitative fuel loading is desired, place additional Brown's transects at 120 deg and 240 deg from origin and mark end w/ pin flag. (enter on *DOWN WOODY DEBRIS & DUFF DEPTHS* datasheet)

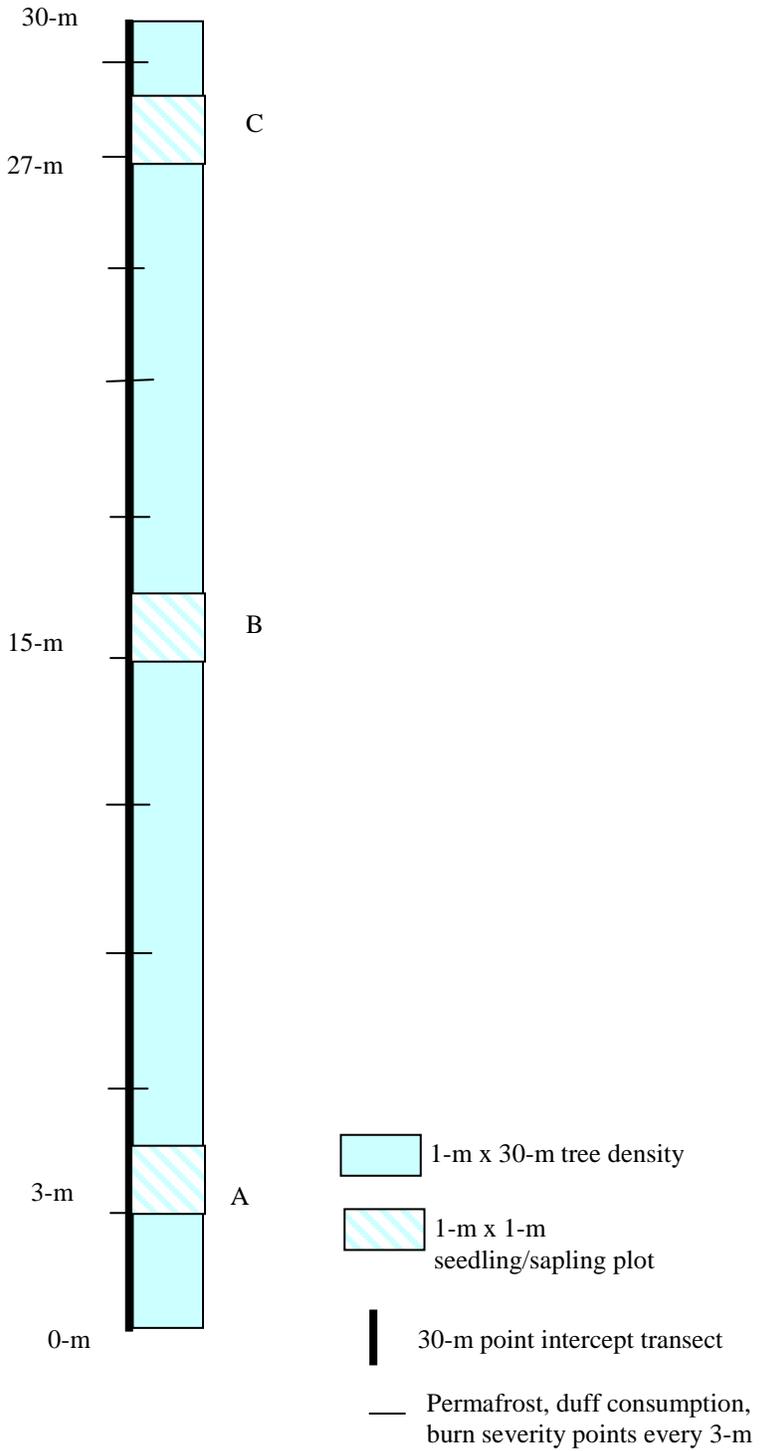
SHRUB DENSITY (optional)

- If quantitative data is desired for woody browse or shrub species, tally individuals (or **stems above ground** for clonal *spp.* such as alder, or when it is not possible to distinguish individual shrubs) in the same 1-m x 30-m belt which was used for trees. In very dense brush, may need to subsample to 0.5 X 30 m belt, or tree seedling plots. (Enter on *SHRUB DENSITY* datasheet).

Additional shrub data options:

- Assign an architectural classifications of each plant along the transect. (Enter on *MOOSE BROWSE ARCHITECTURE* Datasheet).
- Note browsing frequency, extent and brooming of the main apical stem. (Enter on *MOOSE BROWSE ARCHITECTURE* Datasheet).

**Figure 2. Plot Layout Fire and Fuels Protocol.**



## **Method Detailed: Fire and Fuels**

### **Plot Locations/Layout**

Standard plot configuration is depicted in Figure 2. A 30-m x 1-m plot will be setup based off the random point coordinate. Determine a random azimuth, using a random number generator or the compass spin method. Setup a 30-m transect by staking the zero end of a 30-m/100-ft with the chaining pins or conduit and pull the end of the tape in a straight line in the direction of the random bearing (be sure to record declination used). Drive spray painted 2.5-ft conduit into each end of the plot as marked on the figure. Tag the zero-end of the transect (“origin”) with an aluminum tag displaying the plot number and date. Mark additionally with flagging for easy visual in aerial photo. Avoid walking or trampling on the right side of the transect, where the vegetation measurements will be made. For all plots collect a GPS position at the zero end of the tape. Record the waypoint number or point name and lat/long on the data sheet, as well as noting the error. For all plots collect an averaged (20 pt average or more) GPS position at the zero end of the tape. Record the WP number and lat/long on the data sheet. NAD-83 Datum will be used in the GPS receivers (Standard for DOI agencies).

### **Site Description**

General site information will be collected and recorded for each plot on the Site and General Vegetation datasheet. It is recommended that additional site location descriptions, diagrams of plots, and additional notes on the plot be written up on separate sheet. The definitions of the fields for the Site and General Vegetation datasheet are given below:

- **Unit** – land unit identifier or write out land unit name - (i.e. Steese White Mtns, Yukon-Charley NP) (NPS - four letter park acronym)
- **Project** – Description of project: PPF (pre/post fire), CBI (burn severity), HZF (for hazard fuels), PP (paired plots).
- **Plot ID** – Identifier for the plot within the project. For pre/post fire plots, use the fire number and sequential numbering 01 through x.
- **Fire Name and Fire Date** – Fire name/number or project location or cabin name and thinning date if hazard fuels
- **Fire Date** - Date of fire or fuels treatment (pre-treatment will be blank).
- **Field date** – Sample date
- **Field Crew** – Names of crew members
- **WP number and GPS number** – record the WP number of the collected point and the name or number of the GPS used.
- **Lat/Long** – Using a GPS (Garmin V recommended), collect a lat/long averaging the time of collection for 20 points. Record in Decimal Degrees - i.e. Lat: N 65.634891° Long: W 142.982340°
- **GPS Error** - Record the error EPE and units, this must be recorded before you save the waypoint in Garmin handhelds.
- **Datum** – GPS datum used for collecting and navigating to plots, use NAD-83 (this is the same as WGS-84).
- **Transect Azimuth** – record the azimuth of the transect facing from the zero end to the 30-m end.
- **Declination used** – record the declination setting used on your compass, for the initial reading, base your declination on the most recent topographic map. For future reading use the declination used in the original setup.
- **Transect slope** – record the slope looking down the transect
- **Slope** – Percent slope, use clinometer
- **Aspect** – Slope aspect (facing downhill) azimuth in degrees
- **Elevation** – Taken from GPS or maps in feet or meters (record units)
- **Viereck Class** – Using Viereck’s (1992) Alaska Vegetation Classification, determine the vegetation class to level IV, or if possible level V for the plot area. Either write it out: Open PICMAR/LEDGRO/HYSPLE or use numeric: I.A.2.f with Labrador tea.
- **Soil** – Estimate of soil drainage: wet, moist, dry.

- **Disturbance** – General note of disturbances, record date estimate if known. This is for the plot and general vicinity.
- **Evidence of fire**
- **Photo number, time and camera** – record the photo number in the digital camera or keep a photo log if standard camera, record the time of the photos (for digital cameras) and the camera used.

A minimum of two photos will be taken for each plot, aerial photos should be taken of the plot. The photos will be taken from each end of the vegetation sampling transect looking towards the plot center. Label a dry-erase board with the sample date, park-project-location-plot ID (i.e. YUCH-PPF-A324-02), transect azimuth (direction facing) and designate as 0-m ---> 30-m and vice-versa. Hold the board to the edge of the photo view within the first 1.5 - 2 m of the transect with the camera set at a fixed height of 5 ft above the ground. Record the photo number of the plot on the site data sheet.

### **Vegetation and Ground Cover**

**-Ocular Vegetation Sampling-** Ocular estimates of vegetation and ground cover are recorded on the Site and General Vegetation datasheet for dominant vegetation and ground cover within the 30-m transect. The cover classes are defined as: 1-9%, 10-24%, 25-59%, 60-74%, and  $\geq 75\%$ . Estimate the cover of each species or ground cover and check the appropriate column. Due to overlapping and canopy cover, the total cover can equal more than 100%. Additional species can be added on the second page or by crossing out pre-written species. Estimate the height by height class in meters for all trees and shrubs. Species are listed by layer as described below:

**TREE LAYERS** - List all the species that occur within the plot and estimate the percent cover. Willows or alders of tree size are not considered trees. Check the box showing the average height of the canopy, estimate average tree diameter, ladder fuel heights and live crown heights. If a single species datasheets two distinct sub-layers, list it twice. Use scientific names where possible to indicate species, use first three letters of the genus and the species.

**SHRUB LAYERS** - Shrubs are defined as woody plants with multiple stems. For each shrub species check the appropriate cover class and height class. If there are newly established shrubs, identify if plants are new seedlings or re-sprouts, otherwise leave the column blank.

**HERBACEOUS and GROUND LAYER** - Within the herbaceous (non-woody) layer, estimate the % herbaceous cover provided by graminoids (grasses, sedges, rushes), forbs (flowering) plants, ferns, and horsetails. Estimate the % ground cover provided by mosses and hepatics (liverworts), lichens, litter (dead leaves or needle litter), and bare ground or talus. If there are newly established herbs, identify if plants are new seedlings or re-sprouts, otherwise leave the column blank.

**-Point-Intercept Sampling-** Along the 30-m transect, the point intercept method will be used to determine plant and ground cover. Every 50 cm along the 30-m transect, all plant species and forest floor surface cover (mosses, lichens, litter) that are intercepted at that point will be recorded. Start at the 0.5 m mark and sample along the right side of the transect. Using a 1/4" diameter pole (6 ft fiberglass bike flag), gently lower the pole so that the rod is plumb to the ground (on slopes this will not be perpendicular to the ground). At each point intercept record the species that touch one side of the pole from top to bottom, for example if black spruce was the tallest vegetation at that point hit it would be recorded first, similarly ground cover will always be last. Record the species code on the POINT INTERCEPT Data Sheet. Use the NRCS four letter code for vascular plants, bryophytes (mosses) and lichens. In general the first two letters are the genus (i.e. Salix) and the last two are the species (i.e glauca) is SAGL. Use the USDA plants database for most current species codes (<http://plants.usda.gov/>). Numerics are frequently used to differentiate species with similar codes, if you can't remember the exact code write out the species on the bottom of the sheet and the acronym used for that species. If there are unknown species that are common, collect for identification and record an identifiable acronym and note on the data sheet. For dead standing trees record the species and include D after the species code. For dead branches on a live tree, record the tree as though it were alive. From this data we will calculate the species composition and percent cover by species or substrate.

### **Forest Measurements**

**-Tree Density** - Tally all trees taller than 1.4-m (4.5 ft) that occur within an a 1-m belt transect on the right side of the point intercept transect by species and diameter size classes (< 5 cm, 5.1 - 10 cm, 10.1 - 15 cm, 15.1 – 23 cm, > 22.5 cm DBH) (as defined by the Forest Service Natural Fuels Photo Series, 2001). Use a linear metric measuring tape or the folding ruler to determine if trees are within 1-m of the transect line (30 m<sup>2</sup>). All live “seedling” trees less than 4.5 ft tall will be tallied by species on 3 subplots (1-m x 1-m) at the 3, 15, and 27-m mark along the base transect (total seedling area of 3.0 m<sup>2</sup> or 0.00037 ac).

**-Tree Measurements** - Detailed tree measurements will be recorded for all trees larger than 23 cm (9 inch) dbh AND for two smaller live trees (> 4.5 feet tall) of each species and each size class recorded within the tree density plot. In order to randomly select the trees <23 cm to be measured, select trees that are closest to the mid-point of the tree density belt (15-m point). The following measurements will be taken: DBH (diameter at breast height), tree height, height to live crown, height to live and dead ladder fuels, and crown radius. Data will be used to determine summary data such as, density, basal area, crown bulk density, and stand height. Example data sheets for measurements are included below and examples of tree measurements are in Section O.3. Definitions of the parameters measured are given below:

**Species** - record the species of the tree using six letter acronyms (first three letters of genus and first three letters of species). All willows and alders will be classified as shrubs.

**DBH** - measure the diameter of the tree in centimeters at 4.5 ft or 1.37m above the ground, using the metric logger’s tape.

**Tree height** - Measure the tree height in 1/10ths of meters (0.1 m) with a clinometer. Measure 10 – 30 m away from the tree, depending on tree height. Using the percent side of the clinometer, the tree height in meters equals: = (distance from tree in meters) x (% to top of tree - % to base of tree). Note that if the base % is negative this will be added to the total height (Math: minus a negative is positive). See Appendix B.3.

**Crown base height** – measure the height to main live crown – the height in meters (0.1 m) from the forest floor to the obvious live crown. Use a clinometer or measure with tape or pole (See Appendix B.2).

**Height to live ladder fuel** – the height (cm) from the forest floor to the lowest point of a live branch on the tree. Measure with a tape or pole.

**Height to dead ladder fuel** – the height (cm) from the forest floor to the lowest point of a dead branch on the tree.

**Crown radius** -measure the crown radius to the average widest branch or drip-line of the crown, measure to the nearest centimeter.

### **Permafrost, Burn Severity, & Duff/Woody Fuel Loading**

**-Active Layer Depths** - Ten active layer points are located along the baseline at 3-m intervals (Fig. 1), except last point is placed at 29-m. At each point measure the depth of the active layer with the bike flag rod and tape measure. Measure the depth in cm to the point of permafrost or bedrock. If it is possible to determine that depth is to rock, note this on the datasheet.

**-Burn Severity & Duff Consumption (optional)** –

**Burn Severity:** At each point determine burn severity code (BSC) as described in Fire Monitoring Handbook (USDI, NPS, 2003) for the substrate at each point. Determine the burn severity class (definitions can be found in the *Quick Reference* Section O.3 for the substrate) and vegetation every 3 m for a total of 10 points. For quantitative measurements of duff consumption, place 10 burn pins pre-fire (15-30” welding rods work well) firmly in the ground every 3 meters along the transect. Push the pins in so that the top is flush with the surface. If a pin can’t be pushed in flush with the forest floor, either cut it flush with small bolt cutters or record the remaining height above the surface on the *BURN SEVERITY/ACTIVE LAYER Datasheet*.

**Duff consumption:** Duff consumption should be measured as soon as possible post-fire but at least within 1 year of burning. Measure the part of the pin exposed by the fire in cm to get the burn depth and record on CBI Form, **FUEL MOISTURE Data sheet/DUFF PLUG Datasheet**. In addition, burn severity for the general plot area (an approximate 30 m X 30 m stand scale) can be determined using the Composite Burn Index methodology (See Lutes

et. al. FIREMON 2006 for methods and Appendix A.1 for the Alaska-specific form). This option is useful where burn severity is being scaled up to a burn severity map derived from satellite images.

**-Forest Floor Duff Depths and Moisture** – Measuring the depth of the duff and litter layers is standard, removing plugs for oven drying and fuel moisture determination may be added if the data is required for the project. Measure the depth of the forest floor surface material (live moss, dead moss, upper and lower duff layers) at two sites at least 1 m off the transect which appear similar with respect to forest floor characteristics. Do not disturb the vegetation along the transect itself. Carefully cut down through the forest floor to mineral soil or permafrost (for fuel moisture determinations, remove ~ 4-inch-square forest floor plugs) using a compass saw, trowel and/or shovel. Measure the depth of each layer down to mineral soil (live moss, lichen, dead moss, upper duff, lower duff) with a ruler to the nearest 0.5 cm (See Wilmore 2001, duff moisture collection methods). If permafrost or other obstructions are encountered, measure the layers available and indicate the cause and depth of obstruction. Record NA if a layer is not present. For duff moisture sampling (optional), record the depths and collect the samples in nalgene sampling jars, and record bottle number. More detailed information on duff layers, moisture sampling and data sheets for destructive fuel sampling are available (Wilmore 2000, Jandt et al. 2005).

**-Down Woody Fuels (Optional)** - Down woody fuel load can be measured along the 30-m transect line using the planar intersect method outlined by Brown (1974). Woody debris is defined as follows: 1 hr fuels (0 to 1/4" diam), 10 hr fuels (1/4 to 1" diam), 100 hr fuels (1 to 3" diam) and 1000 hr sound (>3" diam), 1000 hr rotten (> 3" diam). Tally the woody fuels by size class along the point intercept transect baseline: 2m for 1-hr and 10-hr; 4m for 100-hr, and 30m for 1000-hr fuels. (6.6 ft, 13.1 ft, and 98 ft respectively). If quantitative fuel loading is desired, place additional Brown's transects at 120 deg and 240 deg from origin and mark end w/ pin flag.

**Shrub Density (Optional)**

If quantitative data is desired for woody browse or shrub species, tally individuals (or **stems above ground** for clonal *spp.* such as alder, or when it is not possible to distinguish individual shrubs) in the same 1-m x 30-m belt which was used for trees. If desired, tally the shrubs by life form (mature, resprout, seedling). In very dense brush, may need to subsample to 0.5-m x 30-m belt, or tree seedling plots. (*Recommend not tallying rose, raspberry, or spirea in shrub transects if doing this for browse info: accurate counts are very difficult.*)

**Moose Browse Architecture (Optional)**- The 30 meter belt transect is 1 meter wide. For each plant of the preferred species, within the 1 meter belt transect, assign an architectural classification. Refer to Tom Seaton's Masters Thesis paper (2002) for additional protocol information. Below are the general architectural classifications used.

**Broomed** - (sapling type plants) the main apical stem has been broken by moose. Look back through the history of the plant, this may have happened 2–10 years before you measured it; (bushy type plants) more than half of the CAG stems arise from lateral stems that were produced as a result of browsing. Look back through stems that are many years old.

**Browsed** - Has been browsed some in the past, but browsing has not significantly affected its growth. Less than half of CAG twigs between 0.0 and 3.0 m arise from lateral stems that were produced from browsing.

**Unbrowsed** - There is no visible evidence that moose have ever browsed this plant.]

Note in comments evidence of bark stripping and other evidence of moose or other wildlife use in the area. (Enter data in the *MOOSE BROWSE ARCHITECTURE* datasheet).

**Field Gear List: Fire and Fuels Protocol**

<b>General</b>	<b>Item</b>	<b>Pre/Post Plots</b>
Plot	30 meter tape	1
Plot	Bike flag	1
Plot	chaining pins	2
Plot	Clinometer	1
Plot	Clipboard	2
Plot	Compass	2
Plot	Diameter calipers	1
Plot	Diameter logger's tape, metric	1
Plot	Diameter tape (small), metric	2
Plot	Field vest	1/person
Plot	Folding ruler 1 meter	2
Plot	Handlens	2
Plot	Paintsticks	2
Plot	Rebar	2 per plot
Plot	steel tags w/wire	2 per plot
Plot	welding rods (duff consumption)	10 per plot
Plot	white board/dry erase pen	1
duff	4" quilting square	1
duff	compass saw	1
duff	duff containers	40
duff	Green duff mat	1
duff	Pruners	1
duff	Ruler, centimeter	1
duff	special duff plug shovel	1
Tech	Digital Camera	1
Tech	GPS w/appropriate map coverage downloaded	1
Tech	PDA w/FEAT Database	1
logistic	BK Radio w/appropriate freqs	1
logistic	Copies of original forms for each paired plot.	1 set for each year
logistic	Form organizer for plot project w/ data sheets	1
logistic	Maps of plot locations	1
logistic	Satellite Phone	1
logistic	Shotgun w/ammo	1
Personal	Food, Clothing, Shelter	yes

**Site Description: Fire and Fuels**

**Location Information**

Unit: \_\_\_\_\_ Project: \_\_\_\_\_ Plot ID: \_\_\_\_\_ Date (M/D/Y): \_\_\_/\_\_\_/\_\_\_

Field Crew: \_\_\_\_\_

Transect Azimuth: \_\_\_\_\_ (Direction from 0-m to 30-m end) Transect Slope: \_\_\_\_\_% Declination used: \_\_\_\_\_

**General Site Information**

Slope: \_\_\_\_\_% Aspect: \_\_\_\_\_ Deg Elevation: \_\_\_\_\_ ft/m

Soil (circle): Wet Moist Dry Disturbance (circle): Fire Wind Insect Other: \_\_\_\_\_

Fire Indicators (circle) : Burn Snags Burned Stumps Fire Scars Burned Plants Charcoal

Fire Number \_\_\_\_\_ Fire Name: \_\_\_\_\_ Fire Year: \_\_\_\_\_ Pre or Post \_\_\_\_\_ yrs

Cabin Name: \_\_\_\_\_

**Latitude/Longitude: (DD.DDDD)**

GPS Type: \_\_\_\_\_ GPS Identification: \_\_\_\_\_ GPS Datum: \_\_\_\_\_ Elev: \_\_\_\_\_

Description: \_\_\_\_\_ WP No: \_\_\_\_\_ Lat: N \_\_\_\_\_ Long: W \_\_\_\_\_ GPS Error: \_\_\_\_\_(m/ft)

Description: \_\_\_\_\_ WP No: \_\_\_\_\_ Lat: N \_\_\_\_\_ Long: W \_\_\_\_\_ GPS Error: \_\_\_\_\_(m/ft)

Description: \_\_\_\_\_ WP No: \_\_\_\_\_ Lat: N \_\_\_\_\_ Long: W \_\_\_\_\_ GPS Error: \_\_\_\_\_(m/ft)

Description: \_\_\_\_\_ WP No: \_\_\_\_\_ Lat: N \_\_\_\_\_ Long: W \_\_\_\_\_ GPS Error: \_\_\_\_\_(m/ft)

Photos: Camera used: \_\_\_\_\_

Photo numbers: \_\_\_\_\_ Description: \_\_\_\_\_ Time of photos: \_\_\_\_\_

Photo numbers: \_\_\_\_\_ Description: \_\_\_\_\_ Time of photos: \_\_\_\_\_

Photo numbers: \_\_\_\_\_ Description: \_\_\_\_\_ Time of photos: \_\_\_\_\_

Photo numbers: \_\_\_\_\_ Description: \_\_\_\_\_ Time of photos: \_\_\_\_\_

**Vegetation Class:**

Current Viereck class: \_\_\_\_\_ Pre-Disturbance Viereck Class: \_\_\_\_\_

List Dominant Spp.

	Species 1	% Cover	Species 2	% Cover
Tree Sp.				
Tall Shrub Sp.				
Low Shrub Sp.				
Graminoid/Herbaceous Sp.				
Moss Sp.				



**(Plot Layout and Notes:** Provide notes and map on relocating or LZ, burn information and other plot notes as needed below.)

**Site Description: Hazard Fuels Treatment**

**Location Information**

Unit: \_\_\_\_\_ Project: \_\_\_\_\_ Plot ID: \_\_\_\_\_

Field Crew : \_\_\_\_\_ Date (M/D/Y): \_\_\_/\_\_\_/\_\_\_

Transect Azimuth: \_\_\_\_\_ (direction towards end of transect) Declination used: \_\_\_\_\_

**Latitude/Longitude:** GPS Type: \_\_\_\_\_ GPS Identification: \_\_\_\_\_ GPS Datum: \_\_\_\_\_

Description	Waypoint	Latitude (DD.DDDD)	Longitude (DD.DDDD)	GPS Error
		N	W	m/ft
		N	W	m/ft
		N	W	m/ft
		N	W	m/ft

Elevation: \_\_\_\_\_

**General Site Information**

**Slope:** \_\_\_\_\_% **Aspect:** \_\_\_\_\_ Deg

**Soil** (circle): Wet Moist Dry **Disturbance** (circle): Fire Wind Insect Other: \_\_\_\_\_

**Evidence of fire:** Yes No / **Indicators** (circle) : Burn Snags Burn Stumps Fire Scars Burn Plants Charcoal

**Treatment** (circle): Thinning Control **Monitoring phase** (circle): Pre-thinning Post-thinning

**Treatment date:** \_\_\_\_\_ **# years post-treatment:** \_\_\_\_\_

**Photos:** Camera used: \_\_\_\_\_

Description: _____	Photo time (military): _____
Description: _____	Photo time (military): _____
Description: _____	Photo time (military): _____
Description: _____	Photo time (military): _____

**Vegetation Community Structure:** (see general cover sheet for common species codes and cover classes) for the entire 4- or 8-M circular plot area.

Community structure classes	Dominant Spp 1	Dom Spp.1 (%Cover)	Dominant Spp 2	Dom Spp. 2 (% Cover)
Tree Sp.				
Tall Shrub Sp.				
Low Shrub Sp.				
Graminoid/Herbaceous Sp.				
Moss/Lichen Sp.				



**(Plot Layout and Notes:** Provide notes and map on relocating, treatment information and other plot notes as needed below.

General Vegetation Information: *Fire and Fuels*

Park Unit: \_\_\_\_\_ Project: \_\_\_\_\_ Plot ID: \_\_\_\_\_ Pre or Post \_\_\_\_\_ yrs Field Date: \_\_\_\_\_  
 Field Crew: \_\_\_\_\_

SPECIES Tree Layer	Common Name	Cover Class					Height Class					Ht to live crown (cm)	Ht to Ladder Fuel (cm)	Avg DBH (cm)
		1-9%	10-24%	25-59%	60-74%	≥75%	0-3 m	3-5 m	5-9 m	9-21 m	> 21 m			
PIGL	White spruce													
PIMA	Black spruce													
LALA	Larch													
POTR5	Aspen													
POBA2	Balsam poplar													
BEPA	Paper birch													
Tall and Low Shrub Layer		1-9%	10-24%	25-59%	60-74%	≥75%	<0.2 m	0.2-1.5 m	> 1.5 m	Seedling	Re-sprout			
ALVIC	Green alder													
SALIX	Unknown willow													
SAGL	Glaucous willow													
SABE2	Bebb's willow													
BENA	Dwarf birch													
BEGL	Tall shrub birch													
DAFRF	Shrubby cinquefoil													
LEPAD	Narrow leaf Labrador tea													
LEPAG	Wide leaf Labrador tea													
SHCA	Soapberry													
CHCA2	Leatherleaf													
RIBES	Unknown Currant													
ROAC	Prickly Rose													
VAUL	Blueberry													
Dwarf Shrubs and Herbs		1-9%	10-24%	25-59%	60-74%	≥75%	Seedling	Re-sprout						
VAVI	Lowbush cranberry													
LIBO3	Twin flower													
ARRU	Bear berry													
COCA13	Dwarf Dogwood													
RUCH	Cloudberry													
EMNI	Crowberry													



**Vegetation Point Intercept: Fire and Fuels**

Park Unit: \_\_\_\_\_ Project: \_\_\_\_\_ Plot ID: \_\_\_\_\_ Pre or Post \_\_\_\_\_ yrs Field Date: \_\_\_\_\_

Field Crew: \_\_\_\_\_

Record substrate and species codes of trees, shrubs, forbs and groundcover intercepted at each 50 cm interval, record plants tallest to lowest. Record status (superscript): D (dead), C (charred), S (scorched). \*=collected

PNT	Meters	<i>Tallest</i>					
		SPP 1	SPP 2	SPP 3	SPP 4	SPP 5	SPP 6
1	0.5						
2	1						
3	1.5						
4	2						
5	2.5						
6	3						
7	3.5						
8	4						
9	4.5						
10	5						
11	5.5						
12	6						
13	6.5						
14	7						
15	7.5						
16	8						
17	8.5						
18	9						
19	9.5						
20	10						
21	10.5						
22	11						
23	11.5						
24	12						
25	12.5						
26	13						
27	13.5						
28	14						
29	14.5						
30	15						
31	15.5						
32	16						
33	16.5						
34	17						
35	17.5						
36	18						
37	18.5						

PNT	Meters	Tallest					
		SPP 1	SPP 2	SPP 3	SPP 4	SPP 5	SPP 6
38	19						
39	19.5						
40	20						
41	20.5						
42	21						
43	21.5						
44	22						
45	22.5						
46	23						
47	23.5						
48	24						
49	24.5						
50	25						
51	25.5						
52	26						
53	26.5						
54	27						
55	27.5						
56	28						
57	28.5						
58	29						
59	29.5						
60	30						

**Common codes:**

**Trees**

Code	Name
PIGL	Picea glauca – White spruce
PIMA	Picea mariana – Black spruce
BEPA	Betula papyrifera – Paper birch
POTR	Populus tremuloides – Aspen
POBA	Populus balsamifera – Balsam poplar

**Shrubs**

Code	Name
BENA	Betula nana- Dwarf birch
ALNUS	Alnus spp – Alder , SALIX – willow
LEPA11	Ledum palustre – Labrador tea
VAUL	Vaccinium uliginosum – blue berry
VAVI	Vaccinium vitis-idaea – lowbush cranberry

**Ground**

Code	Name
FMOSS	Feather moss
HYSP70	Hylocomium splendens – Stair step moss
SPHAG2	Sphagnum spp (moss)
LTRH	Leaf Litter
LTNDL	Needle Litter
DUFF	Organic duff
BARE	Bare Mineral soil
1 HR,	Woody debris by size class
10HR...	

Code	Name
CHAN	Chamerion angustifolium – Tall Fireweed (EPAN2)
POAL	Polygonum alpinum – Wild rhubarb
MEPA	Mertensia paniculata - Tall blue bells
LIBO3	Linnaea borealis – Twin flower
EQUIS	Equisetum spp – Horsetail
CACA4	Calamagrostis canadensis – blue joint grass

**Tree Density Tally: Fire and Fuels**

Park Unit: \_\_\_\_\_ Project: \_\_\_\_\_ Plot ID: \_\_\_\_\_ Pre or Post \_\_\_\_\_ yrs Field Date: \_\_\_\_\_ Field Crew: \_\_\_\_\_

Tally the number of dead or trees taller than 4.5' (1.37-m) by diameter size class and species within the 1-m x 30-m belt transect plot area. Tally by live, dead, or if disease or insects are prevalent, record what type of damage code and if live or dead. Dead trees with less than 45 degree angle with the ground are not tallied (counted as fuel). For small "layering" trees, pull trees upright to determine if height is > 4.5'. Tally the "seedling" - live trees less than 4.5' tall by species and resprout/seedling/mature in the three 1-m x 1-m subplots at 3-m, 15-m and 27-m transect. **Resprouts:** new growth from older root stock < 1.37 m tall, **Seedlings:** new plants from seeds < 10cm high, **Mature** >10cm

Tree Species	Status	Tree Counts by DBH (cm)					Seedlings- Saplings <4.5ft 3 M	Seedling- Saplings <4.5ft 15M	Seedlings- Saplings <4.5ft 27M
		< 5cm	5.1-10 cm	10.1-15 cm	15.1-23 cm	>23 cm			
Black Spruce ( <i>Picea mariana</i> )	LIVE						R	R	R
	Damage						S	S	S
	DEAD								
	Damage						M	M	M
White spruce ( <i>Picea glauca</i> )	LIVE						R	R	R
	Damage						S	S	S
	DEAD								
	Damage						M	M	M
Aspen ( <i>Populus tremuloide</i> )	LIVE						R	R	R
	Damage						S	S	S
	DEAD								
	Damage						M	M	M
Paper birch ( <i>Betula papyrifera</i> )	LIVE						R	R	R
	Damage						S	S	S
	DEAD								
	Damage						M	M	M
Balsam poplar ( <i>Populus balsamifera</i> )	LIVE						R	R	R
	Damage						S	S	S
	DEAD								
	Damage						M	M	M
Larch ( <i>Larix laricina</i> )	LIVE						R	R	R
	Damage						S	S	S
	DEAD								
	Damage						M	M	M



**AK NPS Fire and Fuels Monitoring Protocols**

**Active layer/Duff Consumption: Fire and Fuels**

Park Unit: \_\_\_\_\_ Project: \_\_\_\_\_ Plot ID: \_\_\_\_\_ Pre or Post \_\_\_\_\_ yrs  
 Field Date: \_\_\_\_\_ Field Crew: \_\_\_\_\_

Point	Distance	Active Layer Depth (cm)	Surface Layer Fuel Code	Soil Moisture (%)	pH	Live Moss Depth (cm)	Dead Moss Depth (cm)	Upper Duff Depth (cm)	Lower Duff Depth (cm)
1	3-m								
2	6-m								
3	9-m								
4	12-m								
5	15-m								
6	18-m								
7	21-m								
8	24-m								
9	27-m								
10	29-m								

**Burn Severity/Duff Consumption: Fire and Fuels**

Date: \_\_\_\_\_

Point	Distance	Post-Fire		Pre-fire	Post-fire	
		Burn Severity Code (Substrate)	Burn Severity Code (Vegetation)	Burn Pin above surface (cm) (A)	Burn Pin Exposed (cm) (B)	Burn Depth cm (B-A)
1	3-m					
2	6-m					
3	9-m					
4	12-m					
5	15-m					
6	18-m					
7	21-m					
8	24-m					
9	27-m					
10	29-m					

**Down Woody Debris & Duff Depths: Fire and Fuels**

**Park Unit:** \_\_\_\_\_ **Project:** \_\_\_\_\_ **Plot ID:** \_\_\_\_\_ **Pre or Post** \_\_\_\_\_ **yrs**

**Field Date:** \_\_\_\_\_ **Field Crew:** \_\_\_\_\_

Record the number of intercepts of woody fuels along the 50 ft transect by size class: 0 - 1/4" and 1/4" - 1" from 0 to 6 ft along transect, 1" - 3" diameter from 0 to 12 ft along transect, and > 3" diameter from 0 to 100 ft along transect. Record the diameter of fuels >3" diameter. Measure litter and duff depths at each end of the transect. Or use meters: 2-m (6.6 ft), 4-m (13.1 ft), 30-m (98 ft).

Transect	# of intercepts			Record Diameter (inches) > 3" diam		Litter and Duff Depths (cm)			
	0 – 0.25" 1 hr	0.25 - 1" 10 hr	1 - 3" 100 hr	3"+ solid 1000 hr S	3"+ rotten 1000 hr R	Sample site 1	Depth cm	Sample site 2	Depth cm
Dir. ____  Slope ____						Litter		Litter	
						Lichen		Lichen	
						Live Moss		Live Moss	
						Dead Moss		Dead Moss	
						Upper Duff		Upper Duff	
						Lower Duff		Lower Duff	
Total:	Total:	Total:							

Transect	0 – 0.25" 1 hr	0.25 - 1" 10 hr	1 - 3" 100 hr	3"+ solid 1000 hr S	3"+ rotten 1000 hr R	Sample site 3	Depth cm	Sample site 4	Depth cm
	Dir. ____  Slope ____						Litter		Litter
Lichen								Lichen	
Live Moss								Live Moss	
Dead Moss								Dead Moss	
Upper Duff								Upper Duff	
Lower Duff								Lower Duff	
Total:	Total:	Total:							

**Definitions & Tally Rules:**

- >Downed woody material are dead twigs, branches, stems and boles of trees and shrubs that have fallen and lie on or above the ground.
- >Measure woody material first to avoid disturbing it and biasing your estimates.
- >Do not count dead woody stems and branches still attached to standing shrubs and trees (see below)
- >If more than 45 degrees and dead, but still attached at the bole it is still counted
- >Do not tally any particle having a central axi that coincides perfectly with the sampling plane.
- >If the sampling plane intersects a curved piece more than once tally each intersection
- >For rotten logs that have fallen apart try to estimate its original diameter>Tally uprooted stumps and roots not encased in dirt. Do not tally undisturbed stumps



**BURN SEVERITY -- COMPOSITE BURN INDEX (BI) - Modified for ALASKA 6/8/2005**

<b>Plot Description</b>	Examiners:		Fire Name:	
Registration Code		Project Code		Plot Number
Field Date mm/dd/yyyy	/ /	Fire Date mm/yyyy	/	
Plot Aspect		Plot % Slope		Elevation (m)
Plot Radius Overstory	10 meters	Latitude plot center		GPS Datum
Plot Radius Understory	10 meters	Longitude plot center		GPS Error (m)
Number of Plot Photos		Plot Photo IDs and Time		

<b>BI - Long Form</b>	% Burned 20 m Plot =		% Burned 30 m Plot =		Fuel Photo Series =		
<b>STRATA RATING FACTORS</b>	<b>BURN SEVERITY SCALE</b>						<b>FACTOR SCORES</b>
	No Effect	Low		Moderate		High	
	0.0	0.5	1.0	1.5	2.0	2.5	

**A. SUBSTRATES**

% Pre-Fire Cover: Litter =		Duff =		Soil/Rock =		Tussocks =	
Pre-Fire Depth (cm): Litter =		Duff =		Fuel Bed =			
Litter/ Light Fuels: W. Debris <3" Diam Fuel Consumed	Nochange	--	50% litter	--	100% litter	>80% light fuel	98% Light Fuel
Duff	Nochange	--	Light char	--	50% loss deep char	--	Consumed
Medium Fuel, 3-8 in. or Tussocks basal area	Nochange	--	20% consumed	--	40% consumed	--	>60% loss, deep ch
Heavy Fuel, > 8 in.	Nochange	--	10% loss	--	25% loss, deep char	--	>40% loss, deep ch
Exposed Mineral Soil Cover	Nochange	--	10%	--	40%	--	>80%

Σ =  
N =  
X̄ =

**B. HERBS, LOW SHRUBS AND TREES LESS THAN 1 METER:**

Pre-Fire Cover: Herbaceous/Graminoids =		Moss/Lichen =		Shrubs < 1m =			
Moss/lichens Cover	Unchanged	--	30%	--	80%	95%	100%
% Foliage Altered (blk-brn) - shrubs	Unchanged	--	30%	--	80%	95%	100% + branch loss
Freq % Living/Resprouting	100%	--	90%	--	50%	< 20%	None
Colonizers - Seed/Spores	Unchanged	--	Low	--	Moderate	High	Low to None
Spp. Comp. - Rel. Abund.	Unchanged	--	Little change	--	Moderate change	--	High change

Σ =  
N =  
X̄ =

**C. TALL SHRUBS AND TREES 1 TO 2 METERS:**

Pre-Fire Cover =							
% Foliage Altered (blk-brn)	0%	--	20%	--	60-90%	> 95%	Signifcant branch loss
Freq % Living/Resprouting	100%	--	90%	--	30%	< 15%	< 1%
% Change in Cover	Unchanged	--	15%	--	70%	90%	100%
Spp. Comp. - Rel. Abund.	Unchanged	--	Little change	--	Moderate change	--	High Change

Σ =  
N =  
X̄ =

**D. INTERMEDIATE TREES (SUBCANOPY, POLE-SIZED TREES) 2-8 meters**

Pre-Fire % Cover =		Pre-Fire Number Living =		Pre-Fire Number Dead =			
% Green (Unaltered)	100%	--	80%	--	40%	< 10%	None
% Black (Torch)	None	--	5-20%	--	60%	> 85%	100% + branch loss
% Brown (Scorch)	None	--	5-20%	--	40-80%	< 40 or > 80%	None, due to torch
% Canopy Mortality	None	--	15%	--	60%	80%	%100
Char Height	None	--	1.5 m	--	2.8 m	--	> 5 m

Σ =  
N =  
X̄ =

Post Fire: %Felled =                      %Tree Mortality =

**E. BIG TREES (UPPER CANOPY, DOMINANT, CODOMINANT TREES) >8 meters**

Pre-Fire % Cover =		Pre-Fire Number Living =		Pre-Fire Number Dead =			
% Green (Unaltered)	100%	--	95%	--	50%	< 10%	None
% Black (Torch)	None	--	5-10%	--	50%	> 80%	100% + branch loss
% Brown (Scorch)	None	--	5-10%	--	30-70%	< 30 or > 70%	None, due to torch
% Canopy Mortality	None	--	10%	--	50%	70%	%100
Char Height	None	--	1.8 m	--	4 m	--	> 7 m

Σ =  
N =  
X̄ =

Post Fire: %Felled =                      %Tree Mortality =

<b>Community Notes/Comments:</b>	<b>CBI = Sum of Scores / N Rated:</b>	<b>Sum of Scores</b>	<b>N Rated</b>	<b>CBI</b>
	Understory (A+B+C)			
	Overstory (D+E)			
	<b>Total Plot (A+B+C+D+E)</b>			

% Estimators: 20 m Plot: 314 m<sup>2</sup> 1% = 1x3 m      5% = 3x5 m      10% = 5x6 m      *After, Key and Benson 1999, USGS NRMSC, Glacier Field Station.*  
30 m Plot: 707 m<sup>2</sup> 1% = 1x7 m (<2x4 m)      5% = 5x7 m      10% = 7x10 m      *AK Revised: Version 4.0 June 8, 2005*

Strata and Factors are defined in FIREMON Landscape Assessment, Chapter 2, and on accompanying BI "cheat sheet". [www.fire.org/firemon/lc.htm](http://www.fire.org/firemon/lc.htm)



Moose Browse Architecture Data Sheet: Fire and Fuels

Park Unit: \_\_\_\_\_ Project: \_\_\_\_\_ Plot ID: \_\_\_\_\_ Pre or Post \_\_\_\_yrs

Page \_\_\_ of \_\_\_

Field Date: \_\_\_\_\_ Field Crew: \_\_\_\_\_

The 30 meter belt transect is 1 meter wide. For each plant (see protocol for details) of the preferred species, within the 1 meter belt transect, assign a architecture classification. [**Broomed** - (sapling type plants) the main apical stem has been broken by moose. Look back through the history of the plant, this may have happened 2–10 years before you measured it; (bushy type plants) more than half of the CAG stems arise from lateral stems that were produced as a result of browsing. Look back through stems that are many years old. **Browsed** - Has been browsed some in the past, but browsing has not significantly affected its growth. Less than half of CAG twigs between 0.0 and 3.0 m arise from lateral stems that were produced from browsing. **Unbrowsed** - There is no visible evidence that moose have ever browsed this plant.] Note in comments evidence of bark stripping and other evidence of moose or other wildlife use in the area.

Species	Average Height Class	Unbrowsed	Browsed	Broomed

**Note:** Measure height from ground level to the highest point of growth on the tree. The highest point on a bent tree would be down the trunk of the tree instead of at the growing apex.

### **Appendix G.3. Hazard Fuels Reduction Monitoring Example Protocol**

#### **Alaska NPS Fire Ecology Program Field Method Protocol 2009**

##### **Background: Hazard Fuels Reduction**

In order to help protect structures from wildland fire, it may be necessary to create a defensible space around park structures and along access roads. The following Hazard Fuels Reduction Monitoring Protocol is an example of a protocol utilized by the NPS Alaska Regional Fire Ecology Program to meet the following objectives.

***Forest Structure:*** Gradual (phased) reduction of spruce tree density and ladder fuels. The tree density reduction goal of Phase 1 is to thin the forest to spruce crown spacing of 3-5 feet. The ladder fuel reduction goal of the initial phase is to remove ladder fuels to 5 feet of trees left standing after the initial thinning treatment. The ultimate goal of the gradual hazard fuel reduction treatment to these stands is a mixed age stand with all sizes of healthy hardwoods. Leaving the smaller shrubby hardwoods will help to reduce grass invasion. The goal for the second phase will be determined after post monitoring treatment and may change.

***Hazard Tree Mitigation:*** Remove diseased trees and snags in and around NPS structure, roads, and trails. Diseased aspen trees will be removed throughout the project to reduce spread of spiral fungus, canker, and bronze birch bore.

##### **Purpose: Hazard Fuels Reduction**

The purpose of this study is to document the pre- and post-treatment condition of the vegetation and fuels in areas around structures and along. The example monitoring protocol was conducted in an area that is predominantly white spruce and black spruce forest types, with a mixed understory of soapberry (*Shepherdia canadensis*), willow (*Salix* spp.), cranberry (*Vaccinium vitis-idaea*) and feathermosses (*Hylocomium splendens*, *Pleurozium schreberi*).

##### **Monitoring Goals: Hazard Fuels Reduction**

The specific monitoring goals of this study are to:

- 1) evaluate the implementation of the hazard fuels prescription described above,
- 2) monitor the effects of the fuels treatments on vegetation and fuels and
- 3) model the effects of the fuels treatment on fire behavior (modeled).

##### **Plot Protocol: Hazard Fuels Reduction**

The plot methods follow the same basic protocol as the Alaska Interagency Fire Effects Task Group (FETG) Fire Plots (2007). The methods from the FETG document have been included in this document. All or any combination of the protocol methods (i.e. point intercept, tree density, tree measurements etc.) maybe be used, depending on the objectives of the monitoring project.

##### **Plot Selection/Location: Hazard Fuels Reduction**

###### **Plot Selection**

Sample plots will be randomly established within the treatment zones and control areas immediately adjacent to the treatment areas in stands representative of the pre-treatment forest. GIS layers of the treatment and control areas were utilized to select plot locations. A GIS random point generator and manual manipulation can be used to spread plot distribution within the treated and control areas. A 100 foot buffer around the thinning area was created using ARCGIS. The treatment plots were randomly selected using ArcGIS random point tool within the 100' treatment area buffer polygon. Plots that fell

within the parking areas were thrown out. The control plots were established 200m outside the treatment area.

### **Plot Naming Convention**

The plot names will follow this naming convention: PARK- PPP-TT-####, where the first four letters (PARK) is the park identifier (i.e. DENA, YUCH), the next three letters (PPP) are the project identifier, the second two letters (TT) are the treatment or location information, and the last three are plot identifiers. For YUCH hazard fuel reduction projects the three letter project identifier would be: HZF. The plot treatment/location will be named according to the fuels treatments or control: TX for Treated plots and C for Control plots. And the plots are numerical within each treatment area they are established. EXAMPLE: YUCH (Fuels Reduction Project): YUCH-HZF-HQ-TX01.

### **Method Overview: Hazard Fuels Reduction**

The field methods for the hazard fuels monitoring/inventory plots are a subset of the Alaska Interagency Fire Monitoring Methods (2007). The shape of the plot and some of the methods have been revised to facilitate working around structures and thinned areas. Each plot can be laid out and read by an experienced crew in less than 1 hour. Data can be entered easily into an Interagency Fire Ecology sequel server database called FFI V1.02 (FEAT FIREMON Integrated). Refer to the “FFI Data Entry Instructions for NPS Alaska Manual” (Mitchell and Barnes, 2009) for specific data entry protocols. The attached custom datasheets will expedite field data collection and already have names of common Alaska species filled in. Plot data will be collected prior to implementation of the fuels treatments and all of the plots will be re-visited during the next growing season (~1 year) after fuels treatment implementation. Plots will be revisited for monitoring purposes 1 year post treatment and 5-yrs post treatment. If additional monitoring is needed or desired, the FMO or Chief of Natural Resources will indicate this to the fire ecology program. Plot monitoring will be conducted by Eastern Area Fire Management personnel.

The following section briefly describes the field methods for the hazard fuels reduction monitoring/inventory plots.

#### **PLOT LAYOUT (See Figure 3.)**

- a) Circular plot:
  - i) 4-m radius (8-m diameter) where # of trees in plot greater than approximately 15-20.
  - ii) 8-m radius (16-m diameter) where # of trees in plot less than approximately 15-20.
- b) Mark center of plot with wooden stake and GPS-mark center

#### **PLOT DESCRIPTION (Enter on SITE DESCRIPTION Datasheet)**

- a) General plot description, direction to plots, Lat/Long, datum, error
- b) Photo information
  - i. Ground photo at the plot center.
  - ii. 4 plot photos: 1 horizontal and 1 vertical photo facing each N and S from plot center

#### **GENERAL VEGETATION COVER INFORMATION**

- a) Estimate cover of: trees, tall and low shrubs, dwarf shrubs and herbs, nonvascular plants, ground cover in 4- or 8- M radius plot.

#### **TREE DENSITIES (Enter on TREE DENSITY TALLY Datasheet)**

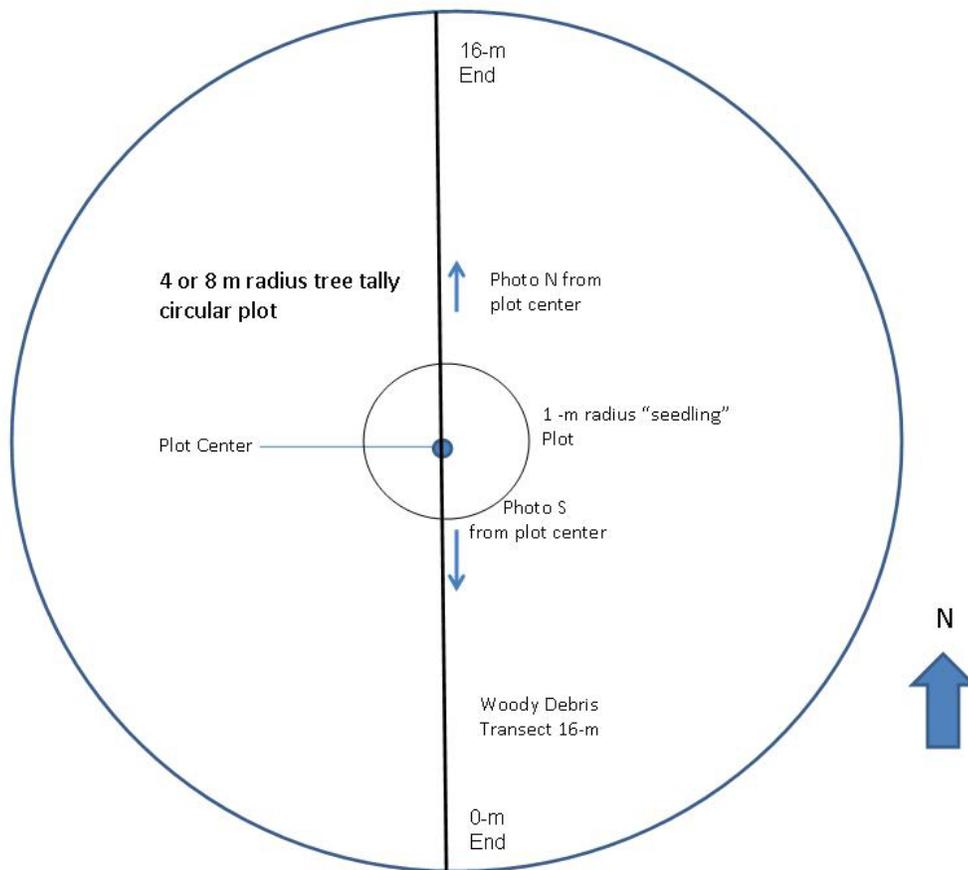
- a) Within the 4- or 8-Mradius circle, record and tally all trees >4.5' (1.37-m) in height by species and diameter size classes: (< 5 cm, 5.1-10 cm, 10.1-15 cm, 15.1-23 cm, >23 cm), and status (Live/Dead/Diseased). (TREE DENSITY TALLY form).
- b) Tally small trees (<4.5' tall) in 1 M radius subplot at plot center (TREE DENSITY TALLY Datasheet).

TREE MEASUREMENTS (Enter on TREE MEASUREMENT Datasheet)

- a) For one live tree of each species and size class record diameter (DBH), height, crown base height (CBH), ladder fuel heights, crown radius, disease/insect damage evidence (see instructions, TREE MEASUREMENT Datasheet)

DOWN WOODY FUEL LOADING (Optional)

- a) Brown's transect tallying down woody fuels by size classes along a 16-m transect baseline: 2-m for 1-hr and 10-hr fuels; 8-m for 100-hr fuels, and 16-m for 1000-hr fuels. (1.82-m, 3.66-m, 15.2-m).



**Figure 3. Plot Layout: Hazard Fuels Reduction.**

## **Method Detailed: Hazard Fuels Reduction**

### **Plot Layout (See Figure 3)**

For all plot centers (whether adjusted or not) collect an averaged (20 pt average) GPS position in the GPS and record on the data sheet, and mark the plot center with a temporary 12" wooded stake. Trimble GPS units are recommended. Once plot center has been GPS'd and marked with a wooden stake. See Figure 11 for plot diagram.

**-Locating Plot Center**-Plot locations area established from a randomly located point within the treatment areas (Treated and Control) and should occur within the assigned treatment. Latitude and longitude of each plot will be uploaded or entered into a GPS unit. This point will be referred to as the center point of the plot. GPS, aerial photos, standard map and compass skills, and distance measurements from the closest structure will be used to navigate to plots. NAD-83 Datum will be used in the GPS receivers. The plots must remain within the designated treatment areas, with enough buffer to accommodate the 4-m or 8-m radius plot size. *Choice of a 4M or 8M radius circular plot will be a function of tree density. While a 4M radius circular plot is the default plot size, if the 4M radius circular plot contains less than approximately 15-20 trees over 4.5 ft then an 8M radius circular plot should be chosen. Note that once chosen the same circular plot radius should be used for all data collection. For instance, if an 8M radius circular plot is selected based on tree density then all data collected on each datasheet should be based on an 8M radius circular plot.*

-If plot lands outside the treatment area, walk in a straight azimuth towards the treated area zone and provide a 5-m buffer from the cut boundary. If the plot occurs within an area that is not vegetated or has other factors that make it unusable (on a road, other infrastructure, in a pond or river), flip a coin to determine whether to adjust right or left, move 10-m in that direction, keeping the appropriate distance from the building. *Note on the data sheet that the plot was relocated from original gps coordinates.*

-If a control plot lands in an area expected to be thinned, adjust the location by moving the plot 20-m into the untreated area. *Note on the data sheet that the plot was relocated from original gps coordinates. If the plot was thinned after initial plot reading. Note that the plot is now a thinned plot and an alternate control plot will need to be established.*

### **Site Description**

General site information will be collected and recorded for each plot on the Site Description form. Additional site location descriptions, diagrams of plots, and additional notes on the plot should be noted on the back-side of the Site Description form. The definitions of the fields for the SITE AND GENERAL VEGETATION Datasheet are given below:

1. **Park Unit** – Park unit identifier or write out land unit name (NPS - four letter park acronym)
2. **Project** – Description of project: PPF (pre/post fire), CBI (burn severity), HZF (for hazard fuels), PP (paired plots).
3. **Plot ID** –Identifier for the plot within the project. For this example, it will be: TX-01 for plot 1 within treated area and C-01 for plot 1 within the control area.
4. **Field Crew** – Full names of crew members
5. **Field date** – Sample date
6. **Declination used:** Determine and record the appropriate declination setting used on your compass, for the initial reading, base your declination on the most recent topographic map or using your GPS units. For future reading use the declination used in the original setup.

Use GPS to record the following information:

1. **GPS type:** GPS Model
2. **GPS identification:** unique GPS identifier (e.g. Fire Eco Allen)
3. **GPS Datum:** GPS datum used for collecting and navigating to plots, use **NAD-83**.
4. **Waypoint information:**
  - a. **Description:** Provide description of where WP was collected. For the example plots collect waypoint at plot center.

- b. **Waypoint:** Waypoint name entered into GPS. For the example plots use treatment type and plot number (e.g.T-01)
- c. **Lat/Long:** Using a GPS, collect a lat/long averaging the time of collection for >20 points. Record in Decimal Degrees - i.e. Lat: N 65.634891° Long: W 142.982340°
5. **GPS Error** - Record the error EPE and units (ft/m), this needs to be recorded before you save the waypoint in Garmin handhelds.
6. **Elevation** – Taken from GPS or maps in feet or meters (record units)

Record the following for the =circular plot area. For WRST Front Country the general plot area is the 4- or 8-M circular plot.

1. **Slope** – Percent slope, use clinometer
2. **Aspect** – Slope aspect (facing downhill) azimuth in degrees
3. **Soil** – Estimate of soil drainage: wet, moist, dry.
4. **Disturbance** – General note of disturbances in or around 4 M circular plot, record date estimate if known in plot notes.
5. **Treatment and Treatment Date** – Record the treatment type (Thinning or Control), Monitoring phase (Pre-thinning or Post-thinning). Record the treatment date and # of years post-treatment if plot visit is post-treatment.
6. **Vegetation Community Structure** – in the plot record the two dominant species in each community structural class and their respective covers. For the example this information should be collected for the circular plot. This information will be used to deduce Viereck Vegetation Class.
7. **Evidence of fire and Fire Indicators:** indicate presence and type of fire evidence
8. **Photographs-** record the camera used (e.g. Fire Eco Allen), a description of the photo taken and the time the photo was taken. For the example information take 4 photographs at each plot. Take two from plot center; one each to N and S. Also take a ground photograph at the plot center.  
**Photography note:** Hold the board to the edge of the photo view within the first 1.5 - 2 m of the photographer with the camera set at a fixed height of 5 ft above the ground. The photo board should list: Project, Plot-ID, Date, Direction facing (azimuth)

### **General Vegetation Information**

Ocular estimates of vegetation and ground cover are recorded on the General Vegetation datasheet for dominant vegetation and ground cover within the 4- or 8-M radius circular plot. The cover classes are defined as: 1-10%, 10-20%, 20-30%, 30-40%, 40-50%, 50-60%, 60-70%, 70-80%, 80-90%, 90-100%. Estimate the cover of each species or ground cover and check the appropriate column. Due to overlapping and canopy cover, the total cover can equal more than 100%. Additional species can be added on the second page or by crossing out pre-written species. Species are listed by layer as described below:

- **TREE LAYERS** - List all the species that occur within the plot and estimate the percent cover. Willows or alders of tree size are not considered trees. Check the box showing the average cover. If a single species forms two distinct sub-layers, list it twice. Use scientific names where possible to indicate species, use two letters of the genus and the species.
- **SHRUB LAYERS** - Shrubs are defined as woody plants with multiple stems. For each shrub species check the appropriate cover class and height class.
- **HERBACEOUS and GROUND LAYER** - Within the herbaceous (non-woody) layer, estimate the % herbaceous cover provided by graminoids (grasses, sedges, rushes), forbs (flowering) plants, ferns, and horsetails. Estimate the % ground cover provided by mosses and hepatics (liverworts), lichens, litter (dead leaves or needle litter), and bare ground or talus.

### **Forest Measurements**

**-Tree and Seedling Density** - All trees taller than 1.37-m (4.5 ft) that occur within a 4- or 8-M radius of the plot center will be tallied by species, life status (live/dead/diseased), and diameter size classes (< 5

cm, 5.1-10 cm, 10.1-15 cm, 15.1-23 cm, >23 cm DBH) (as defined by the Forest Service Natural Fuels Photo Series, 2001). Use a linear metric measuring tape or a Hagloff Distance Measuring Equipment (DME) to determine if trees are within 4-m of the plot center. *Choice of a 4M or 8M radius circular plot will be a function of tree density. While a 4M radius circular plot is the default plot size, if the 4M radius circular plot contains less than approximately 15-20 trees over 4.5 ft then an 8M radius circular plot should be chosen. Note that once chosen the same circular plot radius should be used for all data collection. For instance, if an 8M radius circular plot is selected based on tree density then all data collected on each datasheet should be based on an 8M radius circular plot.* All trees less than 1.37-m tall (“seedlings”) will be tallied by species within a 1-m radius circle at the plot. Resprouts are new growth from older root stock that are less than 1.37 m tall, Seedlings are new plants from seeds less than 10cm high, Mature are seedlings between 10cm and 137cm tall.

**-Tree Measurements** -Detailed tree measurements will be recorded for one live tree (> 4.5 feet tall) of each species for each size class recorded within the tree density plot. In order to randomly select the trees to be measured, select trees that are closest to the center of the 4-m tree density plot. The following measurements will be taken: DBH (diameter at breast height), tree height, height to live crown, height to live and dead ladder fuels, and crown radius. Data will be used to determine summary data such as, crown base height, density, basal area, crown bulk density, and stand height. Example data sheets for measurements and examples of tree measurements are in Section O.3. Definitions of the parameters measured are given below:

- **Species** - record the species of the tree using six letter acronyms (first three letters of genus and first three letters of species). All willows and alders will be classified as shrubs.
- **DBH** - measure the diameter of the tree in centimeters at 4.5 ft or 1.37m above the ground, using the metric logger’s tape.
- **Tree height** - Measure the tree height in 1/10ths of meters (0.1 m) with a clinometer. Measure 10 – 30 m away from the tree, depending on tree height. Using the percent side of the clinometer, the tree height in meters equals: = (distance from tree in meters) x (% to top of tree - % to base of tree). Note that if the base % is negative this will be added to the total height (Math: minus a negative is positive). See Appendix B.3.
- **Height to main live crown** – the height in centimeters from the forest floor to the obvious live crown. Use a clinometer or measure with tape or pole (See Appendix B.2).
- **Height to live ladder fuel** – the height (cm) from the forest floor to the lowest point of a live branch on the tree. Measure with a tape or pole.
- **Height to dead ladder fuel** – the height (cm) from the forest floor to the lowest point of a dead branch on the tree.
- **Crown radius** –measure the crown radius to the average widest branch or drip-line of the crown, measure to the nearest centimeter.
- **Insect/Disease Evidence** – Record damage, disease or insects for each tree measured if present. Use the damage codes in appendix B. Refer to the disease and insect book for descriptions. Describe rot detection and other damage.

### **Down Woody Fuel (Optional)**

Down woody fuel load are measured in English units, the recommend transect length is 50 foot. The number of dead woody debris particles will be tallied along a 16-m transect using the planar intersect method outlined by Brown (1974) and the National Park Service Fire Monitoring Handbook (USDI National Park Service, 2001). Table 1 provides the woody debris size classes and sample distances along the transect. One hour and 10 hour fuels will be tallied along the first two meters of the transect. One hundred hour fuels are tallied along the first 8 meters of the transect and 1000 hour fuels are sampled along the whole 16 meter transect. Tally the number of times down woody debris by size classes intercept (cross) the transect line. Count dead and down woody materials, but not cones, needles, bark or leaves. Do not count stems and branches that are attached to standing trees or shrubs. Tally only pieces

that cross the transect. *For 1000 hr fuels, measure and record the diameter* of the 1000 hr fuels (at the line crossing) and record as solid or rotten. A go-no-go gauge with openings 0.25, 1 and 3 inches is useful for determining size classes. RECORD as “NONE” if there are no woody fuels found in any of the classes.

<b>Diameter size</b>	<b>Fuel Type</b>	<b>Distance to tally along transect</b>
0 to 0.25 inch	1 hour fuels	From 0 to 2 meters
0.25 to 1 inch	10 hour fuels	From 0 to 2 meters
1 to 3 inches	100 hour fuels	From 0 to 8 meters
> 3 inches	1000 hour fuels Record diameter and solid/rotten	From 0 to 16 meters

**Datasheets: Hazard Fuels Reduction**

Field Gear List (per plot/team): Hazard Fuels Reduction

<b>General</b>	<b>Item</b>	<b>Hazard Fuel Plots</b>
Plot	30 meter tape	1
Plot	DME – Hagloff measuring equip.	1
Plot	Chaining pins	2
Plot	Clinometer	1
Plot	Clipboard	2
Plot	Compass	2
Plot	Diameter calipers	1
Plot	Diameter logger's tape, metric	1
Plot	Diameter tape (small), metric	2
Plot	Field vest	1/person
Plot	Folding ruler 1 meter	2
Plot	Handlens	2
Plot	Paintsticks	2
Plot	steel tags w/wire	2 per plot
Plot	white board/dry erase pen	1
Plot	Flagging (rolls)	2
Plot	Woody Fuels Caliper (Go-no-go gage)	1
Plot	1-m x 2-m Quadrat frame	1
Tech	Digital Camera	1
Tech	GPS w/appropriate map coverage downloaded	1
logistic	BK Radio w/appropriate freqs	1
logistic	Copies of original (previous years') forms for each plot.	1 set for each year
logistic	Form organizer for plot project w/ data sheets	1
logistic	Maps of plot locations	1
logistic	Satellite Phone	1
logistic	Shotgun w/ammo	1
Reference	Viereck AK Trees and Shrubs	1
Reference	NPS Plant ID Handbook	2
Reference	Insects and Disease of AK Forests	1
Personal	Food, Clothing, Shelter	yes

**Site Description: Hazard Fuels Reduction**

**Location Information:**

Unit: \_\_\_\_\_ Project: \_\_\_\_\_ Plot ID: \_\_\_\_\_

Field Crew : \_\_\_\_\_ Date (M/D/Y): \_\_\_/\_\_\_/\_\_\_

Transect Azimuth: \_\_\_\_\_ (direction towards end of transect) Declination used: \_\_\_\_\_

**Latitude/Longitude:**

GPS Type: \_\_\_\_\_ GPS Identification: \_\_\_\_\_ GPS Datum: \_\_\_\_\_

Description	Waypoint	Latitude (DD.DDDD)	Longitude (DD.DDDD)	GPS Error
		N	W	m/ft
		N	W	m/ft
		N	W	m/ft
		N	W	m/ft
Elevation: _____				

**General Site Information:**

Slope: \_\_\_\_\_% Aspect: \_\_\_\_\_ Deg

Soil (circle): Wet Moist Dry Disturbance (circle): Fire Wind Insect Other: \_\_\_\_\_

Evidence of fire: Yes No /Indicators (circle) : Burn Snags Burn Stumps Fire Scars Burn Plants Charcoal

Treatment (circle): Thinning Control Monitoring phase (circle): Pre-thinning Post-thinning

Treatment date: \_\_\_\_\_ # years post-treatment: \_\_\_\_\_

**Photos:** Camera used: \_\_\_\_\_

Description: \_ Plot Center to N \_\_\_\_\_ Photo time (military): \_\_\_\_\_

Description: \_ Plot Center to S \_\_\_\_\_ Photo time (military): \_\_\_\_\_

Description: \_ Ground Photo \_\_\_\_\_ Photo time (military): \_\_\_\_\_

Description: \_ Ground Photo \_\_\_\_\_ Photo time (military): \_\_\_\_\_

**Vegetation Community Structure** (see general cover sheet for common species codes and cover classes) for the entire 4- or 8-M circular plot area.

Community structure classes	Dominant Spp 1	Dom Spp. 1 (% Cover)	Dominant Spp 2	Dom Spp. 2 (% Cover)
Tree Sp.				
Tall Shrub Sp.				
Low Shrub Sp.				
Graminoid/Herbaceous Sp.				
Moss/Lichen Sp.				



**(Plot Layout and Notes:** Provide notes and map on relocating, treatment information and other plot notes as needed below.)

**General Vegetation Information: Hazard Fuels Reduction**

Park Unit: \_\_\_\_\_ Project: \_\_\_\_\_ Plot ID: \_\_\_\_\_

Field Date: \_\_\_\_\_ Field Crew Initials: \_\_\_\_\_

Plot Radius: 4-M or 8-M

*In the 4- or 8-M circular plot estimate cover and indicate life status of plant species and ground cover classes.*

Species		Cover Class										Dead?
Tree Layer	Common Name	1-10%	10-20%	20-30%	30-40%	40-50%	50-60%	60-70%	70-80%	80-90%	90-100%	
PIGL	White spruce											
PIMA	Black spruce											
LALA	Larch											
POTR5	Aspen											
POBA2	Balsam poplar											
BEPA	Paper birch											
Tall and Low Shrub Layer	Common Name	1-10%	10-20%	20-30%	30-40%	40-50%	50-60%	60-70%	70-80%	80-90%	90-100%	Dead?
ALVIC	Green alder											
SALIX	Unknown willow											
SAGL	Glaucous willow											
SABE2	Bebb's willow											
BENA	Dwarf birch											
BEGL	Tall shrub birch											
DAFRF	Shrubby cinquefoil											
LEPAD	Narrow leaf Labrador tea											
LEPAG	Wide leaf Labrador tea											
SHCA	Soapberry											
CHCA2	Leatherleaf											
RIBES	Unknown Currant											
ROAC	Prickly Rose											
VAUL	Blueberry											
ARRU	Bearberry											
VAVI	Lowbush Cranberry											
ARRU	Bear berry											
COCA13	Dwarf Dogwood											
RUCH	Cloudberry											
EMNI	Crowberry											
LIBO3	Twin flower											





Tree Density Tally: Hazard Fuels Reduction

Park Unit: \_\_\_\_\_ Project: \_\_\_\_\_ Plot ID: \_\_\_\_\_ Field Date: \_\_\_\_\_ Field Crew Initials: \_\_\_\_\_ Plot Radius: 4M or 8M

Tally the number of live or dead trees taller than 4.5' (1.37-m) by diameter size class and species within the 4- or 8-M radius circular plot area. Dead trees with less than 45 degree angle with the ground are not tallied (counted as fuel). Tally by live, dead, or if disease or insects are prevalent, record what type of damage code and if live or dead. Tally the "seedlings" (*live trees less than 4.5' tall*) by species and resprout/seedling/mature status in the one 1-m x 2-m subplots at the circular plot center. **Resprouts:** new growth from older root stock < 1.37 m tall, **Seedlings:** new plants from seeds < 10cm high, **Mature** >10cm .

Tree Species	Status	Tree Counts by DBH (cm)					Seedling Count	
		< 5cm	5.1-10 cm	10.1-15 cm	15.1-23 cm	>23 cm	W 1x1 M	E 1x1 M
Black Spruce ( <i>Picea mariana</i> )	LIVE						R	R
	Damage						S	S
	DEAD						M	M
	Damage							
White spruce ( <i>Picea glauca</i> )	LIVE						R	R
	Damage						S	S
	DEAD						M	M
	Damage							
Aspen ( <i>Populus tremuloides</i> )	LIVE						R	R
	Damage						S	S
	DEAD						M	M
	Damage							
Paper birch ( <i>Betula papyrifera</i> )	LIVE						R	R
	Damage						S	S
	DEAD						M	M
	Damage							
Balsam poplar ( <i>Populus balsamifera</i> )	LIVE						R	R
	Damage						S	S
	DEAD						M	M
	Damage							
Larch ( <i>Larix laricina</i> )	LIVE						S	S
	Damage						M	M
	DEAD							
	Damage							

Down Woody Debris & Duff Depths: Hazard Fuels Reduction

Park Unit: \_\_\_\_\_ Project: \_\_\_\_\_ Plot ID: \_\_\_\_\_ Field Date: \_\_\_\_\_

FieldCrew: \_\_\_\_\_

Record the number of intercepts of woody fuels along a 16 meter transect by size class: 0 - 1/4" and 1/4"- 1" diameter woody debris (1 hr and 10 hr fuels) from 0 to 2-m along transect, 1" - 3" diameter from 0 to 8-m along transect, and > 3" diameter from 0 to 16-m along transect. Record diameter of fuels >3" diameter. Measure litter and duff depths at each end of the transect.

Transect	# of intercepts			Diameter (inches) and Species		Litter and Duff Depths (cm)			
	0 - 0.25" 1 hr	0.25 - 1" 10 hr	1 - 3" 100 hr	3"+ solid 1000 hr S	3"+ rotten 1000 hr R	Trans -0.5 m	Depth cm	Trans 8.5 m	Depth cm
Dir. ____  Slope ____						Litter		Litter	
						Lichen		Lichen	
						Lv Moss		Lv Moss	
						Dead Moss		Dead Moss	
						Upper Duff		Upper Duff	
						Lower Duff		Lower Duff	
	Total:	Total:	Total:						

**Definitions & Tally Rules**

Downed woody material are dead twigs, branches, stems and boles of trees and shrubs that have fallen and lie on or above the ground.

- >Measure woody material first to avoid disturbing it and biasing your estimates.
- >Do not count dead woody stems and branches still attached to standing shrubs and trees (see below)
- >If more than 45 degrees and dead, but still attached at the bole it is still counted
- >Do not tally any particle having a central axi that coincides perfectly with the sampling plane.
- >If the sampling plane intersects a curved piece more than once tally each intersection
- >For rotten logs that have fallen apart try to estimate its original diameter
- >Tally uprooted stumps and roots not encased in dirt. Do not tally undisturbed stumps

### Appendix G.3. Quick Reference Sheets

#### Tree Crown Measurements

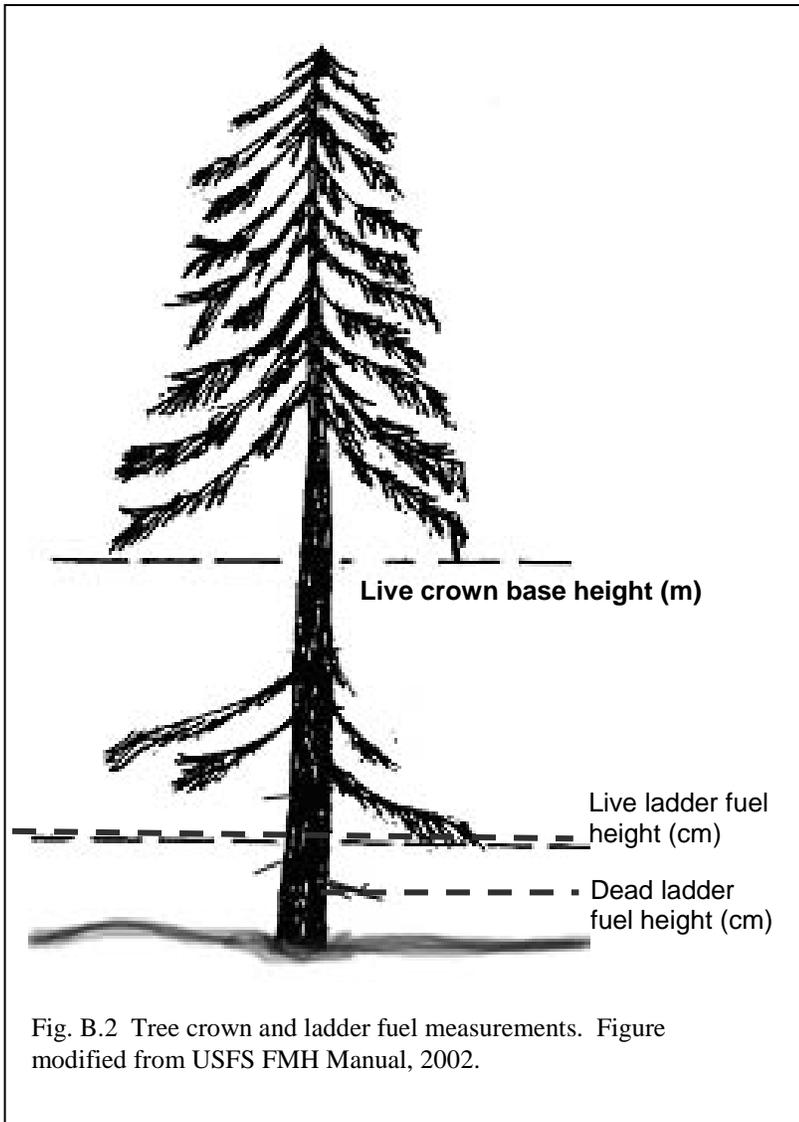


Fig. B.2 Tree crown and ladder fuel measurements. Figure modified from USFS FMH Manual, 2002.

Tree Height Measurements

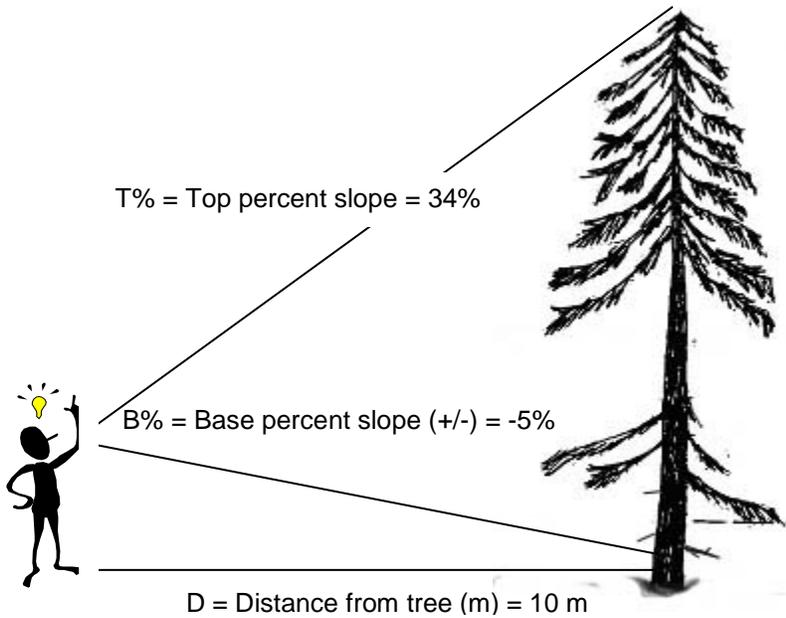


Figure B.3 Tree height equals:  $\text{Height (m)} = D \times (T\% - B\%)$ . If the base percent is negative (reading eye-level to tree or on slope above tree DBH), then add B%, if base percent is positive (on slope below tree DBH) then subtract B%.  $\text{Ht} = 20\text{m} \times (0.34 + 0.05) = 7.8 \text{ m}$

*Remember* to use percent side of clinometer (right side scale or look for percentage sign at top or bottom of scale) and to move the clinometer up and down, not your head if possible. *Hint:* 10-m and 20-m distances makes easier math, but you must go back far enough to accommodate tree heights.

**Burn Severity Code Matrix. (Modified from NPS Fire Monitoring Handbook (2003))**

	Forest and Shrub Types	
	Substrate (S)	Vegetation (V)
(5) Unburned	Not burned	Not burned
(4) Scorched	Litter/moss partially blackened; duff nearly unchanged; wood/leaf structures unchanged	Foliage scorched and attached to supporting twigs
(3) Lightly Burned	Litter/moss charred to partially consumed; upper duff layer may be charred but the duff layer is not altered over the entire depth; surface appears black; small woody debris is partially burned.	Foliage and smaller twigs partially to completely consumed; branches mostly intact; less than 40% of the shrub canopy is commonly consumed
(2) Moderately Burned	Litter entirely consumed, leaving coarse, light colored ash; duff deeply charred to lower duff or upper /lower duff interface, but underlying mineral soil is not exposed; woody debris is mostly consumed; logs are deeply charred, burned-out stump holes are common	Foliage, twigs, and small stems consumed; some branches (>0.5 – 2.5 cm) still present. 40-80% of the shrub canopy is commonly consumed
(1) Heavily Burned	Litter and duff completely consumed, or within 1 cm of mineral soil; mineral soil may be visibly altered, sometimes reddish; if present, sound logs are deeply charred, and rotten logs are completely consumed. <i>Marcantia</i> and fire mosses may be present.	All plant parts less than 2.5 cm in diameter are consumed, leaving some or no major stems or trunks; any left are deeply charred
(NA) Not applicable	Inorganic preburn	None present preburn

## AK Fire and Fuels Monitoring Protocol Quick References

### Common Plants and Substrates

Species scientific names, species codes (NRCS 2005) and common names for plants and substrates (non NRCS).  
Sorted by life form and scientific name.

Common Alaska Plants and Substrates			
Lifeform	SP_Code	Scientific name	Common Name
Tree	BEPA	<i>Betula papyrifera</i>	Paper birch
Tree	PIGL	<i>Picea glauca</i>	White spruce
Tree	PIMA	<i>Picea mariana</i>	Black spruce
Tree	POBA2	<i>Populus balsamifera</i>	Balsam poplar
Tree	POTR5	<i>Populus tremuloides</i>	Aspen
Shrub	ALINT	<i>Alnus incana</i> ssp. <i>tenuifolia</i>	mountain alder, speckled alder, thinleaf alder
Shrub	ALVIC	<i>Alnus viridis</i> ssp. <i>crispa</i>	mountain alder ( <i>Alnus crispa</i> )
Shrub	BENA	<i>Betula nana</i>	bog birch, dwarf birch, shrub birch
Shrub	DAFL3	<i>Dasiphora floribunda</i>	shrubby cinquefoil ( <i>Potentilla fruticosa</i> )
Shrub	JUCO6	<i>Juniperus communis</i>	Common juniper
Shrub	LEPA11	<i>Ledum palustre</i>	Labrador tea
Shrub	RIBES	<i>Ribes</i>	unknown currant
Shrub	RITR	<i>Ribes triste</i>	American red current
Shrub	ROAC	<i>Rosa acicularis</i>	Prickly rose
Shrub	SAAR3	<i>Salix arbusculoides</i>	Littletree willow
Shrub	SABA3	<i>Salix barclayi</i>	Barclay willow
Shrub	SABE2	<i>Salix bebbiana</i>	Bebb willow
Shrub	SABR	<i>Salix brachycarpa</i>	Barren-ground willow
Shrub	SAGL	<i>Salix glauca</i>	Grayleaf willow
Shrub	SAMY	<i>Salix myrtilifolia</i>	Low blueberry willow
Shrub	SAPL2	<i>Salix planifolia</i>	Diamondleaf willow
Shrub	SAPS	<i>Salix pseudomonticola</i>	false mountain willow, white mountain willow
Shrub	SAPU15	<i>Salix pulchra</i>	Diamondleaf willow
Shrub	SASC	<i>Salix scouleriana</i>	Scouler willow
Shrub	VAUL	<i>Vaccinium uliginosum</i>	Bog blueberry
Shrub	VIED	<i>Viburnum edule</i>	High bush-cranberry
Subshrub	ARRU	<i>Arctostaphylos rubra</i>	Red-fruit bearberry
Subshrub	ARUV	<i>Arctostaphylos uva-ursi</i>	Kinnikinnik
Subshrub	ARAR9	<i>Artemisia arctica</i>	Arctic wormwood
Subshrub	DRDR	<i>Dryas drummondii</i>	Drummond's mountain-avens
Subshrub	DRIN4	<i>Dryas integrifolia</i>	entireleaf mountain-avens
Subshrub	EMNI	<i>Empetrum nigrum</i>	Crowberry
Subshrub	GABO2	<i>Galium boreale</i>	Northern bedstraw
Subshrub	RUCH	<i>Rubus chamaemorus</i>	Cloudberry
Subshrub	VAOX	<i>Vaccinium oxycoccos</i>	small cranberry, bog cranberry
Subshrub	VAVI	<i>Vaccinium vitis-idaea</i>	Low cranberry
Forb	ACDE2	<i>Aconitum delphiniiifolium</i>	larkspurleaf monkshood
Forb	ACRU2	<i>Actaea rubra</i>	red baneberry, western baneberry
Forb	ANPA	<i>Anemone parviflora</i>	Small wood anemone
Forb	ANRO2	<i>Antennaria rosea</i>	rose pussytoes, rosy pussytoes
Forb	ARFR2	<i>Arnica frigida</i>	snow arnica
Forb	ARTI	<i>Artemisia tilesii</i>	Tall wormwood
Forb	ASAL7	<i>Astragalus alpinus</i>	Alpine milk-vetch

**AK Fire and Fuels Monitoring Protocol Quick References**

Common Alaska Plants and Substrates			
Lifeform	SP_Code	Scientific name	Common Name
Forb	CHAN9/EPAN2	Chamerion angustifolium	Tall fireweed (Epilobium angustifolium)
Forb	COCA13	Cornus canadensis	Bunchberry dogwood
Forb	GELI2	Geocaulon lividum	Timberberry, false toadflax
Forb	GORE2	Goodyera repens	Lesser rattlesnake plantain
Forb	HEAL	Hedysarum alpinum	Alpine sweet-vetch
Forb	LIBO3	Linnaea borealis	American twinflower, twinflower
Forb	LUAR2	Lupinus arcticus	Arctic lupine
Forb	MEPA	Mertensia paniculata	Tall bluebell
Forb	PAPA8	Parnassia palustris	Northern grass-of-paranasses
Forb	PELA	Pedicularis labradorica	Labrador lousewort
Forb	PEFR5	Petasites frigidus	Frigid coltsfoot
Forb	PESA5	Petasites sagittatus	Arrow-leaf coltsfoot
Forb	POAL11	Polygonum alpinum	Alaska wild rhubarb
Forb	PYAS	Pyrola asarifolia	Common pink wintergreen
Forb	PYCH	Pyrola chlorantha	Greenish-flowered wintergreen
Forb	PYGR	Pyrola grandiflora	Large-flowered wintergreen
Forb	RUAR	Rubus arcticus	Nagoonberry
Forb	SAAN3	Saussurea angustifolia	Tall saussurea
Forb	SOMU	Solidago multiradiata	Northern goldenrod
Forb	STCR	Stellaria crassifolia	Fleshy starwort
Forb	VACA3	Valeriana capitata	Capitate valerian
Forb	VICR	Vicia cracca	bird vetch, cow vetch (invasive weed)
Lower_Vascular	EQAR	Equisetum arvense	Common horsetail
Lower_Vascular	EQPR	Equisetum pratense	Meadow horsetail
Lower_Vascular	EQSC	Equisetum scirpoides	Single-stalk scouring-rush
Lower_Vascular	EQSY	Equisetum sylvaticum	Woodland horsetail
Lower_Vascular	LYAN2	Lycopodium annotinum	Stiff club-moss
Grass	ARLA2	Arctagrostis latifolia	Polar grass
Grass	BROMU	Bromus	brome, brome spp.
Grass	BRINA	Bromus inermis ssp. pumpellianus var. arcticus	Pumpelly's brome
Grass	CACA4	Calamagrostis canadensis	Northern bluejoint
Grass	CALA6	Calamagrostis lapponica	Lapland reed-grass
Grass	CAPU	Calamagrostis purpurascens	Purple reed-grass
Grass	FESTU	Festuca	fescue
Grass	FEAL	Festuca altaica	Altai fescue
Grass	POGL	Poa glauca	Glaucous bluegrass
Grass	POPR	Poa pratensis	Kentucky bluegrass
Grass_Like	CAAQ	Carex aquatilis	Water sedge
Grass_Like	CABI5	Carex bigelowii	Bigelow's sedge
Grass_Like	CACO10	Carex concinna	Low northern sedge
Grass_Like	CADI6	Carex disperma	Two-seeded sedge
Grass_Like	CAME4	Carex membranacea	Fragile sedge
Grass_Like	CAVA2	Carex vaginata	Sheathed sedge
Grass_Like	ERVA4	Eriophorum vaginatum	Tussock cottongrass
Bryophyte	AUPA70	Aulacomnium palustre	Tufted moss
Bryophyte	CEPU12	Ceratodon purpureus	Purple horn-toothed moss

**AK Fire and Fuels Monitoring Protocol Quick References**

Common Alaska Plants and Substrates			
Lifeform	SP_Code	Scientific name	Common Name
Bryophyte	FMOSS	Feather moss	feather moss
Bryophyte	HYSP70	Hylocomium splendens	Stair-step moss
Bryophyte	POJU70	Polytrichum juniperinum	Juniper polytrichum moss
Bryophyte	MAPO16	Marchantia polymorpha	Green-tongue liverwort
Bryophyte	PLSC70	Pleurozium schreberi	Big red stem
Bryophyte	SPHAG2	Sphagnum	Sphagnum moss
Bryophyte	TONI70	Tomentypnum nitens	Tomentypnum moss
Bryophyte	MOSS	unknown moss	unknown moss
Lichen	CEIS60	Cetraria islandica	Icelandmoss
Lichen	CLAR60	Cladina arbuscula	Tree reindeer lichen
Lichen	CLMI60	Cladina mitis	Green reindeer lichen
Lichen	CLRA60	Cladina rangiferina	Grey reindeer lichen
Lichen	CLADO3	Cladonia	Cup lichen
Lichen	HYPH60	Hypogymnia physodes	Monk's hood lichen
Lichen	PEAP60	Peltigera aphthosa	Freckle pelt lichen
Lichen	STERE2	Stereocaulon	snow lichen
Lichen	LICHEN	unknown lichen	unknown lichen
Substrate	1HR	1 hour fuel	1 hour fuel
Substrate	10HR	10 hour fuel	10 hour fuel
Substrate	100HR	100 hour fuel	100 hour fuel
Substrate	1000HR	1000 hour fuel	1000 hour fuel
Substrate	ROCK	Bare Rock	Bare Rock
Substrate	BARE	Bare Soil	Bare Soil
Substrate	LTR	Litter	Litter
Substrate	LTRH	Litter Herbaceous	Litter Herbaceous, leaf litter
Substrate	LTRL	Litter, Lichen	Litter, Lichen
Substrate	LTRNDL	Needle Litter	Litter, needle
Substrate	DUFF	Organic Duff	Duff
Substrate	WD	woody debris	woody debris

**AK Fire and Fuels Monitoring Protocol Quick References**

**Damage codes for trees**

Damage Code	Brief Description
FORK	Forked top of a tree, multiple primary leaders in a tree crown.
BROK	Broken tree top.
DTOP	Upper portion of tree is dead
BURL	A hard, woody and often rounded outgrowth on a tree.
DAMG	Mechanical damage to tree
FIRE	Evidence of fire damage or death.
LEAN	Tree is leaning.
MAMM	Damage caused by mammals, such as bear claw marks, porcupine, rabbit or beaver chewing.
REDB	Red belt, winter desiccation. Foliage and buds killed or faded. May be worse on windward side of tree. New growth is green & normal. Pg. 202 AK I & D
RUST	Spruce needle rust. Current year spruce needles are infected leaving the trees with a distinct orange tinge when the rust is fruiting on the needles. Pg. 129 AK I & D
BRM	Spruce broom rust. Branches or twig swelling, large burls on main bole or witches' broom (branch proliferation in tree crown). Rust tints needles in the broom yellow/orange. Pg. 146 AK I & D
HRT	Heart rots. <i>Phellinus pini</i> conks are hard and woody, upper surface dark brown, hairy (when young), with concentric ridges and a narrow velvety, light brown margin. Lower surfaces dark brown with pores. Coring shows discoloration of the heartwood, light purplish to gray and later changing to reddish brown. Decay pockets may be empty or filled with a mass of white fibers. Other heart rots would be brown cubicle rots, cores will show brown, yellow crumbly rot. Rots described Pg. 162-193 AK I & D.
ROOTRT	Tomentosa root rot ( <i>Inontus tomentosus</i> ) and Armillaria. Both may have chloritic thin crown, reduced growth, distressed cone crop, resin flow or saturation near root collar. Wind thrown trees lacking major roots. Lose needles oldest to youngest. In Tomentosa roots honeycombed and filled with white mycelium, pink staining. Armillaria has white mycelium and black stringy rhizomorphs under the bark. Rhizomorphs may also be on roots or in soil. Decay in root produces yellow stringy rot w/ fine black lines. Pg. 160 AK I & D
ROT	Unknown cause of rot, try to record if brown or white rot (Br or W).
BUDW	Spruce bud worm, brown head, with a lighter body and ivory spots. Web new foliage together and feed in web. Pg. 24 AK I & D
GALL	Spruce gall aphids, cause the tree to form conspicuous cone shaped galls on spruce twigs. Dark purple to green initially and then turning brown. Pg. 58 AK I & D
BB	Unknown bark beetles, not identifiable as either spruce bark beetle or <i>Ips</i> spp. Describe galleries or collect insects.
IPS	<i>Ips</i> spp., engraving beetle. Easily confused with spruce bark beetle. They are smaller (1/8 to 1/4 in) with concave wing covers with projections at the rear. Y, H or star shape galleries. Differences from spruce bark beetle; forked egg galleries, lighter (yellow brown to red orange), and finer boring dust, little boring dust in galleries. Pg. 79 AK I & D
SPB	Spruce bark beetle damage. Spruce trees. Pg. 71-77 AK I & D.
BORE	Other boring insect damage – e.g. Carpenter ants, Long-horn beetles, wood wasps, ambrosia beetles
BRNZ	Bronze birch bore damage. Stem swelling on birch or aspen due to larval galleries are winding – 6mm wide filled with boring dust. Adult may feed on foliage. Pg. 94 in AK I & D.
UNKN	Tree is damaged or dead, but cannot determine cause.

**AK Fire and Fuels Monitoring Protocol Quick References**  
**FIREMON CBI Quick Reference V4, June 2004**  
Revised AK 6/8/2005

**STRATA:**

**Substrates** - Inert surface materials of soil, duff, litter, and downed woody fuels. **Herbs, Low Shrubs, Trees < 1 m** – All grasses + forbs, mosses + lichens, and shrubs + small trees <1 m. **Tall Shrub and Trees 1-2 m** - Shrubs and small trees 1-5 m tall. **Intermediate Trees (pole-size, subcanopy) 2-8 m**- Trees between tall shrubs and upper canopy, approx. 10-25 cm diameter, and 2-8 m tall. May be stratified heights and extend to upper canopy, but crowns receive little direct sunlight. Size is relative to upper canopy and varies by community. If this size is upper canopy, count as intermediate trees. **Big Trees (dominant and co-dominant, upper canopy)** – Larger than intermediate trees, occupy upper canopy, receive direct sunlight above; tallest may extend above average big-tree level. **Understory** - Substrates, herbs/low shrubs/tiny trees, tall shrubs/small trees. **Overstory** - Intermediate and big trees. **Total Plot, or Overall** - All strata of the plot combined.

**GENERAL:**

**Pre-fire exposed soil/rock** is considered unburned if there is no sign of overlying substrates or vegetation that burned. Avoid sites with >50% exposed pre-fire soil/rock, see guidelines. **Rehab Site** - mulch or other does not count, estimate as if that was not present. Planted, growing vegetation can be tallied where appropriate, but not as new colonizers. **A specific factor may not be rated if** is not relevant, shows inconsequential presence or insignificant indication of severity (not applicable N/A), or when effects are unclear and cannot be reasonably judged (uncertain UC).

**% Plot Area Burned** – Enter % of 30 m plot area (and 20 m plot if used) exhibiting *any sign* of burning.

**Pre-Fire Variables** – Report cover (% area), depth (inches) and density (number of trees) plot-wide as if before fire. Consider burned evidence + unburned areas within plot or nearby. Estimate non-burnable area within the plot (e.g. pre-fire soil and rock). Pre-fire conditions are particularly relevant to all understory ratings. Develop reasonable approximation of pre-fire conditions. If too difficult to estimate, write in UC for uncertain, or N/A for not applicable.

**SUBSTRATE RATING FACTORS: Do not count litter or fuels built up after fire.**

**Litter/Light Fuel** - Relative amount consumed of leaves, needles, and < 3" dia woody debris that were on the ground at time of fire. Not new litter-fall. Count litter/light fuels even if it occurs under living plants. Note: if less than 15% cover pre-fire, do not score.

**Duff condition** - Relative amount consumed and charring of decomposed organic material lying below the litter, includes moss layer. Not fine root mass. Count even if it occurs under living plants.

**Medium Fuel or Tussock Basal Area**- Consumption of down woody fuel between 3-8" diameter (7.6-20.3 cm) or tussock basal stock consumption. Do not score if no medium fuels or tussocks pre-fire.

**Large Fuel** – Loss and charcoal from down woody fuel >8" dia (20.3 cm). Base both classes on change to fuel load. Omit or join as one if either fuel class < 5% plot cover, see text. Include stumps in appropriate size class, if relevant.

**Exposed Mineral Soil Cover** - New exposed soil and color change; lightening at mod to high, ~10% red at high severity - overlook ash. Consider soil or rock surface *not* covered by litter, duff or low herbaceous cover less than about 30 cm. If such occurs under taller shrubs and trees, count it.

**HERBS, LOW SHRUBS AND TREES LESS THAN 1 METER RATING FACTORS:**

**Moss/Lichen Cover** – The percent change in spatial cover of pre-fire mosses and lichens affected (killed or consumed) by fire.

**% Foliage Altered** – Only low shrub/small trees, pre-fire live-or-dead cover that's newly brown, black or consumed. Ignore post-fire resprout - it does not mitigate against pre-fire foliage altered.

**Frequency % Living/Resprouting** – % of all pre-fire *perennials*, that are unburned plus burned but viable, based on number plot-wide. Survivorship, not cover, not new seedlings. Include all perennial plants plus examine growth points for viability if needed. Do not include new plants from seed or suckers.

## **AK Fire and Fuels Monitoring Protocol Quick References**

**Colonizers** - Potential dominance 2-3 years post fire of new plants from seed (native or exotic), including: non-vasculars, herbs, shrubs and tree seedlings. Include aspen suckering and fireweed or equisetum that have proliferated vegetatively. Rate only if spp response to fire is known.

**Species Composition Relative Abundance** – Change in spp and/or relative abundance of spp anticipated 2-3 years post fire. How much does post-fire spp composition resemble pre-fire stratum? Consider presence of new or absence of old spp, plus how dominance is spread across spp.

### **TALL SHRUB AND TREES 1-2 METERS RATING FACTORS:**

**% Foliage Altered** - % pre-fire live-or-dead crown volume (leaves, stems) newly brown, black or consumed. Ignore new resprout - it does *not* lessen the amount of pre-fire foliage altered.

**Frequency % Living** - % of pre-fire tall shrubs/trees 1-2 m, unburned plus burned but viable, based on number of shrubs & trees plot-wide. Survivorship frequency, not cover, not new seedlings. Include all green in stratum plus examine growth points for viability if needed. Consider within 2 yrs post fire.

**% Change in Cover** – Plot-wide % decrease in cover for up to 2 yrs post-fire, relative to area covered pre-fire. Resprout plus unburned cover count to lessen the amount of change in cover.

**Species Composition Relative Abundance** – Change in spp composition and/or relative abundance anticipated 2-3 years post fire. Include larger trees resprouting from the base. How much does post-fire spp composition resemble pre-fire stratum? Consider presence of new or absence of old spp, plus how dominance is spread across spp.

### **INTERMEDIATE AND BIG TREE RATING FACTORS (COMBINED):**

**% Unaltered (green)** – % pre-fire live-or-dead crown volume unaltered by fire. Include new resprout from burned crowns, not from bases.

**% Black (torch)** - % pre-fire live-or-dead crown volume that actually caught fire (black or consumed stems, leaves). May or may not be viable post-fire; resprout from black crowns does not lessen % black. At high severity, consumption of fine branching is evident. Include deciduous blackened crowns.

**% Brown (scorch)** – % pre-fire live crown volume affected by scorch or girdle without direct flame contact. Brown is due to proximal heating, where foliage did not catch fire. Includes delayed mortality, insect damage, and brown foliage that has fallen to ground.

**% Canopy Mortality** - % pre-fire live canopy volume made up by trees killed directly or indirectly by fire w/in 1-2 yrs. Proportion of a plot's total once-living canopy lost to dead trees (incl. insect/disease kill) in relation to total pre-fire canopy volume.

**Char Height** - Mean char height from ground flames averaged over all trees. The mean is halfway between upper and lower heights on a tree. Include unburned (char height=0) and burned trees *only* when char height is discernable. Do *not* include black from crown fire; enter N/A for most crown fire burns.

### **Record For Each Overstory Stratum, but Do Not Count in CBI Scores:**

**% Girdled (at root or lower bole)** - % of trees effectively killed by heat through the lower bark, sufficient to kill cambium around lower boles or buttress roots. Include trees either dead or likely to die within 1-2 years. Do not include trees killed by torch or scorch to crown. May show char through bark or loose sloughing bark in 1-2 years.

**% Felled (downed)** - % live-or-dead trees, that were standing before fire but now are on the ground. Usually from wind throw after fire, they exhibit fresh up-turned root masses, and different charring patterns than trees that were down when fire occurred.

**% Tree Mortality** - % of once living trees on the plot that were killed by the fire, based on number of trees. Suspected insect and disease effects also may be included, if such contributed to killing whole trees relatively soon after fire, e.g. within 1-2 years.

## **Appendix G.4 Literature Cited**

### **Alaska Region NPS Fire Ecology Program Fire and Fuels Monitoring Protocols**

Alaska Interagency Fire Effects Task Group 2007. Fire Effects Monitoring Protocol (version 1.0). Editors: J. Allen, K. Murphy and R. Jandt. , 43 pp. Available from:  
[http://depts.washington.edu/nwfire/publication/AK\\_Fire\\_Effects\\_Monitoring\\_Protocol\\_2007.pdf](http://depts.washington.edu/nwfire/publication/AK_Fire_Effects_Monitoring_Protocol_2007.pdf) OR  
<http://fire.ak.blm.gov/administration/awfcg.php>

Brown, James K. 1974. Handbook for inventorying downed woody material. USDA Forest Service Gen. Tech. Rep. INT-16. Intermountain Forest and Range Experiment Station. Ogden, UT. 24 p.

Elzinga, C.L., Daniel Salzer, and John W. Willoughby. 1998. BLM/RS/ST-98/005+1730. BLM Technical Reference 1730-1. U.S. Department of the Interior, Bureau of Land Management. National Business Center, Denver, CO. 475.

FMH USDI National Park Service. 2003. Fire Monitoring Handbook. Boise (ID): Fire Management Program Center, National Interagency Fire Center. 274 p.

Jandt, R.R., J.L. Allen, and E. Horschel. 2005. Forest floor moisture content and fire danger indices in Alaska. BLM/AK/ST-05/009+9218+313. Alaska Technical Report 54. U. S. Department of the Interior, Bureau of Land Management. Anchorage, Alaska. 30 p.

Key, C.H. and Benson, N. 2005. Landscape Assessment (LA) Sampling and Analysis Methods (Version 5.0); USDA Forest Service Gen. Tech. Rep. RMRS-GTR-164-CD. 2006

Lutes, Duncan C., Robert E. Keane, John F. Caratti, Carl H. Key, Nathan C. Benson, Steve Sutherland, and Larry J. Gangi. 2006. FIREMON: Fire effects monitoring and inventory system. Gen. Tech. Rep. RMRS-GTR-164-CD. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 1 CD.

Seaton, C. T. 2002. Winter foraging ecology of moose in the Tanana Flats and Alaska Range foothills. Thesis, University of Alaska Fairbanks, Fairbanks, USA. (Accessed February 2010)  
[http://www.wildlife.alaska.gov/pubs/techpubs/propubs/seaton\\_thesis.pdf](http://www.wildlife.alaska.gov/pubs/techpubs/propubs/seaton_thesis.pdf).

Viereck, L.A., C.T. Dyrness, A.R. Batten, and K.J. Wenzlick. 1992. The Alaska Vegetation Classification. General Technical Report PNW-GTR-286. Portland, OR, USA. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 278 p.

Wilmore, B. 2000. Fuel moisture sampling in boreal forest duff. Unpublished report, U.S. Bureau of Land Management., Alaska Fire Service. 12 p

***AK Fire and Fuels Monitoring Protocol Quick References***

## **APPENDIX H.1 WILDLAND FIRE DECISION SUPPORT SYSTEM**

### **A. Overview:**

The Wildland Fire Decision Support System, or WFDSS, was developed in response to the increase in complexity of wildland fire situations and a reduction in available resources. The former system, WFSA, was becoming cumbersome and is not scalable or flexible enough to deal with the complexities of current fire situations. WFDSS streamlines and improves the decision support system used by fire managers and Agency Administrators.

WFDSS uses fire behavior modeling, current economic principles and information technology to assist in effective decision making. Information from Resource and Fire management guides is incorporated into the program and assists managers in maintaining consistency with management objectives.

WFDSS also replaces the Wildland Fire Implementation Plan (WFIP) and Long-Term Incident Planning (LTIP) processes. The following are available options more advantageous than previous systems:

- Spatial data layering
- Use of map displays with reduction of text
- Reduces input requirements
- Starts the process at the time of discovery
- Removes alternative comparison and decision tree development
- Pre-loads information from Land management Plan, Fire management Plans, Other planning resources, Preplanned decision criteria and local spatial data files.
- Provides scalability for changing incident complexity with three response levels, RL1, RL2, and RL3.
- Ability to end the process at any level, progress through levels or jump to an appropriate level
- Can be used for single or multiple fire situations.

### **Response Levels:**

Response Level 1 coincides with Fire Discovery, Situation Assessment and Documentation, Initial Action and the previous WFIP Stage 1. This stage requires little analysis based on historic IA data.

Response Level 2 involves extended Action and is akin to WFIP Stage 2. More analysis needs to be completed when incidents escape initial attack in order to inform and support decisions.

Response Level 3 is initiated for large fire suppression incidents, long-duration fires and the old WFIP Stage 3 and LTIP. These are long term incidents that require the most analysis and users can choose what is appropriate for decision making.

The flow of information goes from Information to Periodic Assessment and involves 7 sub-tabs that document a risk-informed decision through analysis and deliberation. The 7 sub-tabs or steps of WFDSS are:

- Information- provides documentation of the initial and continuing fire situation and assists in administrative fire reporting
- Situation- Risk assessment and decision support information to support decision on strategy and develop a course of action.
- Objectives- defines objectives as stated in the Land, Resource, and Fire Management Plans as well as lists specific management and incident requirements that frame and influence strategic decisions and tactical implementation.

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- **Course of Action-** Defines a course of action ranging from pre-planned initial response to a specific response for a certain situation. As fire complexity varies, so does the specific of the course of action. A set of actions can be included to be used when the current decision is no longer meeting objectives during the time that a new decision is being made.
- **Validation-** Reviews the Situation, Objectives, and Course of Action to ensure that the Objectives can be met and the Validation guides the development of a new Course of Action.
- **Decision Summary-** This documents the response decision, the rationale for the decision, and sets the timeframe for revisiting and reassessing the decision.
- **Periodic Assessment-** Process to periodically review the decision, response, and accomplishments of the incident in order to evaluate effectiveness and confirm accuracy. This can indicate progression to a higher response level and the associated planning activities.

There are eleven user roles for the WFDSS application. Of these the more important role to recognize is the author role. Authors are those individuals involved in decisions and documentation of an incident, such as fire planners, AFMOs, FMO's, and resource personnel. They have the ability to edit an incident, generate fire behavior reports, request to initiate RAVAR or other analyses to support a decision and ability grant privileges to other users.

Below is an example of the screens and information flow process for WFDSS.

**B. Wildland Fire Decision Support System Online Form Example**

Form needs to be locked (can be done on the Forms Toolbar)

Click [HERE](#) and click F1 to view form HELP

Unit	Response Level	1
Date	National Significance	No

<b>INFORMATION</b>
--------------------

RL1 RL2 RL3 NOTE: Information listed under RL columns refers to:  
 NA - Not Applicable; O - Optional; M - Mandatory;  
 R - Recommended

Incident Name	This information mandatory at all Response Levels	
Latitude		
Longitude		
Geographic Area		SELECT GEOGRAPHIC AREA
Administrative Unit(s)		
Involved Cooperators		
Fire Number		
Management Code		
Start Date/Time		
Contained Date/Time		
Controlled Date/Time		
Out Date/Time		
Incident Size		
Incident Cause		SELECT CAUSE OF IGNITION

Fire Management Unit

**SITUATION**

	RL1	RL2	RL3	
Map	M	M	M	<i>See Attached Map(s)</i>
Fire Weather Forecast	M	M	M	<i>See Attached Forecast(s)</i>
Current/Forecasted Fire Danger	M	M	M	
Fuels	M	M	M	
Hazards and Safety Concerns (check applicable items)	M	--	--	<input type="checkbox"/> Human Factors <input type="checkbox"/> Operations <input type="checkbox"/> Travel <input type="checkbox"/> Environmental Factors <input type="checkbox"/> Aviation Operations <input type="checkbox"/> Other (list)
Hazards and Safety Concerns (list all concerns)	--	M	M	
Short-Term Fire Behavior	M	M	M	
Resource Availability	M	M	M	
External Influences	O	M	M	<input type="checkbox"/> Pre-existing controversies/relationships <input type="checkbox"/> Potential sensitive media relationships <input type="checkbox"/> Potential smoke management problems <input type="checkbox"/> Potential sensitive political interests <input type="checkbox"/> Other
Additional Risk Analysis	NA	M	M	<b>Additional Risk Analysis Required as Response Levels progress - Users Define specific analysis tools</b>
Medium-Term Fire Behavior	O	R	R	
Value Inventory	O	R	R	
Fire Spread Probability	O	O	R	<i>See WFDSS - web system</i>

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RAVAR	O	O	R	See WFDSS - web system
SCI	O	O	R	See WFDSS - web system

**OBJECTIVES**

	RL1	RL2	RL3	
Strategic Objectives	M	M	M	
Relative Risk Assessment	M	O	NA	See Relative Risk Assessment Chart
Incident Objectives	M	M	M	
Management Requirements	O	M	M	
Incident Requirements	O	M	M	

**COURSE OF ACTION**

	RL1	RL2	RL3	
Initial Response	M	NA	NA	
Planning Area	NA	O	R	See Attached Map
Implementation Actions	NA	R	R	General Course of Action and Management Resources
			O	Management Action Points (MAP) Designator and Description
				Recommended Actions
				Recommended Resources
				Estimated Time to Complete
				Estimated Costs
				(Repeat for multiple MAPs-Click here and F1 for HELP)
			O	Management Action Points (MAP) Designator and Description
				Recommended Actions
				Recommended Resources
				Estimated Time to Complete
				Estimated Costs
				(Repeat for multiple MAPs-Click here and F1 for HELP)

**AK Fire and Fuels Monitoring Protocol Quick References**

Complexity Analysis    **NA**    O    **R**    *Complete Complexity Analysis Below, Reference Guidelines are included in Appendix. Click Here and hit F1 for Help*

Other

**RECOMMENDED MANAGEMENT ORGANIZATION**

Reference Fire Costs    **NA**    O    **R**    *See WFDSS - web system, or attach other Estimated Cost Information*

Contingency Actions    **NA**    O    **R**

**VALIDATION**

	RL1	RL2	RL3	
Is the pre-planned initial attack being successful?	<b>M</b>	NA	<b>NA</b>	<input type="checkbox"/> Yes -- Continue <input type="checkbox"/> No -- Move to RL2
Review Situation, Objectives, and Course of Action - Determine if Objectives can be met.	<b>NA</b>	M	<b>M</b>	<input type="checkbox"/> Yes -- Continue <input type="checkbox"/> No -- Revise Course of Action

**DECISION SUMMARY**

	RL1	RL2	RL3
Response Decision	<b>M</b>	M	<b>M</b>
Response Decision Rationale	<b>M</b>	M	<b>M</b>
Signature	<b>M</b>	M	<b>M</b>
Periodic Assessment Frequency	<b>M</b>	M	<b>M</b>

**PERIODIC ASSESSMENT**

	RL1	RL2	RL3	
Relative Risk Assessment	<b>NA</b>	M	<b>O</b>	<i>See Relative Risk Assessment Chart</i>

Response Level Progression Chart	M	M	NA	See Response Level Progression Chart
Normal Validation Process	NA	NA	M	Refer to Validation Subsection

**C. Wildland Fire Decision Support System Complexity Analysis**

**A. Guidelines for Assessing Complexity**

The following list of complexity elements are presented as to provide a review guide for Agency Administrators and staff to review and consider in analyzing the complexity or predicted complexity of a fire situation.

USE OF THE GUIDELINES:

1. Analyze each element and check if that element is a factor of concern for this incident.
2. Fire Complexity and ultimately Incident Management Team determination is based on the current and predicted fire situation. Discussion between the Incident Commander, Fire support Staff and the Agency Administrator is critical in determining the Type of Team configuration that will be needed for the Incident. Careful consideration should be given to the specific question(s) that are checked.
3. The question content and not a total number of checked items should be used as discussion points between the Agency Administrator, Host Unit Staff, Incident Commander, and his/her Incident Management Team for determining whether the Incident is moving upward or downward in Complexity. Upward trending fire complexity is indicated by increasing numbers of checked elements while declining fire complexity is indicated by decreasing numbers of checked elements. Managers should give careful consideration to the specific complexity elements that are checked and use this in determining the appropriate management organization for the specific incident.

**Glossary of terms:**

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

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.

**B. COMPLEXITY ANALYSIS WORKSHEET:**

**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.

**AK Fire and Fuels Monitoring Protocol Quick References**

**B. FIREFIGHTING RESOURCES COMMITTED:**

- 1. Responders may range from 200-500 or more.
- 2. Numerous kinds and types of resources may be required including many that will trigger a formal demobilization process
- 3. Complex aviation operations involving multiple aircraft may be involved.
- 4. Incident requires an Incident base and numerous other ICS facilities to provide support.
- 5. Majority of initial attack resources committed.

**C. VALUES THREATENED:**

- 1. Critical infrastructure or Key Resources may be adversely affected or possibly destroyed and actions to mitigate affects may extend into multiple Operational Periods and require considerable coordination.
- 2. Restricted, threatened or endangered species habitat.
- 3. Cultural/Heritage sites.
- 4. Unique natural resources, special designation zones or wilderness.
- 5. Other special resources.

**D. SAFETY:**

- 1. Hazardous fire line conditions.
- 2. Serious accidents or fatalities.
- 3. Threat to safety of visitors from fire and related operations.
- 4. Restrictions and/or closures in effect or being considered.
- 5. No night operations in place for safety reasons.

**E. OWNERSHIP:**

- 1. Fire burning or threatening more than one jurisdiction.
- 2. Potential for claims (damages).
- 3. Different or conflicting management objectives.
- 4. Dispute over fire management responsibility and jurisdiction.
- 5. Potential for Unified Command.

**F. EXTERNAL INFLUENCES:**

- 1. Elected and appointed governing officials, stakeholder groups, and political organizations require a high level of interaction.
- 2. Pre-existing controversies/relationships.
- 3. Sensitive media relationships.
- 4. Population surrounding general incident area is affected (smoke, evacuation, etc.)

**G. CHANGE IN STRATEGY**

- 1. Change in strategy (from lower to higher intensity management).
- 2. Large amounts of unburned fuel within planned perimeter.
- 3. WFDSS DAR invalid or requires updating.

**H. EXISTING OVERHEAD:**

- 1. Resources may need to remain at scene for extended operational periods, require complete logistical support, and numerous personnel replacements.
- 2. Existing management organization ineffective.
- 3. Overhead/IMT overextended mentally and/or physically.
- 4. Formal Incident Action Plan (IAP) needed for each operational period.

***AK Fire and Fuels Monitoring Protocol Quick References***

## **D. Wildland Fire Decision Support Relative Risk Assessment**

### **1. Overview**

The Federal Fire Policy requires that sound risk management be a foundation for all fire management activities. Recent reviews and audits have also stressed the need for risk management. In fact, risk management is rapidly becoming a cornerstone phrase associated with fire management. A report by the National Academy of Public Administration (NAPA) (2001),” stresses the role of risk reduction in wildlands as a critical mitigation approach to improve community protection.” The Government Accountability Office (USGAO 2004) completed a report on risk assessment associated with the fuels treatment program. This report also stresses the importance of risk assessment in fire and fuels management.

All wildland fires present an inherent level of risk given that we are dealing with a number of unknowns and uncertainty in what the future will bring. The relative risk rating is intended to characterize the general magnitude of risks associated with implementing wildland fire management activities as a snapshot in time. It is an attempt to qualify the level of uncertainty regarding the eventual outcomes of the fire in relation to the management objectives and other mandates. The relative risk rating is a direct input into the periodic fire assessment and response level progression chart.

The Wildland Fire Relative Risk Assessment provides the Agency Administrator with a quick but comprehensive assessment of the relative risk of the fire. This is a qualitative process that can be completed in less time than a quantitative long-term risk assessment.

The relative risk assessment chart uses three risk components: values, hazard, and probability. Each of these components is assessed in an independent step. Then, the three outputs are evaluated in a final step that provides the relative risk for the fire. Each risk component is defined by three variables. One variable is located on the right and one on the left side of the box and the third variable is defined by three interior lines extending from top to bottom.

**Values:** Values are those ecologic, social, and economic resources that could be lost or damaged because of a fire. Ecologic values consist of vegetation, wildlife species and their habitat, air and water quality, soil productivity, and other ecologic functions. Social effects can include life, cultural and historical resources, natural resources, artifacts, and sacred sites. Economic values make up things like property and infrastructure, economically valuable natural and cultural resources, recreation, and tourism opportunities.

**Hazard:** The hazard in wildland fire is made up of the conditions under which it occurs and exists, its ability to spread and circulate, the intensity and severity it may present, and its spatial extent.

**Probability:** Probability refers to the likelihood of a fire becoming an active event with potential to adversely affect values.

Initial information to consider in developing the rating for the individual element is provided in the following section. This descriptive list is not all inclusive and items on the list can vary by place and time. Users are expected to exercise their judgment in determining the ratings; information is intended to provide both guidance in completion and flexibility in determining exactly what the descriptions mean. Local information can and should be amended to the lists to better reflect site-specific situations. Local, site-specific information concerning air quality and smoke management must be amended into the Wildland Fire Relative Risk Assessment at the local level to reflect variances in situations and local values and regulatory concerns. Air quality criteria should be reflected in the values assessment portion, smoke production can be incorporated into the hazard descriptive list, and descriptive information related to the probability of adverse smoke events, if available, can be addressed as part of the probability assessment.

**2. Value Assessment**

Values are those ecologic, social, and economic effects that could be lost or damaged because of a fire. Ecologic values consist of vegetation, wildlife species and their habitat, air and water quality, soil productivity, and other ecologic functions. Social effects can include life, cultural and historical resources, natural resources, artifacts, and sacred sites. Economic values make up things like property and infrastructure, economically valuable natural and cultural resources, recreation, and tourism opportunities. This assessment area allows opportunity for the local Agency Administrator to identify particular local concerns. These concerns may be identified in the fire management plan or other planning documents.

**Natural/Cultural Resource Concerns** - key resources potentially affected by the fire. Examples include, but are not limited to habitat or populations of threatened, endangered, or sensitive species, water quality, erosion concerns, and invasive species.

Low	Moderate	High
Resource concerns are few and generally do not conflict with management of the fire. Mitigation measures are effective.	Significant resource concerns exist, but there is little conflict with management of the fire. Mitigation measures are generally effective.	Multiple resource concerns exist, some of which may conflict with management of the fire. The effectiveness of needed mitigation measures is not well established.

**Social/Economic Concerns** - the risk of the fire, or effects of the fire, impacting the social or economic concerns of an individual, business, community or other stakeholder involved with or affected by the fire. Social concerns may include degree of support for the wildland fire use program or resulting fire effects, potential consequences to other fire management jurisdictions, impacts to tribal subsistence or gathering of natural resources, air quality regulatory requirements and public tolerance of smoke. Economic concerns may include potential financial impacts to property, business, or infrastructure. Infrastructure impacts may be costs to repair or replace sediment catchments, wildlife guzzlers, corrals, roads, culverts, power lines, domestic water supply intakes, and similar items.

Low	Moderate	High
Local support for wildland fire use is high. The fire should have little or no impact on subsistence or Tribal activities involving treaty rights. The fire is expected to remain within a single jurisdiction or agreements are in place to allow the fire to move across several jurisdictions. Media coverage is favorable. Few structures or business ventures are potentially affected by the fire. There are few impacts to recreation and tourism.	Local support of wildland fire use is clearly divided between supporters and opponents. The fire will have some impacts on subsistence or Tribal activities involving treaty rights. The fire is expected to involve more than one jurisdiction, cooperator, or special interest group and agreements need to be developed. Media coverage tends to be a mix of favorable and unfavorable views. Some structures may be threatened by the fire or some business ventures may be affected by the fire.	Local support for wildland fire use is low. The fire will have significant impacts on subsistence activities or Tribal activities involving treaty rights. Smoke impacts may become a concern for higher level air quality regulatory agencies. The fire is expected to involve several jurisdictions, cooperators, and special interest groups and agreements requiring significant negotiation need to be developed. Media coverage tends to be unfavorable. Many structures or private properties could be threatened.

**Location of Fire to Values**

Distant	Moderate	Adjacent
Fire location is not proximate to values to be protected or fire is located where it is highly unlikely that it would reach the values.	Fire location is moderately proximate to values. Location is such that, based on historical data, fire could potentially reach the values but will take multiple burning periods and sustained fire activity to reach the values.	Fire location is in close proximity to values. Without mitigation actions, fire will be expected to reach the values.

## 2. Hazard Assessment

The hazard in wildland fire is made up of the conditions under which it occurs and exists, its ability to spread and circulate, the intensity and severity it may present, and its spatial extent.

**Current Fire Behavior** – the current fire behavior or that most recently observed. Changing fire behavior is addressed through repeated completion of the Periodic Fire Assessment.

Low	Moderate	High
Short duration flaming front with occasional torching. Fuels are uniform and fire behavior can be easily predicted and tactics implemented.	Short range spotting occurring. Moderate rates of spread are expected with mainly surface fire and torching. Fuels and terrain are varied but don't pose significant problems in holding actions.	Long range spotting > ¼ mile. Extreme rates of spread, and crown fire activity are possible. Fuels, elevation, and topography vary throughout the fire area creating high resistance to control.

**Departure from Historic Conditions** – a measure of ecological functions at risk based on changes in vegetation.

1	2	3
Vegetative composition and structure are resilient, similar to historic conditions, and key components are at low risk of loss.	Both the composition and structure of vegetation has shifted from historic conditions towards conditions that are less resilient and more at risk of loss.	Vegetation composition and structure are highly altered and predisposes the landscape to fire effects well outside the range of historic variability, potentially producing changed fire environments never before measured.

**Potential fire size** - the potential fire size by the end of the season in comparison to historical fire occurrence.

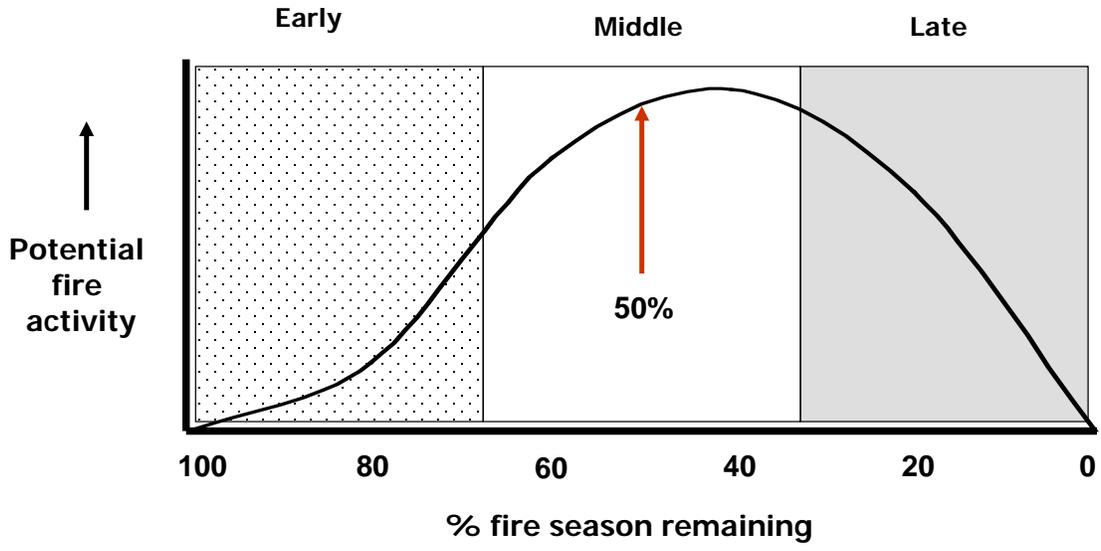
Small	Medium	Large
Fire size is expected to be small for the dominant fuel type involved.	Fire size is expected to be in the mid-range for the dominant fuel type involved.	Fire size is expected to be large for the dominant fuel type involved.

## 3. Probability Assessment

Probability refers to the likelihood of a fire becoming an active event having potential to adversely affect values.

**Time of Season** - the current time in relation to the historical fire season. The chart below the guidelines reinforces the importance of time of season. During the early part of the fire season, the peak of burning activity is still to come, thus the fire could present substantial variation in behavior and activity. In the middle of the season, the peak of burning activity may or may not have occurred while in the late part of the season, the peak of fire activity generally has occurred and managers can reasonably expect diminishing fire activity and behavior as time progresses. As the amount of fire season remaining decreases or as the time of season progresses from early to late, management concerns and issues associated with potential fire activity decrease.

*AK Fire and Fuels Monitoring Protocol Quick References*



**AK Fire and Fuels Monitoring Protocol Quick References**

<b>Early</b>	<b>Middle</b>	<b>Late</b>
The current date is in the early portion of the historic fire season, at least 2/3 of the established fire season remains and the peak of burning activity is still to come.	The current date is in the middle of the historic fire season, at least 1/3 of that period has passed and no less than 1/3 remains. The peak burning activity period either has occurred, is occurring now, or will occur very soon.	The current date is in the latter part of the historic fire season. At least 2/3 of the historic period has passed, the peak burning activity period has occurred, and the probability of a season-ending or fire-ending event is increasing quickly.

**Seasonal Severity** - a measure of the potential burning conditions as expressed by factors such as energy release component (ERC), drought status, live fuel moistures, dead fuels moistures, soil moisture, stream discharge, and similar types of measures.

<b>Low</b>	<b>High</b>	<b>Extreme</b>
Measures of fire danger are below to somewhat above seasonal averages. Drought status is within seasonal norms with no long-term drought present	Measures of fire danger are well above seasonal averages but not setting new records. The area is in short-term drought (1-2 years of drought) but not considered to be in long-term drought.	Measures of fire danger are setting new records. The area is considered to be in long-term drought (3 or more years of drought).

**Barriers to Fire Spread** – a measure of the natural defensibility of the fire location and an indication of degree of potential mitigation actions needed.

<b>Numerous</b>	<b>Moderate</b>	<b>Few</b>
The location of the fire and presence of natural barriers and fuel breaks limit the horizontal fuel continuity, minimal mitigation actions on-the-ground will be needed.	The location of the fire and presence of some natural barriers and fuel breaks limit the horizontal fuel continuity on some, but not all fire flanks, some mitigation actions on-the-ground will be needed to protect threats to boundaries and sensitive areas.	The location of the fire and presence of only limited natural barriers and fuel breaks will permit fire spread across continuous fuels. Mitigation actions on-the-ground will be needed but are expected to be effective.

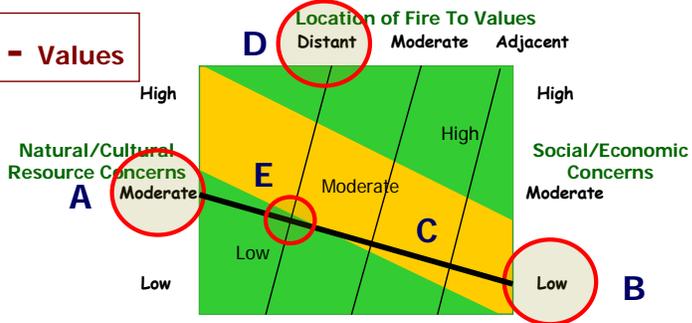
### 4. Risk Assessment Chart Instructions

Use drawing tools to draw lines across the charts. Drawing tool can be accessed from VIEW – TOOLBARS – DRAWING.

A	Step 1	Locate Natural/Cultural Resource Concern level
B	Step 1	Locate Social/Economic Concern level
C	Step 1	Draw line connecting left and right variables
D	Step 1	Locate Location of Fire to Values level
E	Step 1	Follow interior line down to intersection with line connecting left and right variables, locate Value Assessment output (Low, Moderate, High)
F	Step 4	Take Step 1 - Value Assessment output to Step 4 as Value input
G	Step 2	Locate Fire regime condition class level
H	Step 2	Locate Potential Fire Size level
I	Step 2	Draw line connecting left and right variables
J	Step 2	Locate Fire Behavior level
K	Step 2	Follow interior line down to intersection with line connecting left and right variables, locate Hazard Assessment output (Low, Moderate, High)
L	Step 4	Take Step 2 - Hazard assessment output to Step 4 as Hazard input
M	Step 4	Draw line connecting Value and Hazard levels
N	Step 3	Locate Time of Season level
O	Step 3	Locate Seasonal Severity level
P	Step 3	Draw line connecting left and right variables
Q	Step 3	Locate Barriers to Fire Spread level
R	Step 3	Follow interior line down to intersection with line connecting left and right variables, locate Probability Assessment output (Low, Moderate, High)
S	Step 4	Take Step 3 – Probability assessment output to Step 4 as Probability input
T	Step 4	Follow interior line down to intersection with line connecting left and right variables, locate Relative Risk Assessment (Low, Moderate, High)

## Step-By-Step Instructions for Completing the Wildland Fire Relative Risk Assessment

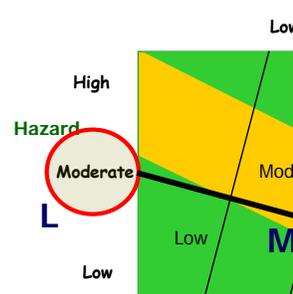
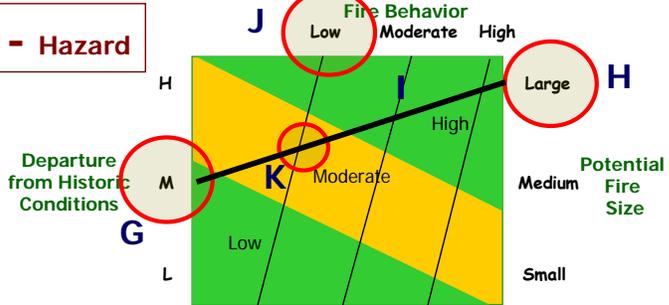
**1 - Values**



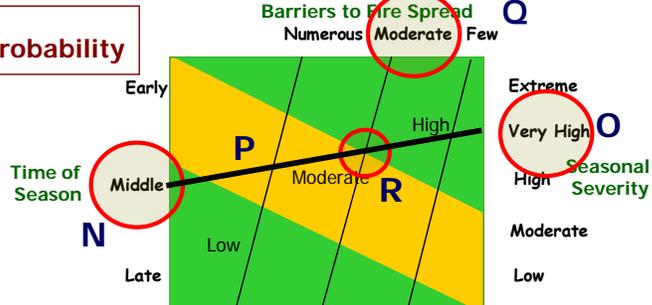
**Wildland Fire Relative Risk Assessment**

**4 - Relative Risk Assessment**

**2 - Hazard**



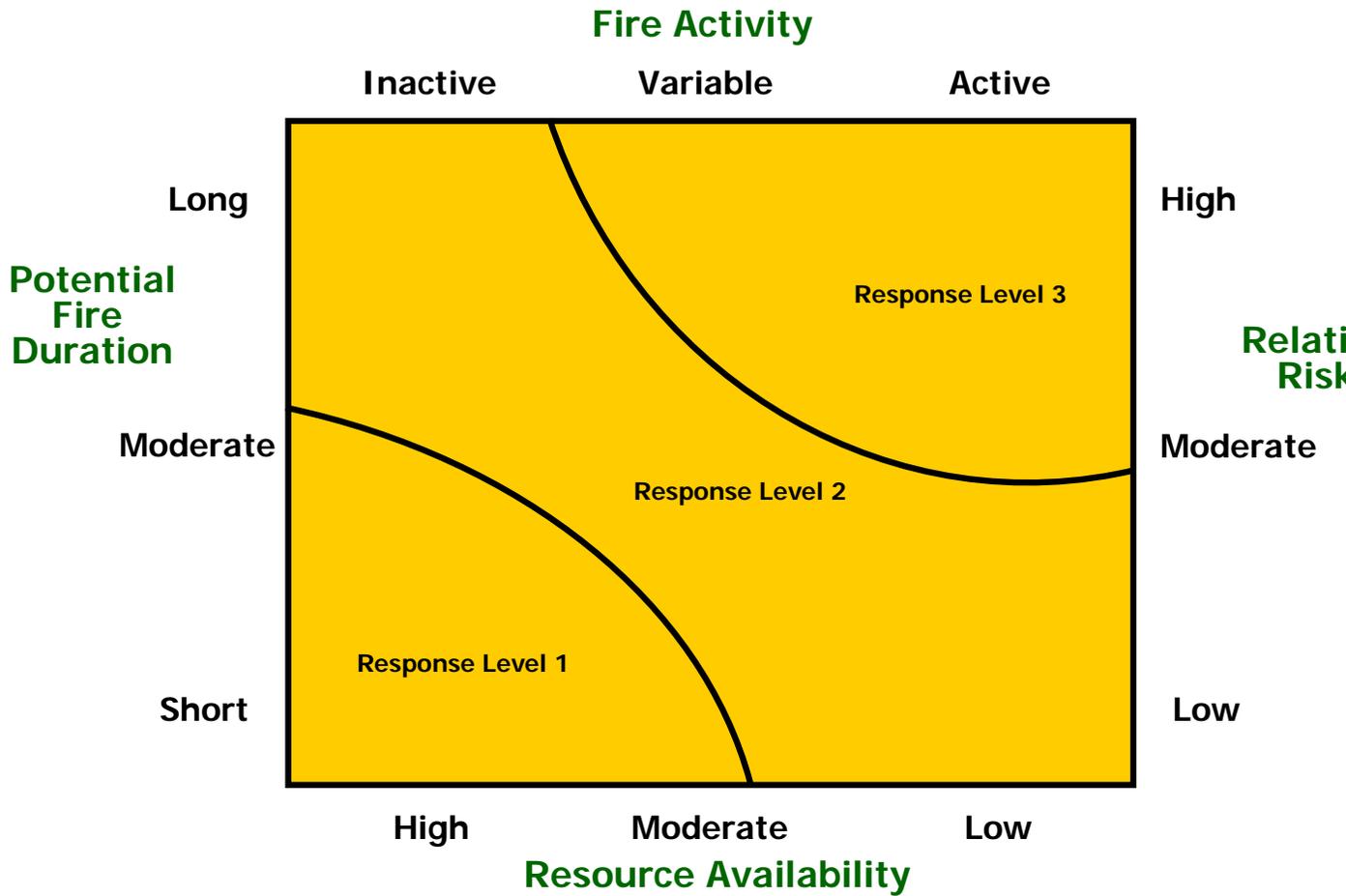
**3 - Probability**



**Complete Steps 1-3**  
left and right variables of the chart, select the value from the background intersection with the line connecting the left and right variables. Take Step 4.  
**Complete Step 4**  
risk from the background intersection occurs.

5. Response Level Progression Chart

## Response Level Progression Chart



**APPENDIX H.2: SAMPLE DELEGATION OF AUTHORITY**

Everglades National Park  
And  
Fort Jefferson National Monument  
Homestead, Florida

**Delegation of Authority**

As of 1800, May 20, 1989, I have delegated authority to manage the Ingraham fire, number 8930, Everglades National Park, to Incident Commander, Rex Mann and his Incident Management Team.

The fire, which originated as four separate lightning strikes occurring on May 17, 1989, is burning in legislated wilderness. My considerations for management of this fire are:

1. Provide for firefighter safety.
2. I would like the fire managed in such a manner that suppression actions will cause as little environmental damage as possible.
3. Key cultural features requiring priority protection are: Mahogany Hammock, overlook board walks, park headquarters, the Pinelands campground and residential area, Royal Palm Visitor Center, and hydrostations with recording equipment.
4. Key resource considerations are: protecting endangered species by providing aircraft telemetry monitoring of Florida Panther, preserving as much Cape Sable Sparrow habitat as possible and avoiding wildlife entrapment situations.
5. Restrictions for suppression actions are no tracked or wheeled vehicles in the wilderness except where roads exist and are identified for use, and no retardant will be utilized.
6. Minimum tools for use are Type II/III helicopters, chainsaw and weed whips.
7. My agency advisor will be park Fire Management Officer, Sue Husari.
8. The NE flank of the fire borders Florida Department of Forestry (DOF) protection. Chekika State Park must be protected if threatened. John Flowers will be the DOF representative.
9. Managing the fire cost-effectively for the values at risk is a significant concern.
10. Providing training opportunities for the South Florida parks personnel is requested to strengthen our organizational capabilities.
11. Minimum disruption of visitor access of the main park road consistent with public safety.

Michael V. Finley  
Superintendent, Everglades National Park  
May 20, 1989  
Everglades National Park  
And  
Fort Jefferson National Monument  
Homestead, Florida

**Amendment to Delegation of Authority**

The Delegation of Authority dated May 20, 1989, issued to Incident Commander, Rex Mann for the management of the Ingraham fire, number 8930 is hereby amended as follows. This will be effective 1800, May 22, 1989.

Key cultural features requiring priority protection are: Mahogany Hammock, overlook board walks, park headquarters, the Pinelands campground and residential area, Royal Palm Visitor Center, hydrostations with recording equipment, Shark Valley, Hammock 55, and Binky Hammock Chain.

Minimum tools for use are medium and light chainsaws, and weed whip.

12. Use of tracked vehicles authorized to protect the Miccosukee Strip.

Michael V. Finley  
Superintendent, Everglades National Park

Everglades National Park  
And  
Fort Jefferson National Monument  
Homestead, Florida

### **APPENDIX H.3: ALASKA NPS STRUCTURE PROTECTION PROCEDURES**

The following procedures provide guidance to NPS Park Management, Alaska Fire Service (AFS), the Alaska Division of Forestry (DOF), the USDA Forest Service (FS) and Incident Management Teams concerning structure protection priorities for wildland fire suppression activities on lands managed by the National Park Service (NPS) in Alaska. These procedures do not pertain to non-federal lands within NPS unit boundaries. This document was prepared in cooperation with regional and park wildland fire, resource management and cultural resources management staffs.

1. The safety of the public and fire suppression personnel is the first priority in fire suppression/structure protection decision and implications. Regardless of the protection status of the structure, if humans are present at a structure threatened by wildland fire, human safety is the priority. Firefighter safety will not be compromised for structure protection.
2. The priority of structure protection is determined by the selected fire management options (Alaska Interagency Wildland Fire Management Plan, 1998) and dependent upon the availability of resources. Firefighting resources may not be available or able to safely access the structure(s) identified for protection.
3. The appropriate laws, regulations and policies in conjunction with General Management and Resource Management Plan(s) will be referenced for decisions regarding protection of structures.
4. The determination of the wildland fire management options for lands and resources managed by the NPS is the responsibility of NPS park management in conjunction with NPS wildland fire and park personnel. The NPS will determine the fire management option for structures on NPS managed lands using the following criteria:
  - a. The structure(s) is a primary domicile (Critical Management Option.)
  - b. National Historic Landmarks that may be threatened by wildland fire (Critical Management Option.)
  - c. The Structure has been determined eligible for or is on the National Register of Historic Places, has structural integrity (e.g. intact roof and walls, a reasonable probability for defense), is at potential risk from wildland fire and has been identified for or undergoing routine maintenance/restoration (Full Management Option.)
  - d. NPS administrative (e.g. patrol cabin) or public use structures public funds expended to construct or maintain (Full Management Option.)
  - e. The use of the structure is provided for under NPS permit or an approved Mining Plan of Operations (Full Management Option.)

***AK Fire and Fuels Monitoring Protocol Quick References***

f. The Structure is undergoing an eligibility or management assessment and has structural integrity (e.g. intact roof and walls, a reasonable probability for defense) or is involved in a legal process (Full Management Option.)

5. Unauthorized structures will not be protected.
6. In a wildfire situation, if information on the fire map atlas is not sufficient, the suppression organization fire management officer will contact the appropriate NPS Area or Regional Fire Management Officer for a decision.
7. If in a wildfire situation, an undesignated structure is discovered on NPS lands, appropriate NPS Area or Regional Fire Management Officer will be notified. NPS will determine fire management option for the structure using criteria listed in # 4. If the structure has intact roofs and walls, it will be afforded protection commensurate with Full Management Option until a final determination is reached.
8. NPS wildland fire and park personnel will initiate the actions to reduce hazardous fuels adjacent to structures on NOS managed lands that have been identified for protection. The NPS will clarify hazardous fuel reduction responsibilities of NPS permit holders within their permit stipulations. The NPS may assist permit holders with fuel reduction activities. The NPS also may assist non-federal entities with fuel reduction activities that are mutually beneficial to both parties.
9. The NPS wildland fire management officers are responsible for providing current NPS fire management option selections to the suppression organizations, ensuring changes are incorporated into the map atlas, and maintaining the NPS wildland fire management atlas. Structures that do not warrant protection will be identified as “non-sensitive” on the map atlas. Changes in wildland fire management options and updating of map atlas should be part of the annual fire management plan review.
10. Any fire operations that included structure protection actions in the preceding year will be evaluated to determine if the fire management category is appropriate and if the operations were safely and efficiently conducted.

**APPENDIX H.4: ANNUAL OPERATING PLAN ELEMENTS**

**1. Organization and Contact Phone numbers**

Unit	Role	Name	Office Phone	Home/Cell Phone
AKRO	Regional FMO	Dan Warthin	(907) 644-3409/3809	(907) 865-5984/ (907) 444-8788
YUGA	Superintendent	Greg Dudgeon	(907) 455-0615	(907) 978-9452
YUGA	Chief of Resources	Tom Liebscher	(907) 455-0620	(907) 374-4784
YUCH/Eagle	Supervisory Interp.	Pat Sanders	(907) 547-2233 x120	(907) 547-2240 (907) 347-1661
YUGA	FMO	Vacant(James Savage Acting)	(907) 455-0650	
YUGA	AFMO	James Savage	(907) 455-0651	(907) 457-3608/ (907) 347-7102
YUGA	Supervisory Forestry Tech.	Andrew Ruth	(907) 455-0654/ 0601	(907) 474-0372/ (907) 699-2218
YUGA	Helicopter Manager	Alicia Tanrath	(907) 455-0659/ 0601	(907) 699-2142
YUGA	Asst. Helicopter Manager	Jessica Sherwood	(907) 455-0658/ 0601	(907) 699-2208
GAAR/Bettles	Park Dispatcher	Dalelynn Gardner	(907) 692-6100	
DENA	Superintendent	Paul Anderson	(907) 683-9581	DENA Dispatch (907) 683-9555
DENA	Asst. Superintendent (Rangers/Maintenance)	Elwood Lynn	(907) 683-9581	DENA Dispatch (907) 683-9555
DENA	Asst. Superintendent (Interp./Resources)	Philip Hooge	(907) 683-9581	DENA Dispatch (907) 683-9555
DENA	FMO	Larry Weddle	(907) 683-9548	(907) 768-2626/ (907) 460-1688
DENA	AFMO	Charlie Reynar	(907) 683-9549	(907) 683-3322/ (907) 978-9477
DENA	Park Dispatcher		(907) 683-9555	
DENA	Public Affairs	Kris Fister	(907) 683-9583	
DENA	Helicopter Mgr	Gilbert Garcia	(907) 683-6220	
AFS - Upper Yukon	FMO	Steve Theisen	(907) 356-5558	(907) 388-2749
AFS - Upper Yukon	AFMO	Pat O'Brien	(907) 356-5550	(907) 378-4600
AFS - Upper Yukon	Fuels Specialist	James Higgins	(907) 356-5561	(907) 750-1799
AFS - Tanana	FMO	Mike Butteri	(907) 356-5562	(907) 388-1547
AFS - Tanana	AFMO	VACANT	(907) 356-5574	(907) 388-3089
AFS - Tanana	Fuels Specialist	Willie Branson	(907) 356-5570	(907)-388-2706
UYT Dispatch	Center Manager Assistant	VACANT Ted Pierce	(907) 356-5551 (907)-356-5552	(907)-388-6297 (907)-388-7395
UYT IA Desk – Upper Yukon		Hudson Plass Brandon Poe	(907) 356-5555	
UYT IA Desk - Tanana		Amber Sunderland	(907) 356-5554	
UYT Overhead/Crews Equipment/Aircraft		Rod Thorsen Rob Davis Jennifer Northway	(907)-356-5553 800-237-3652	Fax (907)-356-5556

**Table : Annual Operating Plan Contacts**

## **2. Notification Procedures/Forms (See Table 31)**

Following fire confirmation suppression provider organization faxes or emails Preserve FMO (or delegate) the completed notification forms as soon as possible. Fax or email is followed up with a confirmation of receipt phone call.

## **3. Designated IC Chain of Command**

### **A. Multi-Agency Personnel/Equipment**

IC reports directly to suppression provider organization at interval and timeframes designated by the suppression provider organization UYD FMO.

**B. AFS** carries out the primary responsibility for suppression actions on lands within National Park Service Lands in the State of Alaska. IC reports directly to the suppression FMO (UYD FMO) at intervals and timeframes designated by the suppression provider.

## **4. Fire Update (Reporting Requirements)**

**A.** Status update reported to UYT (Tanana or Upper Yukon desk) no later than 1900 hours.

### **B. Report Items:**

Fire Size, Fire Behavior, Flame length, Rate of Spread (ROS), Percent Active, Spread direction, Growth potential, Date/time of recon, Participants/Resources, Actions Taken, Values at risk, Future Actions, Geographic Name, Fuel Types, Weather Description, Smoke Conditions

### **C. Alaska ICS-209 Requirements for Wildfires**

1. The Incident Status Summary (ICS-209) is used to report large wildfires or fires that have a significant resource commitment. The ICS-209 form is a Fire and Aviation Management Web (FAMWEB) application known as the 209 Program. Specific instructions for entering ICS-209 data using the 209 Program are located in the User's Guide at <http://www.fs.fed.us/fire/planning/nist/sit.htm>. The 209 Program is located at <http://fam.nwcg.gov/fam-web/>.
2. ICS-209's should be submitted as required by the National Mobilization Guide (NMG). The NMG classifies large fires as one hundred (100) acres or larger in timber fuel types, three hundred (300) acres or larger in grass or brush fuel types, or when a Type 1 or 2 Incident Management Team is assigned. A report should be submitted daily until the incident is contained.
3. In addition to above the national standard, Alaska requires 209s for all fires (whether in Critical, Full, Modified or Limited) that have a commitment of 17 or more personnel for more than one burning period (overnight). Zone and Area dispatch offices are responsible for completing the ICS 209s in the event that the Incident Commander fails to submit one.
4. The Alaska Interagency Coordination Center may also request ICS 209s for other fires not covered by the above criteria as determined by the Predictive Services section.
5. Alaska ICS-209's should be submitted by 2200 Alaska time.
6. \* ICS 209s are the primary source of Alaska fire activity information for national fire managers. These managers determine the allocation of firefighting resources on a national basis. 209s are therefore an essential element in our ability to obtain national resources such as smokejumpers, Airtankers, Helicopters and Type 1 crews.

## **5. Dispatch Operations**

*General information; Dispatcher roles and responsibilities; Dispatcher training and qualifications; Procedures for dispatch of resources off unit.*

- A.** Resource dispatching off unit. Park Area Programs are responsible for maintaining status of fire personnel in ROSS. UYT will be the primary dispatch center for YUCH, GARR and DENA employees.
- B.** Park Area Programs are responsible for maintaining qualifications of fire personnel in IQCS.

## **6. Daily Duties**

*Check-in/out of administrative/fire personnel; Intelligence; Weather/briefings; Verify initial attack response levels; Status suppression resources; Preparedness level establishment and verification.*

- A.** Fire personnel will check in at the beginning of every shift and confirm their status with their supervisor.
- B.** At 0930 daily weather briefing and operational briefing for Park personnel will take place. Daily Situation report and resource availability will be discussed at this briefing.
- C.** During times of fire activity briefings for Regional Fire Staff and Agency Administrator will occur when necessary.

## **7. Initial Attack Response Plan Elements**

*Preplanned dispatch plans, Dispatch procedures, Notification of a reported fire; Procedures for identifying preparedness levels; Fire weather; Identification of fire danger; Process for assessing the appropriate response; Identification and notification of resources to respond (Local units will establish standard response times for all initial attack resources); Appropriate management notification; Cooperator support and planned response; Communications procedures; Procedures to follow when activity exceeds the initial attack plan; Aviation procedures.*

- A.** Initial smoke reports received by the Park Area Programs.
  - 1.** Park area program will notify the UYT.  
The AFS Zone and Park Area Program will coordinate a response.

- B.** Dispatch procedures from UYT.
  - 1.** Resource ready times  
Response by helicopter will vary based on helicopter availability.  
Jumper/IA resource ready time.

- 2.** Decision Document Preparation (Response Plan Elements beyond the Initial Attack stage)
  - c.** WFDSS- See Alaska Master Agreement

Fire Information -- Initial fire information inputted into Wildland Fire Decision Support System by UYT.

Situation – Jointly inputted by Zone and Park Area programs.

Objectives – Inputted by Park Area programs.

Course of Action-- Jointly inputted by Zone and Park Area programs.

Validation -- Jointly inputted by Zone and Park Area programs.

Decision Summary -- Inputted by Park Area programs.

Periodic Assessment -- Jointly inputted by Zone and Park Area programs.

### **3. Resource Ordering Procedures**

**AK Fire and Fuels Monitoring Protocol Quick References**

All ordering for fire suppression resources will be conducted through UYT Dispatch, with UYD FMO working in consultation with YUCH FMO or delegate.

**8. Emergency Operations (Fire/Non-fire)**

*Notification of a reported incident; Jurisdiction verification; Response plan activation; Agency and area notification; Move-up and cover procedures; Call-back procedures; Evacuation of incident area; Closing public/private roads; Ordering additional personnel, equipment, and aircraft; Fire Weather Watch and Red Flag Warning notification; Temporary Flight Restrictions (TFRs) ; Agency duty officers (roles and responsibilities) ; Aircraft pre-accident plan; Utility company notification (power and gas) ; Law enforcement dispatching procedures/requirements; HazMat/spill response notification procedures; Local government requesting all-risk assistance; Search and Rescue; Identify the incident commander.*

**A. Evacuation** – The Alaska Division of Emergency Services has developed standard procedures for the evacuation of personnel and/or public due to risks posed by fire and/or smoke. Either the NPS Superintendent or the Agency Administrator may request the Alaska Division of Emergency Services (ADES) to implement evacuation procedures for the Park/Preserve or for adjacent communities. This could range from the evacuation of an individual adversely affected by smoke to community evacuation due to the threat of fire. Any fire related evacuation effort will be coordinated with the suppression organization FMO or Incident Commander

**B. Fire Weather and Watch Notification**

**C. Temporary Flight Restrictions** – Establishment of TFRs will be coordinated through the YUCH and UYD FMOs.

**D. Agency Duty Officer** – NPS Regional FMO is the NPS Duty Officer.

**E. All Risk Responses on NPS Lands** will be coordinated by NPS Ranger Staff.

**9. Local Agreements**

*Copies of all interagency or inter-unit agreements and associated annual operating plans that govern the use of fire management resources. Maps delineating areas of responsibility for fire suppression coverage.*

See the Alaska Interagency Fire Management Plan, NPS/AFS Intra-Agency Agreements, AFS/State of Alaska, DNR, DOF Agreements.

**10. Communications**

*Procedures for assigning/managing local radio frequencies; Procedures for obtaining additional frequencies; maps of repeater sites; instructions for using local dispatch radio consoles, phones, computers, fax machines, paging systems, etc.*

**All NPS and BLM Frequencies are Narrowband**

Unit	Rx	Tx	Tone	Location
NPS-YUCH	166.300	166.300		Local Eagle
NPS-YUCH	166.300	166.300	100.0	Hillard Repeater
NPS-YUCH	166.750	166.750		Local Twin
NPS-YUCH	166.750	166.750	103.5	Twin Repeater
NPS-YUCH	166.825	166.825		Local Yukon
NPS-YUCH	166.825	166.825	107.2	Yukon Repeater

**AK Fire and Fuels Monitoring Protocol Quick References**

NPS-YUCH	164.750	164.750		Local Kathul
NPS-YUCH	164.750	164.750	110.9	Kathul Repeater
NPS-YUCH	168.350	168.350		Local Maintenance
NPS-YUCH	163.025	163.025		Local Kluane Canada
NPS-YUCH	166.300	166.900	123.0	Chilkoot Repeater-Skagway
NPS-YUCH	162.55			Weather
BLM-AFS	163.0250	163.0250		Glacier Repeater “Gold”
BLM-AFS	127.450	127.450		Eagle Air to Ground
BLM-AFS	128.450	128.450		Air to Air “Victor”

**Table 11: YUCH UHF Frequencies**

**11. Weather**

*Processing of weather observations via Weather Information Management System (WIMS); Daily posting and briefing procedures; Broadcasts of fire weather forecasts to local fire suppression personnel; Procedures for processing spot weather forecast requests and disseminating spot forecasts to the field; Procedures for immediate notification to fire suppression personnel of Fire; Weather Watches and Red Flag Warnings*

- A. Weather forecasts, fire weather watches and red flag warnings and outlooks available through the web hyperlinks on the AICC webpage (<http://fire.ak.blm.gov>). Additionally the NOAA website contains weather forecasts and outlooks (<http://www.arh.noaa.gov/>) and (<http://raws.wrh.noaa.gov>) .
- B. Spot forecast request can be processed via the AICC website or through park or zone dispatch.
- C. Weather forecasts are transmitted to the field via handheld radio or satellite phone.
- D. Manual field observations relayed for spot weather forecasts requests.

**12. Fire Danger**

*Remain aware of locally significant fire danger indices and record those values daily; Update and post monthly the seasonal trends of those values versus seasonal averages.*

- A. Canadian Forest Fire Danger Rating System indices available daily at 1400 on AICC website.
- B. Indices will be monitored via the AICC webpage. Eastern will track Ben Creek, Eagle RAWS.
- C. Weekly fire danger outlook available through the web hyperlinks on the AICC webpage (<http://fire.ak.blm.gov>).

*Information to be provided by dispatch for Suppression/Support Resource availability, radio frequencies to be used; burning conditions/fuel types; weather forecast updates; local fire activity; agency policies, etc. For management: fire activity, incident updates, weather updates, resource status.*

**13. Briefings**

*Time frames and frequencies/locations for daily briefings must be clearly specified in the local dispatch SOP. A method should also be identified for documenting briefings (time given, content of briefing, and person(s) conducting and receiving briefing).*

- A. AICC weather briefings during fire season at 0930.
- B. Morning operation briefing for fuels and fire staff including 6 minutes for safety

- C. For Preserve operations, at the start of any new project a JHA will be reviewed.
- D. Agency administrators will be briefed on new fire starts and additionally as needed.

#### **14. Preparedness Levels**

*General information relating to the local preparedness plan:*

- *Procedures for identifying preparedness level.*
- *Notification to management.*
- *Dispatching roles and responsibilities at each preparedness level.*

NPS Area Programs – Preparedness levels are determined by CFFDRS indices, Lightning Activity Level, number(s) of active fires and values to be protected that may impact each park unit. Additional considerations that may require augmenting minimal staffing levels include Statewide Preparedness level, resource availability, proximate fire activity, etc. See Preparedness Level in Fire Management Plan Chapter IV Section E.3

#### **15. Trigger Points**

*Specific triggers should be incorporated into preparedness plans that cause the preparedness level to move up or down. These triggers could be related to number/size of fires, amount and type of resources available/committed, regional/national fire situation, condition of local fuels, observed fire behavior, human-caused risk or predicted lightning activity level, etc. Specific actions should also be tied to each preparedness level, such as repositioning of suppression resources (crews, engines, air tankers, smokejumpers, etc.), the activation of local Multi-Agency Coordination (MAC) groups, making contact with other agencies, and hiring of call when needed (CWN) aircraft, emergency equipment rental agreements (EERA), or administratively determined (AD) pay plan crews.*

##### **A. NPS Specific triggers**

Trigger points for low, moderate, and high preparedness levels can be found in NPS Fire Management Plans Chapter IV Section E. 3

**B.** Monitoring Planning elements for a given incident as identified in incident planning document.

#### **16. Aviation**

*Ordering/scheduling requirements and procedures; special use airspace:*

- *Special use mission requirements.*
- *Incident/accident reporting and documentation procedures.*
- *Flight management/tracking procedures.*

##### **A. NPS Aviation**

**1.** All monitoring flights will be coordinated between land manager and suppression agency through phone call or radio communication to UYT Dispatch.

**2.** For rotor wing operations see: Helicopter Operations plan.

*I:\AVIATION\Aviation\_Plans\EAFM\_Aviation\_Operating\_Plan*

**B.** All fire incident related aviation operations will be coordinated between land manager and suppression agency through phone call or radio communication to UYT dispatch, and all aircraft flying on or near fires will monitor 128.45, the primary air to air “Victor” frequency.

##### **C. Coordination with AFS**

**1.** Sharing Resources

- a. Resource Order
- b. Tactical (initial attack, detection) requests
2. Scheduling and flight planning
  - a. Form 9400-1A or equivalent
  - b. Daily Operational Plan
3. Flight Following Agreement
4. Establishment and cancelation of TFR's

### **17. Expanded Dispatch Plan**

*Indicators for considering establishment of expanded dispatch:*

- *Recommended organization and points of contact.*
- *Overhead positions to order.*
- *Location/facilities, equipment/supplies, support needs.*
- *Procurement or buying unit team considerations.*
- *Service and supply plan*
- *UYT determines it's need for expanding dispatch operations based on complexity analysis, current and anticipated fire activity levels, preparedness levels, expected duration, resource availability and other factors.*
- *Need for extended or 24 hour coverage*
- *Other offsite support*
  - *Staging Areas*
  - *Transportation*
  - *Food, housing, sanitation.*

### **18. Administrative Items**

*Funding; travel; time sheets; fire reports, etc.*

*Accident/Incident*

*Criteria/definitions; agency notification and documentation requirements:*

- *Procedures for mobilization of critical incident stress debriefing teams.*

#### **A. Pre-identify Training Opportunities**

1. NPS [Insert Table (Name, Dispatch Center, Office, Qualifications, Trainee Positions)]
2. AFS [Insert Table *as needed*]

#### **B. Preposition/Preparedness Support**

1. Travel and Perdiem to be covered by receiving unit.
2. Salary – Base salary covered by home unit. Receiving unit covers premium pay items.

#### **C. Fuels Management Support**

1. Travel and Perdiem to be covered by Home unit.
2. Salary – Base salary and premium pay covered by home unit.

#### **D. Fire Incident Support**

1. Travel and Perdiem to be covered by receiving unit.
2. Salary
  - a. Preparedness funded positions – Base salary covered by home unit. Receiving unit covers premium pay items.
  - b. Fuels funded positions – Base salary and premium pay covered by receiving unit.

**E. Post-Season Meeting (AAR) Elements**

1. Communication between Agencies
2. Critique of how the fires were managed.
  - a. Good or Bad
  - b. Issues
  - c. Solutions: What could we do better? Recommendations, and fire information timelines to AFS
3. Dispatching Procedures Review: Good or Bad, Issues, Solutions, Resource ordering procedures.
4. Pre-identify Training Opportunities: Good or Bad, Issues and Solutions
5. Functional Areas: Operations, Aviation, Planning, Logistics and Finance.

**19. Medical Plan**

- *Activation/evacuation information.*
- *Medical facility locations and phone numbers.*
- *Air and ground transport (Medivac) capability.*
- *Burn center information.*

**A. Emergency Medical Procedures:**

**1. Notify UYT(1-907-356-5555 or 1-800-237-3652) or Eagle Dispatch (907-237-3652) immediately if medical emergency occurs. Request medical response from responsible medical first responders. Provide type of injury, location, access and number of patients (DO NOT USE NAMES OVER RADIO).**

**B. In the event of an injury or illness occurring the following plan should be placed in action.**

1. Identify EMT's and available medical equipment on project during briefing / tailgate safety session. Notify supervisor of injury. Complete necessary paperwork.
2. Line personnel are to follow the chain of command until the burn boss/IC has been notified. The nearest EMT's and/or first responders on the fire line are to proceed to the patient.
3. The EMT's are expected to stabilize and prepare the patient for transport if necessary. They are also expected to update **UYT Dispatch (1-907-356-5555 or 1-800-237-3652) or Eagle Dispatch (907-237-3652).**
4. Patient evacuation from the fire should be coordinated with Burn Boss or IC who may terminate or curtail operations to facilitate the removal of the patient to the nearest helispot or road.

*(Reminder: It may take a 10-20 person crew to carry a patient on a litter to a helispot efficiently depending on terrain and distance.)*

**A. Emergency Evacuation Methods:**

1. Requests for ambulances or paramedics/ALS must be routed through **UYT Dispatch (1-907-356-5555 or 1-800-237-3652) or Eagle Dispatch (907-237-3652).**
2. If it is necessary to evacuate personnel to a medical facility from the fire site by foot, carryout or helicopter medivac, the Burn Boss/IC or lead EMT is expected to contact UYT Dispatch.
3. Helicopter operations and life flights are expected to follow pre-established dispatch protocols.

**20. UYT MEDICAL TRANSPORT GUIDE**

**MEDEVAC**

## ***AK Fire and Fuels Monitoring Protocol Quick References***

A medevac is defined as a medical emergency, either a serious injury or illness where immediate medical attention is required. Zone aircraft can be used or a transport aircraft can be requested through the Zone Initial Attack dispatch or AICC. The zone may choose to use a commercial air ambulance and should make arrangements direct with the air ambulance service.

### **MEDICAL TRANSPORT**

Medical transport is a situation in which an injured or ill person requires transportation to medical care. On base medical transports are usually dealt with by the involved division or group utilizing the AFS phone system to call **911** and request transport to Fairbanks Memorial Hospital (non-emergency civilian medical transports may be able to bypass Bassett). For field medical transports, the AFS zone/station dispatch usually receives the request for assistance, coordinates air and/or ground transportation, and contacts local medical facilities. AICC Overhead desk will be contacted if the situation cannot be handled within the zone (i.e. to Fairbanks).

### **GENERAL PUBLIC MEDICAL TRANSPORTS**

General Public medical transports are those not involving people working for the federal government. They are the responsibility of the **Alaska State Troopers (call 451-5100)**. The Alaska Fire Service may provide support only at the request of the Troopers. Inform the Troopers immediately if a request for assistance comes from other than them. If the Troopers request AFS assistance, they will then need to establish a reimbursable account(charge code). Whenever general public medical transport assistance is requested (by the Troopers or anyone else), contact the Zone FMO to inform them of the situation and to get management direction on what our response will be. If you are unable to contact the Zone FMO, contact the AICC Center Manager, Dave Curry, at 356-5670.

### **RELEASING INFORMATION**

Confidentiality is important. Do not pass names, social security numbers, or any unnecessary information over the radio or teletype.

### **PROTECT OTHER PERSONNEL**

Anyone who may come in contact with a sick or injured employee must be notified of the nature of the illness or injury so they can take proper precautions to protect themselves from exposure to blood borne pathogens or any other communicable diseases. If you are unsure why a person is being medically transported, do not make assumptions about their condition - inform the personnel who may come into contact with the sick or injured employee that you have no further information.

If exposure is a potential problem, do not hesitate to use an ambulance and/or other professional services.

### **DOCUMENTATION AND NOTIFICATION**

#### ***Incident Management Team Responsibility:***

Procedures on incident should be listed in the Medical Plan (ICS-206) of the Incident Action Plan. The incident will notify UYT dispatch at 356-5555 of the following information:

Name of individual. (Except by radio)

Resource Order request number.

Nature of injury.

**AK Fire and Fuels Monitoring Protocol Quick References**

Whether individual is to be released after treatment or returned to the incident.  
Flight following information for aircraft or vehicle information for ground transport.  
Tail number of vehicle

ETD/ETE

Destination

Manifest including accompanying personnel

ATD and updated ETE after departure

Whether an ambulance will be necessary to meet fixed wing aircraft. Fixed wing aircraft should be instructed to contact UYT dispatch on the appropriate Initial Attack frequency and directed to meet ambulances at Fairbanks International.

Medevacs to Fairbanks Memorial Hospital can have status details faxed directly to 458-3335. The Medical Unit may want to contact the Emergency Room directly at 458-5555, all other communications will be routed through UYT dispatch.

***UYT Responsibility:***

The UYT dispatcher will document all information on the medivac/medical transport form located in file folders in the drawer next to the console in the Initial Attack sections. The form prompts for most of the information needed.

Medical transport documentation will be inserted into the fire folder for Initial Attack resources or attached to the Resource Order for others.

**Notify:**

1. The respective Zone FMO or duty officer
2. Financial Services
3. For any state employee, notify the State Logistics Center (SLC) at 451-2680 (fax 451-2763).
4. The overhead desk in AICC

The easiest form of notification(ask first), may be to fax the Medivac/medical transport form to those listed above.

**For medical transports that come to Fairbanks for treatment:**

1. If an Air Ambulance Service is used, all arrangements including flight following, hospital contacts, and ambulance transfers are taken care of by the company. Flight follow all other aircraft normally including teletype messages (mention that it is a medical transport or medivac).
2. If coming to Fairbanks Memorial Hospital by helicopter, update the **Emergency Room** with the ETA when the helicopter is 15 minutes out (**458-5555**). Request they activate their EMS frequency radio and contact the helicopter directly for an updated status. The hospital has a pager radio system and the tone activation must be bypassed at the hospital. The helicopter will need to monitor 155.16 for direct contact with the hospital. If the hospital is not able to make contact with the helicopter, relay any updated patient status from the helicopter.

Phone	Fax	Frequency	Coordinates
458-5555	458-5553	155.16	64 49.9 X 147 44.5

## ***AK Fire and Fuels Monitoring Protocol Quick References***

3. If coming to Fairbanks by fixed wing, recommend landing at FAI and determine where the plane will park when they are 15 minutes out. If the pilot has *no preferences* or is *unfamiliar with the airport*, non-commercial air ambulances coming into FAI usually **use Gate 1 on the west ramp (located at the north end near the tower)**. Arrange for an ambulance to meet the aircraft (for FAI notify the **University Fire/Ambulance Service at 474-7721**). For fixed wing not requiring ambulance transfer have aircraft land at Ft. Wainwright (FBK).

### **For ground transport:**

Again, notify Financial Services of vehicular transport with destination and the ETA. Ambulances will contact the Emergency Room directly. For all other vehicles enroute to the hospital UYT will contact the Emergency Room with an ETA and last known patient status. Most vehicles will be without radio contact so ETA's may be rough.

For any medivac/medical transport:

Financial Services or the duty office will contact the zone when the patient is released from medical care. The FMO will decide if the person/s will be sent back to the incident or to their home unit/village. The zone will arrange all transportation (commercial, charter, or zone A/C).

For medical transports to a local in-zone clinic or otherwise not through Fairbanks:

Notify the Zone Admin Officer for insuring all proper paperwork is completed and arrange all transportation.

### **For medical transports requiring treatment in Anchorage:**

Notify AFS Financial services at AFS immediately of any federal employee medical transports.

Notify The State Logistics Center(SLC) in Fairbanks(451-2680) of any State of Alaska employee medical transport. SLC will notify their administration people in Anchorage to take care of arrangements for the patient/s once they arrive in Anchorage.

### ***Financial Services Responsibility(Federal):***

Financial services will take care of non-ambulance transportation, doctor appointments, paperwork, and housing. Financial Services will coordinate with the Duty Office for other arrangements. If the employee is transported to Anchorage, Financial Services will call a BLM Anchorage contact to handle these duties. **Refer to the after hours binder at the AICC Overhead desk AK-320 section for financial services duty officer.**

### **AIR AMBULANCE SERVICE IN FAIRBANKS AND ANCHORAGE**

The zone handling a medevac is responsible for arranging an air ambulance. The Initial Attack section will assist as needed and is the coordination point within AICC for medevacs involving an air ambulance. Information regarding air ambulance services is located in the Overhead and Crew section in the medevac binder.

*Information needed to request a fixed wing air ambulance:*

- \* Requestors name

## **AK Fire and Fuels Monitoring Protocol Quick References**

- \* Requestors phone number
- \* Exact location of accident, illness
- \* Number of patients
- \* Sex, age, and vital signs of patient(s) if available
- \* Specific injuries/level of consciousness if available
- \* Medical personnel on scene
- \* Any other information available

Air ambulances come with the personnel and equipment necessary to deal with the situation that has been described; the minimum level of care provided is advanced life support (ALS), which is staffed by a *minimum* of an EMT III with advanced cardiac life support (ACLS) capabilities. Most of the services also utilize Paramedics, and flight nurses and MD's might be included if the situation warrants. The more information that can be provided to the air ambulance service about the medevac, the better.

### Anchorage:

**Columbia Alaska Regional Air Ambulance (LifeFlight) (1-800-478-9111) or (907) 264-2388**  
Fixed wing only. Available 24 hours a day. C-441 Conquest aircraft, Metro Liner or other aircraft as needed.

**Providence's LifeGuard Air Ambulance (1-800-478-5433) or (907) 261-3070** Fixed wing and helicopter. Available 24 hours a day. King Air, Lear fixed wing aircraft; Bolkow helicopter.

### Fairbanks:

**Guardian Flight (1-888-997-3822) or 474-1746** Fixed wing services only. Available 24 hours a day. Navajo or King Air aircraft.

**Warbelow's AK Air Ambulance (University dispatch 1-800-491-1247)** Fixed wing services only. Available 24 hours a day. Navajo aircraft.

### Tok:

**40-Mile Medevac Service ((907) 883-5191/5742)** Fixed wing only. Available 24 hours a day. Navajo, C-207 or C-206 aircraft. Lief Wilson co-owner (883-5742)

**MAST Helicopter (request via Alaska State Troopers at 451-5100)** Army helicopters which operate out of Ft. Wainwright. Available 24 hours a day. *These aircraft are staffed with EMT's.* Response time (from notification of emergency to lift-off) is 15 minutes. Response is normally limited to a 129 nautical mile radius of respective base. With authorization and fueling stop, they can respond to emergencies farther away. MAST helicopters can carry 4-6 patients (the exact number varies depending on how many are ambulatory or in litters, and which aircraft the Army utilizes for the mission). *Make sure to discuss any special equipment that may be required - Hoist (allows helicopter to hover over an accident site and lower a medic and stokes litter into an area where access may be otherwise difficult), stokes litter, forest/jungle penetrator, & incubator.* **Special equipment needs must be requested or they will not have it!**

## **SMOKEJUMPER EMERGENCY MEDICAL TECHNICIANS**

Smokejumper EMTs can parachute into a site, stabilize victims, and construct a helispot to permit helicopter medical transport.

**AK Fire and Fuels Monitoring Protocol Quick References**

EMT's are interspersed on the jump list. They might be on any jumpship. Each jumpship carries an EMT box.

If requested and available, a load (six to ten EMT's, or as many EMT's as available and ex-EMTs and non-EMT jumpers) with a trauma and mass casualty kit (with aircraft extrication tools) can be dispatched from Ft Wainwright.

A request for Smokejumpers EMT's must be coordinated through the AICC Initial Attack Coordinator.

**PHONE NUMBERS**

**FAIRBANKS**

Alaska State Troopers	dispatch	451-5100
Bassett Army Hospital	business	353-5172
	emergency room	353-5143 or 5144
Fairbanks Fire Department	business	450-6600
Fairbanks International Airport Tower		474-0452
Fairbanks Memorial Hospital	business	452-8181
	emergency room	458-5555
	fax	458-5553
Guardian Flight		1 (888) 997-3822
Ft. Wainwright Emergency	from AFS phone system	<b>911</b>
Ft. Wainwright Ambulance (Fire Dept)		353-7470
Ft. Wainwright Military Police		353-7535
Ft. Wainwright Airfield Operations*	(AKA Base Ops)	353-6514
Poison Control		1-800-222-1222
University Fire/Ambulance Service		474-7721
Warbelow's Alaska Air Ambulance	(University dispatch center)	1 800- 491-1247

**Table 12: Fairbanks Emergency Numbers**

*\*(If Airfield Operations is closed, Fairbanks Flight Service will have Duty Officer number)*

**ANCHORAGE**

Anchorage contacts for federal medevacs*		

**AK Fire and Fuels Monitoring Protocol Quick References**

Anchorage contacts for federal medevacs*		
Alaska Native Medical Center	business	(907) 563-2662
	emergency department	(907) 729-1729
Alaska State Troopers	business number	(907) 269-5511
(after hours will also go to this #)	emergency only	(907) 352-5401
Anchorage Fire Department	(ambulance dispatch in ANC)	(907) 267-4950
Anchorage International Airport Tower		(907) 271-2700
Columbia Alaska Regional Hospital	business	(907) 276-1131
	emergency room	(907) 264-1222
	Air ambulance dispatch	1 (800) 478-9111
FAA Duty Officer		(907) 271-5936
Merrill Airport Tower		(907) 271-3121
Poison Control		1 (800) 222-1222
Providence Hospital	business	(907) 562-2211
	emergency room	(907) 261-3111
	Lifeguard air ambulance	1 (800) 478-5433
	or	(907) 261-3070

**Table 13: Anchorage Emergency Numbers**

*(If no federal coordinator is available Barb Sylte (AFS, Financial Services) can do this job over the phone)*

**AK Fire and Fuels Monitoring Protocol Quick References**

<b>MEDICAL PLAN</b>	1. Incident Name	2. Date Prepared	3. Time Prepared	4. Operational Period			
	<b>5. Incident Medical Aid Station</b>						
Medical Aid Stations	Location	Paramedics					
		Yes	No				
Eagle	Eagle EMS 547-2300	X					
Eagle Village Clinic	Eagle Village 547-2243	X					
Circle Health Aid	Circle City 773-7425	X					
Eagle HQ	Eagle, possible EMS assistance 547-2233				X		
<b>6. Transportation</b>							
<b>A. Ambulance Services</b>							
Name	Address	Phone	Paramedics				
			Yes	No			
Eagle EMS	Eagle	547-2300	X				
State Troopers	Tok	883-5111	X				
State Troopers	Fairbanks	451-5100					
Guardian Air Ambulance Fairbanks	Fairbanks International, Fixed Wing Only	474-1746 800-997-3822					
Warbelows Air Ambulance	Fairbanks International, Fixed Wing Only	800-491-1247					
<b>B. Incident Ambulances</b>							
Name	Location	Paramedics					
		Yes	No				
<b>7. Hospitals</b>							
Name	Address	Travel Time		Phone	Helipad		Burn Center
		Air	Grnd		Yes	No	Yes
Denali Center Memorial Hospital	1650 Cowles St. FBKS	1.5 hr Each way		452-8181	X		X
Eagle Village Clinic	Eagle	1 hr Each Way		547-2243	X		
<b>8. Medical Emergency Procedures</b>							
<p>During field operations at least one individual qualified in first aid/cpr will be onsite with a ten person first aid kit. In the event of a medical emergency, aid will be rendered to the victim. If reasonable the victim will be transported by snow machine to the nearest airstrip, and then by fixed wing ambulance. If necessary there is a helispot appropriate for a light ship at Ben Creek Airstrip and 4<sup>th</sup> of July Creek Cabin.</p> <p>The nearest EMS will be contacted for immediate first aid and SAR procedures will follow standard protocol including calling Eagle Office and the Tok State Troopers. State Troopers will coordinate medivac.</p>							
9. Prepared by (Burn Plan Writer)				10.			
<b>James Savage</b>							

**Table 25: YUCH Project Medical Plan**

**THE MEDEVAC/MEDICAL TRANSPORT FORM**

STARTED AT: DATE/TIME	TO/FROM
REPORTERS NAME & PHONE #:	
PATIENT'S NAME	CREW NAME
ORDER/REQUEST #	CHARGE CODE
HOW MANY PEOPLE ARE INJURED?	

IS THIS A **MEDEVAC** OR **MEDICAL TRANSPORT** ? (Circle one)

**NATURE OF INJURY** (BLEEDING, BREATHING PROBLEMS, CONSCIOUS OR UNCONSCIOUS ETC....) \_\_\_\_\_

LOCATION OF INJURED? \_\_\_\_\_

**IS AN AMBULANCE REQUIRED?** YES NO (Circle one)

*\*\*NOTE: PREFER MEDEVAC/MEDICAL TRANSPORT BE SENT TO FAI IF AN AMBULANCE IS REQUIRED TO FMH\*\**

**ADDITIONAL INFORMATION:** \_\_\_\_\_

**TRANSPORTATION:**

AIRCRAFT TYPE:	TAIL #

**FLIGHT PLAN:**

DEPART	ETD
(Airport)	(Time)
ARRIVE	ETA
(Airport)	(Time)

NOTIFICATION CHECKLIST	DATE/TIME	TO/FROM
ZONE FMO		
FINANCIAL SERVICES (or STATE LOGISTICS if state employee 451-2680)		
OVERHEAD DESK(courtesy call)		
ZONE ADMIN(if person is treated at local village clinic)		

DOCUMENT ALL ACTION CONCERNING MEDEVAC/MEDICAL TRANSPORT, INCLUDING WHEN AND HOW THE PERSON WAS RETURNED TO HOME OR BACK TO DUTY.

DATE	TIME	TO/FROM	ACTION TAKEN



<b>Fire Notification Form</b>			
<b>Fire Number:</b>		<b>UYD Zone Representative:</b>	
<b>Fire Code:</b>		<b>Management Option:</b>	
<b>Fire Name:</b>		<b>Nearby Protection Boundaries:</b>	
<b>Date/Time Fire Reported:</b>		<b>Nearby Ownership Boundaries:</b>	
<b>Land Manager:</b>		<b>Coordinates:</b>	
<b>Land Manager Contacted</b>		<b>Legal:</b>	
<b>Who:</b>		<b>Map Quad:</b>	
<b>When:</b>			
<b>Most Recent Fire Size Up:</b>			
<b>Acreage:</b>		<b>Fuels:</b>	
<b>Wind:</b>		<b>Probability of Growth:</b>	
<b>Topography:</b>		<b>Natural Barriers:</b>	
<b>Fire Behavior:</b>			
<b>Allotments:</b>		<b>Structures:</b>	
<b>Risk to Public Safety</b>	<b>Yes</b>	<b>No</b>	
<b>Risk to Firefighters</b>	<b>Yes</b>	<b>No</b>	
<b>IA Forces Available</b>	<b>Yes</b>	<b>No</b>	
<b>Fire Catchable</b>	<b>Yes</b>	<b>No</b>	
<b>Action Plan:</b>			
<b>Other Pertinent Data:</b>			

Table 26: Notification Form

**APPENDIX I: PRESCRIBED FIRE PLAN**

**PRESCRIBED FIRE PLAN**

ADMINISTRATIVE UNIT(S): Yukon-Charley Rivers National Preserve  
\_\_\_\_\_

PRESCRIBED FIRE NAME: Preserve-Wide Pile Burns  
\_\_\_\_\_

PREPARED BY: J. Savage RXB2 DATE: 8/21/08  
Name & Qualification \_\_\_\_\_

TECHNICAL REVIEW BY: Larry Weddle DATE: 8/21/2008  
Name & Qualification

COMPLEXITY RATING: LOW

APPROVED BY: \_\_\_\_\_ DATE: \_\_\_\_\_  
Agency Administrator

**ELEMENT 1: AGENCY ADMINISTRATOR PRE-IGNITION APPROVAL CHECKLIST**

Instructions: The Agency Administrator’s Pre-Ignition Approval is the intermediate planning review process (i.e. between the Prescribed Fire Complexity Rating System Guide and Go/No-Go Checklist) that should be completed before a prescribed fire can be implemented. The Agency Administrator’s Pre-Ignition Approval evaluates whether compliance requirements, Prescribed Fire Plan elements, and internal and external notifications have been or will be completed and expresses the Agency Administrator’s intent to implement the Prescribed Fire Plan. If ignition of the prescribed fire is not initiated prior to expiration date determined by the Agency Administrator, a new approval will be required.

YES	NO	KEY ELEMENT QUESTIONS
		Is the Prescribed Fire Plan up to date? <i>Hints: amendments, seasonality.</i>
		Will all compliance requirements be completed? <i>Hints: cultural, threatened and endangered species, smoke management, NEPA.</i>
		Is risk management in place and the residual risk acceptable? <i>Hints: Prescribed Fire Complexity Rating Guide completed with rational and mitigation measures identified and documented?</i>
		Will all elements of the Prescribed Fire Plan be met? <i>Hints: Preparation work, mitigation, weather, organization, prescription, contingency resources</i>
		Will all internal and external notifications and media releases be completed? <i>Hints: Preparedness level restrictions</i>
		Will key agency staff be fully briefed and understand prescribed fire implementation?
		Are there any other extenuating circumstances that would preclude the successful implementation of the plan?
		Have you determined if and when you are to be notified that contingency actions are being taken? Will this be communicated to the Burn Boss?
		Other:

Recommended by: \_\_\_\_\_ Date: \_\_\_\_\_  
FMO/Prescribed Fire Burn Boss

Approved by: \_\_\_\_\_ Date: \_\_\_\_\_  
Agency Administrator

Approval expires (date): \_\_\_\_\_

**ELEMENT 2: PRESCRIBED FIRE GO/NO-GO CHECKLIST**

<p><b>A.</b> Has the burn unit experienced unusual drought conditions or contain above normal fuel loadings which were not considered in the prescription development? If <u>NO</u> proceed with checklist., if <u>YES</u> go to item B.</p>	<b>YES</b>	<b>NO</b>
<p><b>B.</b> If <u>YES</u> have appropriate changes been made to the Ignition and Holding plan and the Mop Up and Patrol Plans? If <u>YES</u> proceed with checklist below, if <u>NO</u> STOP.</p>		

YES	NO	QUESTIONS
		Are ALL fire prescription elements met?
		Are ALL smoke management specifications met?
		Has ALL required current and projected fire weather forecast been obtained and are they favorable?
		Are ALL planned operations personnel and equipment on-site, available, and operational?
		Has the availability of ALL contingency resources been checked, and are they available?
		Have ALL personnel been briefed on the project objectives, their assignment, safety hazards, escape routes, and safety zones?
		Have all the pre-burn considerations identified in the Prescribed Fire Plan been completed or addressed?
		Have ALL the required notifications been made?
		Are ALL permits and clearances obtained?
		In your opinion, can the burn be carried out according to the Prescribed Fire Plan and will it meet the planned objective?

**If all the questions were answered "YES" proceed with a test fire. Document the current conditions, location, and results**

\_\_\_\_\_  
Burn Boss

\_\_\_\_\_  
Date

**ELEMENT 3 COMPLEXITY ANALYSIS SUMMARY**

<b>PRESCRIBED FIRE NAME</b>			
<b>ELEMENT</b>	<b>RISK</b>	<b>POTENTIAL CONSEQUENCE</b>	<b>TECHNICAL DIFFICULTY</b>
1. Potential for escape	Low	Moderate	Low
2. The number and dependence of activities	Low	Low	Low
3. Off-site Values	Low	Low	Moderate
4. On-Site Values	Low	Low	Low
5. Fire Behavior	Low	Low	Low
6. Management organization	Low	Low	Low
7. Public and political interest	Low	Low	Low
8. Fire Treatment objectives	Low	Low	Low
9. Constraints	Moderate	Low	Moderate
10. Safety	Low	Low	Low
11. Ignition procedures/ methods	Low	Low	Low
12. Interagency coordination	Low	Low	Low
13. Project logistics	Moderate	Low	Moderate
14. Smoke management	Low	Low	Low

<b>COMPLEXITY RATING SUMMARY</b>	
	<b>OVERALL RATING</b>
<b>RISK</b>	Low
<b>CONSEQUENCES</b>	Low
<b>TECHNICAL DIFFICULTY</b>	Low
<b>SUMMARY COMPLEXITY DETERMINATION</b>	Low
<b>RATIONALE:</b> Despite the remoteness of the project sites, this is a simple project with no special safety, operational, or fire behavior concerns.	

**ELEMENT 4: DESCRIPTION OF PRESCRIBED FIRE AREA**

**A. Physical Description**

**Location:** Within the Preserve, there are twenty-one remote sites in full protection status that are covered under this burn plan (Table 1). *Please note that one site [Ben Creek Airstrip Cabin (BECR-002)] falls under “non-sensitive” fire protection status but was approved for hazard fuel reduction per the former Superintendent (Dave Mills) and piles at this location will be burned. In addition, there are twelve sites in full protection status that are not covered in this burn plan because the sites are either on native allotment or on private land. Please see the cabin database for these sites.*

<b>SITES IN FULL PROTECTION STATUS: YUKON-CHARLEY RIVERS NATIONAL PRESERVE</b>				
<b>Cabin Number</b>	<b>Cabin Name</b>	<b>Protection Status</b>	<b>Latitude</b>	<b>Longitude</b>
BECR-STR-004	Ben Creek Complex	FULL	65.29	-143.03
BECR-STR-RAWS	Ben Creek Remote Automated Weather Station	FULL	65.30	-143.07
CHRI-STR-021	Gelvin's Cabin - Non Historic (1963)	FULL	64.82	-143.44
COALCP83	Coal Creek Dredge	FULL	65.33	-143.11
COCR-STR-003	Frank Hall/Boulder Creek Mine Cabin - UPM	FULL	65.29	-143.17
COCR-STR-022	Coal Creek Camp	FULL	65.31	-143.15
COCR-STR-023	Cheese Camp	FULL	65.28	-143.21
COCR-STR-028	Coal Creek Airstrip and Buildings	FULL	65.31	-143.14
FOJU-STR-002	Fourth of July Creek Cabin	FULL	65.13	-141.99
FOJU-STR-005	4th of July Creek Mine Cabin	FULL	65.13	-142.00
KARI-STR-004	Charlie Edward's Cabin/Woodruff's Cabin - Non Historic	FULL	65.46	-142.19
KARI-STR-009	Ricketts/Trainor Cabin - Non Historic P/U	FULL	65.38	-142.52
MICR-STR-001	Sager Line Cabin - Non Historic (1980)	FULL	65.10	-141.79
SACR-STR-001	Sam Creek Cabin and Cache	FULL	65.31	-142.87
WOCR-STR-001	Woodchopper Mining Camp (Complex)	FULL	65.29	-143.41
YURI-STR-011	Sager Cabins - Trout Creek P/U	FULL	65.12	-141.66
YURI-STR-013	Nation Bluff Cabin - P/U	FULL	65.20	-141.74
YURI-STR-023	Glenn Creek Cabin - P/U	FULL	65.30	-142.09
YURI-STR-040	Frank Slaven Roadhouse	FULL	65.35	-143.12
YURI-STR-045	Ray Bell (40-mile) Cabin - Non Historic 1971 (permit)	FULL	65.43	-143.55
YURI-STR-063	Slaven's Public Use Cabin - Non Historic P/U	FULL	65.35	-143.12

**Table 14: Full Protection Sites**

**Size:** Each project site: 1.0 acres (10 Piles, resulting from approx. 1.0 acre of tree removal)

**Topography:** Elevation Range: 700 to 4000 ft. Slope(s): 0 % Aspect(s): Flat

**Project Boundary:**

These pile burns will occur at several locations within the Preserve and are adjacent to structures that have been treated by mechanical fuel reduction. Piles are arranged equidistant from one another in the second zone of thinning (~ 30 feet from structure) and at least ten feet away from any historic artifacts. The project/burn unit boundary consists of the area within a 100’ radius of the structures.

**Fall 2008 Site Specifics:**

The Fall 2008 pile burning will occur at Ben Creek Airstrip Cabin, Ben Creek Airstrip RAWS, Ben Creek Mine, 4<sup>th</sup> of July Creek Cabin, and various sites within the Coal Creek Drainage. These sites can all be seen on the maps in Appendix 2.

### **Ben Creek Airstrip Cabin**

This site is on a ridge top with thick alder to the east and south, upland black spruce to the west and north. Since it is on a ridge top, there is little potential for fire growth given normal seasonal conditions. Also the old airstrip is still bare to gravel in some place, and provides a convenient fire break. There are 14 piles at this location, most of them in the upland black spruce to the west of the structure.

### **Ben Creek Airstrip RAWS**

This site is located near the top of the ridge that Ben Creek Airstrip sits on. It is surrounded by upland black spruce. Adjacent to the site to the east is the airstrip which is currently overgrown with alder. Ground fuels are continuous at this site, with a layer of moss and duff almost 30 cm thick in some places. Piles here will be well bone piled and chunked to ensure adequate consumption due to the ground fuels. There are about a dozen piles at this site.

### **Ben Creek Mine Cabin**

This site is located in the drainage of Ben Creek approximately fifty feet from Ben Creek. There are two structures at this site. To the south, across the creek, there is upland black spruce. To the north is a slope of mixed birch, aspen, and white spruce. East and west is the creek drainage which is mostly willow and hardwoods. Also to the north is small pond. Immediately adjacent to the structures is blue joint grass, which was scalped with a weed whacker the previous summer. Also to the west, upstream, are mine tailings and other bare areas due to past mine operations. The only concern at this site is the possibility of a spot fire to the south slope with black spruce. To mitigate this all the piles were built on the south side of Ben Creek. There are eight piles at this location.

### **4<sup>th</sup> of July Creek Cabin**

This site is located on a tailing pile adjacent to 4<sup>th</sup> of July Creek. There are three structures at this site. Immediately adjacent are mixed hardwoods with white spruce. Beyond the immediately adjacent fuels is a wetland swamp in all directions beyond the tailings pond. Beyond the swamp, upland black spruce grows on all aspects. There are approximately 15 small piles at this site. There is a great deal of bare gravel adjacent to the piles as well. The mine tailings are also beginning to be colonized by willow, there is juvenile willow in and adjacent to the treatment area as well. To the south of the structure is the abandoned airstrip which has some bare gravel, but is also colonized by willow and alder.

## **B. Vegetation/Fuels Description:**

On-site fuels data: The burn piles consist mainly of spruce, aspen, birch, willow, and alder.

2. Adjacent ground fuels consist of spruce (moss understory), mixed conifer, birch, and aspen (grass, moss, and forbs understory), or willow and alder (grass and forb understory).

**C. Description of Unique Features:**

**ELEMENT 5: GOALS AND OBJECTIVES**

<p><b>GOALS:</b></p> <p><u>Remove and Reduce hazard fuels.</u></p> <p>Remove the burnable debris resulting from the mechanical fuels reduction around cabins within the Preserve.                  Reduce debris accumulations to provide more defensible space in the event of wildfire by removing brush piles.                  Provide training opportunities for agency fire staff if possible.</p> <p><b>SPECIFIC OBJECTIVES:</b></p> <p>Reduce piled debris fuels by 95+% in the treatment area.                  Prevent impacts to cultural resources.</p>
---

**ELEMENT 6: FUNDING:**

Item:	Project Phase:	Planning	Preparation	Execution	Evaluation
Personnel		\$200.00	\$20.00	\$13,500	\$40.00
Equipment (pro-rated)			\$25.00	\$25.00	\$25.00
Supplies				\$500.00	
Per Diem for 10 Days				\$625.00	
Aircraft				\$26,175.00	
Phase Costs		\$200.00	\$45.00	\$40,825.00	\$65.00

Aircraft cost is due to roundtrip charter flights (Fairbanks to Coal Creek; Coal Creek to Fairbanks) for 4 people. 2 flights each way and 3 hours each flight  
 Total 12 hrs flight time X \$350.00/hr rate for 207.  
 Supplies: 10 gallons drip-torch fuel/day X \$5.00/gal X 10 days= \$500.00

TOTAL ESTIMATED ADDITIONAL PROJECT COST: **\$6,992.95** Overhead Cost

TOTAL ESTIMATED BASE FUNDING PROJECT COST: **\$48,127.95**

COMBINED TOTAL PROJECT COST (including base funding): **\$48,127.95**

ESTIMATED TOTAL COST PER ACRE: (\$48,127.95/4.0-acres) **\$12,031.99**

**B. Funding source:** Base Funding

**ELEMENT 7: PRESCRIPTION**

The following prescriptions will to be used according to the Burn Boss Matrix below:

	RXB3	RXB3	RXB2	RXB2
<b>Prescription No.</b>	<b>4</b>	<b>3</b>	<b>2</b>	<b>1</b>
PIG (FBP, C-2 fuel model derived)	<5	<15	<30	<40
Holding Personnel	1 holder	2 holders	3 holders	4 holders
Hose Lay Established	Yes	Yes	Yes	Yes

**Environmental Prescription:**

**Prescription 1**

Weather	Range 1	Range 2	Range 3
Temperature (degrees F)	-50 to 70	-50 to 60	-50 to 50
Relative Humidity (%)	> 50	> 45	> 40
Wind Direction (Cardinal direction)	Any	Any	Any
20 ft Wind Speed (mph)	< 6	< 6	< 6
Fine Fuel Moisture Code	< 85	< 85	< 85
Duff Moisture Code	< 45	< 45	< 45

**Prescription 2**

Weather	Range 1	Range 2	Range 3
Temperature (degrees F)	-50 to 71	-50 to 60	-50 to 50
Relative Humidity (%)	> 62	> 55	> 45
Wind Direction (Cardinal direction)	Any	Any	Any
20 ft Wind Speed (mph)	< 4	< 4	< 4
Fine Fuel Moisture Code	< 85	< 85	< 85
Duff Moisture Code	< 45	< 45	< 45

**Prescription 3**

Weather	Range 1	Range 2	Range 3
Temperature (degrees F)	-50 to 70	-50 to 60	-50 to 50

Relative Humidity (%)	> 60	> 53	> 45
Wind Direction (Cardinal direction)	Any	Any	Any
20 ft Wind Speed (mph)	< 4	< 4	< 4
Fine Fuel Moisture Code	< 80	< 80	< 80
Duff Moisture Code	> 30	> 30	> 30

### Prescription 4

Weather	Range 1	Range 2	Range 3
Temperature (degrees F)	-50 to 60	-50 to 50	-50 to 40
Relative Humidity (%)	> 64	> 57	> 46
Wind Direction (Cardinal direction)	Any	Any	Any
20 ft Wind Speed (mph)	< 4	< 4	< 4
Fine Fuel Moisture Code	< 75	< 75	< 75
Duff Moisture Code	> 30	> 30	> 30

If one or more of the following parameters occur then the minimum organization required will be at the Prescription 4 level (ie. RXB3 and one FFT2), other environmental parameters will not apply.

If the pile site receives rain on the day of the burn and 0.1 inches of rain the previous day

If the pile site receives 0.25 inches of rain in the previous 24 hours.

If the pile site receives 0.5 inches of rain in the previous 48 hours.

If at the pile site snow covers the ground.

### Fire Behavior Prescription:

Characteristics	Range
Rate of Spread (chains/hour)	N/A – Pile burning ONLY
Flame Length (feet)	N/A – Pile burning ONLY
Scorch Height (feet)	N/A – Pile burning ONLY
Fireline Intensity (btu/ft/sec*)	N/A – Pile burning ONLY
Spread Component (feet/minute)	N/A – Pile burning ONLY
Probability of Ignition (%)	N/A – Pile burning ONLY

\*NOTE: See Appendix for BEHAVE calculated fire parameters off site.

## **ELEMENT 8: SCHEDULING**

### **Ignition Time Frames/Season(s):**

Proposed Ignition Dates.....August 2008 – August 2018

No ignition or burning will occur during the moose or sheep hunting seasons, nor will it occur during times that would affect caribou hunter access.

Piles may be burned any time of year, out side of the below constraints, so long as all prescription parameters (current weather, weather forecasts, air quality approval, and available resources, etc.) are met.

### **Projected Duration:**

Projected Burn Duration.....5 days

Burn duration may range from two days to several weeks depending on conditions meeting the prescription. The Burn Boss in conjunction with the FMO will determine burn duration based on weather, smoke dispersion and other factors. Typically a set of piles is ignited, monitored, consolidated and then secured requiring an initial 8 to 10 hour shift for the crew. The next day that set of piles is checked and mopped up. Then (depending on conditions) that set of piles will be checked again at least 4 hours later and may be declared out by the Burn Boss. Based on conditions and Burn Bosses discretion additional checks and time may pass before the piles are declared out and burn duration ends. Often, if favorable conditions persist, additional sets of piles will be burned each day and be subjected to the same procedure. When this occurs the crew may be igniting, monitoring, consolidating, and securing one set of piles the same day they are mopping up a second set of piles and checking a third set of piles. Due to the potential for multiple days of ignition and the Burn Bosses discretion to allow for more time to pass before calling the piles out the burn duration may be several weeks long.

### **Constraints:**

Dates when burn will not be conducted:

1. National or Regional Fire Preparedness Levels preclude new prescribed fires.
2. 2. Times of high visitor use, such as during the Yukon Quest, moose and sheep hunting seasons (approximately the first three weeks of September), or in times/places that would affect caribou hunting.

## ELEMENT 9: PRE-BURN CONSIDERATIONS

### Considerations:

#### On Site:

##### 1. SUMMER BEFORE PILE BURNING:

- a. Take pre-burn photos of unit and record photo point locations.

##### 2. ONE DAY BEFORE BURN:

- a. Mobilize personnel and gear to Coal Creek Airstrip or Eagle.

##### 3. DAY OF BURN:

1. Deploy necessary water handling equipment.
2. Pre-treat fuels around pile.
3. Take on-site weather.

#### Off Site:

##### a. ONE WEEK BEFORE BURN:

1. Determine equipment, supply and food needs.
2. Ensure adequate equipment and supplies are available for the complete project.

##### b. TWO DAYS BEFORE BURN:

1. Complete necessary pre-work as listed on the Prescribed Fire Checklist.
2. Notify Management Team of project.

##### c. ONE DAY BEFORE BURN:

1. Obtain spot weather forecast.
2. Ready equipment, supply and food needs for helicopter transport.
3. Make notifications

##### d. DAY OF BURN:

1. Obtain Spot Weather Forecast
2. Notify the Eagle of intent to burn/not burn.
3. Hold briefing and safety meeting with all pertinent staff.

**Method and Frequency for Obtaining Weather and Smoke Management Forecast(s):** Daily sat phone call into Eagle or FAC, office staff will read general weather service forecast.

### Notifications:

**1.** One week before the burn public notices will be sent and posted in the communities of Circle, Tok, and Eagle.

**2.** Fire Management staff will notify the following at least two days prior to the proposed ignition date:

Park Superintendent or their acting

Chief of Resources

Acting Supervisor in Eagle

**3. Fire Management Staff will notify the following at least one day prior to the proposed ignition date:**

Alaska Fire Service UYT Dispatch

NPS Regional Fire Management Officer

<b>AGENCY:</b>	<b>TELEPHONE NUMBER:</b>	<b>Contacted by:</b>	<b>Contact Date and time</b>	<b>Comments</b>
UYT Dispatch (AFS)	907-356-5554			
Eagle Park Service Office	907-547-2233			
<b>INDIVIDUALS:</b>				
Park Superintendent, Greg Dudgeon	907-455-0615			
Chief of Resources, Tom Liebscher	907-455-0620			
NPS Regional Fire Management Officer, Dan Warthin	907-644-3409			
Other concerned individuals or parties (e.g. subsistence cabin users, in holders, etc.)				

**ELEMENT 10: BRIEFING**

**Briefing Checklist:**

Burn Organization

Burn Objectives

Description of Burn Area

Expected Weather & Fire Behavior

Communications

Ignition plan

Holding Plan

Contingency Plan

Wildfire Conversion

Safety

**ELEMENT 11: ORGANIZATION AND EQUIPMENT**

**Positions:**

Few hazards exist for the implementation of this project(s). The overall rating of the project is “low” complexity. Under environmental prescriptions 3 and 4 there is a negligible chance of escape from the project area due to the low probability of ignition and contingency water handling system in place therefore the project(s) requires a RXB3 burn boss at minimum. Under environmental prescriptions 1 and 2 there is a still a

**AK Fire and Fuels Monitoring Protocol Quick References**

negligible, though increased, chance of escape, due to the low to moderate probability of ignition and contingency water handling system in place and therefore the project(s) requires a RXB2 burn boss at minimum. See attached Prescribed Fire Complexity Rating Worksheet (Appendix C).

The following resources are required to be used according to the Burn Boss Matrix below:

<b>Prescription No.</b>	<b>4</b>	<b>3</b>	<b>2</b>	<b>1</b>
Burn Boss Type	RXB3	RXB3	RXB2	RXB2
PIG	<5	<15	<30	<40
Holding Personnel	1 FFT2	2 FFT2	3 FFT2	1 FFT1 3 FFT2
Ignitions	See Holding	See Holding	See Holding	See Holding
Monitoring	See Holding	See Holding	See Holding	See Holding
Hose Lay Established	Yes	Yes	Yes	Yes

**Equipment:** Drip torches, hand tools, chain saw, Mark III pump kit, sufficient hose and hardware.

**Aviation Equipment:** (2) 3000 lb cargo nets, lead line, swivels.

**Supplies:** Drip torch mix, chain saw mix, Mark III pump mix.

**ELEMENT 12: COMMUNICATION**

**Radio Frequencies**

Channel	Rx	Tx	Tone	Repeater
1	166.300	166.300		Local Eagle
2	166.300	168.225	100.0	Hillard Repeater
3	166.750	166.750		Local Twin
4	166.750	168.575	103.5	Twin Repeater
5	166.825	166.825		Local Yukon
6	166.825	168.500	107.2	Yukon Repeater
7	164.750	164.750		Local Kathul
8	164.750	166.900	110.9	Kathul Repeater
9	168.350	168.350		Local Maintenance
10	164.525	164.525		AFS Silver
11	163.025	163.025		AFS Gold
12	163.050	163.050		AFS Brown
13	163.8375	163.8375		AFS White
14	162.550	0.000		Weather

**Table 15: Radio Frequencies**

Command Frequency(s): Channel 8 Rx 164.750 Tx 166.900 Kathul Repeater  
 Tactical Frequency(s): 164.750 Channel 7 Local Kathul  
 Air Operations Frequency(s): 164.750 Channel 7 Local Kathul

**Telephone Numbers:**

Field Satellite Phone numbers: 8816-4142-6466  
 Helicopter Sat Phone Number: 8816-4142-6454

**ELEMENT 13: PUBLIC AND PERSONNEL SAFETY, MEDICAL**

**Safety Hazards:**

**Motor Vehicle accident**  
**Slippery road surfaces**  
**Soft Shoulders**  
**Weather**  
**Smoke**  
**Darkness**  
**Other road users**  
**Injuries**  
**Falls**  
**Burns**  
**Fatal Injury**  
**Rolling material (off of pile)**

**Spills**

**Fuel saturated clothing and boots**  
**Improper labeling**  
**Explosive Smoke**  
**Back Injuries**  
**Eye Injuries**  
**CO Poisoning**  
**Puncture Wounds**  
**Hypothermia**  
**Injury or Threat of violence**  
**Illness/Injuries**  
**Heavy Machinery**  
**Working in and around Helicopter**

**Measures Taken to Reduce the Hazards:**

Perform inspections on equipment. All NPS employees who operate Government vehicles shall hold a valid state driver's license with proper endorsements for the size and class being driven. Use seat belts. Identify road

### ***AK Fire and Fuels Monitoring Protocol Quick References***

conditions during briefings. Assigned burn personnel and/or ranger staff will be placed along Main Park Road to conduct traffic control if smoke emissions are impacting driving visibility. Post road guards if needed. Mark hazards. Use headlights. Scout roads and identify turnouts before ignition of project. Provide road system map for project. Use backers and chock vehicle's tire. Have vehicles facing out. Use warning lights and provide traffic control on roadways during smoky and nights operations. Know and observe all state and local traffic regulations.

Employees recruited for burn assignments shall meet age, health and physical requirements established for regular firefighting duties. They also meet Prescribed Burn qualifications.

Provide Briefings and Tailgate Safety Sessions. Document briefings and sessions. Clarify firing order, organization responsibilities, communications, hazards, weather and expected fire behavior.

Wear personal protective equipment. Wear approved hard hat, safety glasses, flame resistant fabric pants and shirts NPFA 1977 compliant. keep sleeves rolled down. Avoid undergarments and socks made of 100 percent, or a high percentage of, polyester, nylon or acrylic. Wear leather, lace type, boots with skid resistant soles, and tops at least 8" high. Drink a sufficient amount of fluids to keep hydrated. Drink warm fluids if weather is cold. Wear OSHA approved firefighting gloves. Wear hearing protection when working around equipment where noise level exceeds 85 dba. Wear additional protective equipment as dictated by local conditions and exposure to special equipment. If extremely cold temperatures exist wear extra clothing underneath flame resistant fabric.

Adhere to LCES, Follow Standard Fire Orders and Watch Out Situations. Always have an escape route and safety zone.

Lighters shall be trained in the use of Drip Torches. Do not fill drip torches near ignition sources. Do not spill burn mix on clothing. Be alert to foreign objects dumped in burn pile. Transport fuel in approved, labeled containers secured in vehicle beds. Park and secure vehicles hauling flammables / combustibles in a separate, predetermined, safe area. No smoking within 25 feet of mixing and filling area. Do not fill or mix in pick ups bed with bed liners. Avoid use of cellular phones in and around fill or mixing area. Avoid fuel contact with bare hands, clothing and boots. Provide pour spouts. Follow fuel mixture ratio in the Health and Safety Code Handbook. Wear PPE listed above. Protective clothing and equipment shall be the same as required for firefighting.

Receive briefing from RXB2, FIRB, and holding boss. Maintain communications with other lighters. Hand Held radios shall be provided to all lighters.

Identify and mark hazards in work area.

Maintaining a high level of aerobic fitness is one of the best ways to protect oneself against heat stress. Drink appropriate amount of fluids before, during and after work. Periodically rotate personnel from work site with high levels of smoke to areas of less smoke or smoke free areas. Set a reasonable work pace and allow adequate rest breaks while on the project. Monitor personnel for symptoms and behavior associated with CO exposure and take appropriate action when necessary.

Ensure that tools remain in safe condition through periodic inspection and repair. Monitor employee performance periodically to ensure proper utilization methods are used. Handles must be free of splinters, splits and cracks.

Violence occurs at different levels of intensity, and usually increases over time. In order to prevent violence from escalating, employees and supervisors need to pay attention to the work environment, recognize the signs of possible violence early, and take all necessary actions to reduce the risk to life and property. Violent people may come from inside or outside your organization. Call Communication Center for law enforcement if needed.

**Maintain radio communications with Eagle.**

**Emergency Medical Procedures: see medical plan**

**Emergency Evacuation Methods:**

Request for air ambulance will be routed through Eagle. Depending on the nature of injury or incident, the Park Service helicopter may be used for immediate transport. Should the nature of the injury preclude using the NPS helicopter, another medivac ship will be ordered by Eagle from the State Troopers at 1800-811-0911 or 907-451-5100

**Emergency facilities: see medical plan**

Fairbanks Memorial Hospital            907-452-8181

Eagle Village Clinic                        907-547-2243

## **ELEMENT 14: TEST FIRE**

### **Planned location:**

One pile will be ignited to conduct a test fire. The decision to ignite the pile will be based on weather conditions on site at the time of the scheduled burn and the spot weather forecast. The ignition will be discontinued if the observed fire behavior indicates spread or spotting outside the immediate vicinity of the pile.

### **Test Fire Documentation:**

Weather conditions On-Site:

Test Fire Results: Proceed if test fire does not spread or spot beyond the immediate vicinity of the pile.

## **ELEMENT 15: IGNITION PLAN**

**Firing Methods:** Hand Firing

**Devices:** Drip Torch, fusees

**Techniques:** Dot pattern

### **Sequences:**

Piles furthest from the cabin or structure will be ignited first then ignition will progress towards the structure.

**Patterns:** n/a

### **Ignition Staffing:**

See Element 11: Organization and Equipment Section A - Positions

**ELEMENT 16: HOLDING PLAN**

**General Procedures for Holding:**

Establish hose lay with access to all piles, pre-treat the fuels surrounding the pile with water prior to ignition if it has not received rain in the last 24 hour period. Monitor spread of fire outside the immediate vicinity of each pile, grid the surrounding vegetation for spots.

**Critical Holding Points and Actions:**

Monitor the piles closest to the structure or cabin. If flames from the piles are near the structure the pile will be put out and moved to a location further away from the structure or consolidated with another pile further away from the structure. Before ignitions ensure piles are greater than 2.5 the expected flame height from a structure.

**Minimum Organization or Capabilities Needed:**

Prescription No.	4	3	2	1
Burn Boss Type	RXB3	RXB3	RXB2	RXB2
PIG (FBP, C-2 fuel model derived)	<5	<15	<30	<40
Holding Personnel	1 FFT2	2 FFT2	3 FFT2	1 FFT1 3 FFT2
Ignitions	See Holding	See Holding	See Holding	See Holding
Monitoring	See Holding	See Holding	See Holding	See Holding
Hose Lay Established	Yes	Yes	Yes	Yes

Note: Once ignition is complete all of the qualified holding personnel will transition to holding and one qualified person with transition to the fire effects monitor.

## **ELEMENT 17: CONTINGENCY PLAN**

### **A. Trigger Points:**

Spots or spread outside the piles.  
Fire outside designated burn unit.  
Smoke emissions create a safety hazard or air quality advisory.  
Fuel consumption objective is not being met.

### **B. Actions Needed:**

#### Spots outside the piles

If the fire spots or spreads into the wildland interface and exceeds the capabilities of on-site personnel, burning operations will cease at the discretion of the Burn Boss. Holding forces are to proceed promptly to the spot fire or “slop-over” and initiate the appropriate strategy as determined by the Burn Boss. The spot fire will be immediately reported to the Burn Boss. Priority will be personnel safety. Otherwise, the spot or slop-over will be suppressed by the most appropriate suppression response and monitored

#### Fire Outside Designated Burn Unit

If the fire leaves the burn unit(s) and spots or spreads into the wildland interface and exceeds the capabilities of on-site personnel, burning operations will cease at the discretion of the Burn Boss. Holding forces are to proceed promptly to the spot fire or “slop-over” and initiate the appropriate strategy as determined by the Burn Boss. The spot fire will be immediately reported to the Burn Boss. Priority will be personnel safety. Otherwise, the spot or slop-over will be suppressed by the most appropriate suppression response and monitored.

#### Fuel Consumption Objectives

Fuel consumption will be monitored by the burn boss. Lighting patterns will be adjusted to meet objectives as needed. If fuels objectives are not being met, burning operations will cease at the discretion of the Burn Boss.

#### Smoke Emissions Objectives

The smoke column will be observed throughout the burn. Smoke receptors will be monitored to ensure that they do not exceed smoke parameters. If smoke emissions exceed thresholds, burning operations will cease at the discretion of the Burn Boss.

### **C. Additional Resources and Maximum Response Time(s):**

If the current and predicted fire behavior exceeds the capabilities of the on-site personnel and any project funded reinforcements to contain the fire, the Burn Boss will become the Incident Commander and remain as

***AK Fire and Fuels Monitoring Protocol Quick References***

such until the fire exceeds his/her capabilities. If the Burn Boss determines that available resources cannot contain the escape in a timely manner the burn will be declared a wildfire. The Burn Boss will assign ICS positions for the escaped fire and re-assign positions to continue management of the Prescribed Burn as necessary. The Incident Commander will notify UYT Dispatch and Park Staff, and an Escaped Fire Situation Analyses will be completed. In addition, the Burn Boss and the Line Officer or his/her Designee will complete a Wildland Fire Situation Analysis (WFSA).

Type II Crew Various locations (2 Days)  
AFS (Tanana Zone) Dispatch  
907-356-5551

On-Call Helicopter(s)  
Office of Aviation Management – Anchorage  
907- 271-5021

## **ELEMENT 18: WILDFIRE CONVERSION**

### **Wildfire Declared By:**

A wildfire will be declared by the RXB3 or RXB2. If spot fires and/or slop-overs cannot be controlled within one burning period with on-site resources and the spot potentially threatens other resources, the Burn Boss will convert the fire to wildfire status. A Wildland Fire Situation Analysis (WFSA) will be completed. Any suppression actions will be in accordance with the Yukon-Charley Rivers National Preserve Fire Management Plan at the direction of Upper Yukon Zone Management.

### **IC Assignment:**

RXB3 or RXB2. If the prescribed fire is converted to a wildfire, the Burn Boss will make the declaration and assume the role of Incident Commander until relieved by an Incident Commander Type 4 (ICT4). If the Burn Boss is not a qualified ICT4, prior to ignition of the prescribed fire, one will be available on scene, or be ordered and confirmed to be available on scene within two hours.

### **Notifications:**

The Burn Boss will immediately notify the Eagle Office, AICC, and the Park Superintendent of the change in status to a wildland fire and will order resources through AICC.

### **Extended Attack Actions and Opportunities to Aid in Fire Suppression:**

The RXB3, FFT1, ICT4 or ICT5 as appropriate will supervise suppression actions in the event of spot fires, slopovers or extended attack. All section leaders (Holding, Ignition) will ensure the safety of ALL personnel assigned to them. All personnel will be assigned holding or suppression duties. Additional resources will be ordered through AICC.

## **ELEMENT 19: SMOKE MANAGEMENT AND AIR QUALITY**

### **Compliance:**

Controlled burning to manage forest land, vegetative cover, fisheries, or wildlife habitat, other than burning to combat a natural wildfire, requires written DEC approval if the area to be burned exceeds 40 acres yearly (DEC Open Burning Policy and guidelines, January 2006). The units covered by this burn plan will not exceed 40 acres yearly.

**Permits to be Obtained:** none

**Smoke Sensitive Areas/Receptors:** none

**Impacted Areas:** Coal Creek may experience short term smoke impacts.

### **Mitigation Strategies and Techniques to Reduce Smoke Impacts:**

Material will be stacked in order to enhance oxygen flow to the flames. Non-combustibles will be separated to expose burnable debris in order to enhance burning. If snow is present some snow will be removed from the

pile to enhance oxygen flow and allow for effective ignition. It is anticipated that the level of curing experienced by the fuels will sustain vigorous combustion. This level of combustion generates considerable heat providing for more efficient burning, hence producing less gas/particulate matter (smoke).

**ELEMENT 20: MONITORING**

**Fuels Information (forecast and observed) Required and Procedures: n/a**

The natural debris pile is the result of hazard fuels treatments at cultural or administrative features. Fuels consist of mainly spruce (70 percent) and alder and willow (30 percent) for a total volume per pile of 563 (cubic feet). The piles are located around cultural or administrative features in cleared areas denuded of surface vegetation. However the pile typically rest on surface moss and duff. Outside of the 100 foot treatment area natural fuels begin. The vast majority of the sites are located along rivers with a fuel type of white spruce (NFFL Fuel Model 9). However outside the riparian zone the white spruce forest often gives way to black spruce forest with a feather moss understory (FBP C-2 fuel model).

The fuels objective for this burn is to consume 95+% of the debris. Fuel consumption will be monitored throughout the burn and lighting patterns and fuels arrangement will be adjusted to ensure a 95+% consumption.

Note: Estimated tons-per-pile for fuel models come from Consume 2.1 and is based on volume and loading for a pile 15ft X 12ft X 6ft in size.

Vegetation Type	Fuel Model NFFL/NFDRS FBP	% Of Unit	# acres Based on %	Estimated Tons per pile
Debris Pile (Natural Debris)	Q/9	100	0.10	1.3
Surrounding Vegetation	163/C-2	N/A	N/A	N/A

**Weather Monitoring Required and Procedures:**

Onsite weather taken at 1000, 1200, and 1400.

The nearest associated RAWS station is immediately adjacent to the burn unit at the Ben Creek RAWS station. Spot weather forecasts will be requested at least one day prior to and each consecutive day of the burn. Actual on site weather information will be reported back to the weather forecaster to help improve the forecasts during the burn.

**Fire Behavior Monitoring Required and Procedures:** Fire Behavior narrative kept in ICS 214 by either fire monitor or Burn Boss.

**Monitoring Required To Ensure That Prescribed Fire Plan Objectives Are Met:**

Photo points from summer after burning

**Smoke Dispersal Monitoring Required and Procedures:** none

## **ELEMENT 21: POST-BURN ACTIVITIES**

### **Post-burn Activities That Must be Completed:**

Any necessary rehabilitation of temporary firelines, if necessarily constructed, will be completed once the Burn Boss has declared the prescribed fire out.

The Burn Boss will maintain an ICS-214 Unit Log.

The Lead Fire Monitor will prepare and submit an individual report that summarizes weather, fire behavior, and smoke observation data within two-weeks after the fire.

The Burn Boss will prepare an Individual Fire Report, DI-1202, within ten days after declaring the fire out.

The FMO will prepare a project accomplishment report in NFPORS.

Fire Management staff will maintain a project file that includes the burn unit plan, spot weather forecasts, and all required reports.

The area must be rehabbed and scanned for nails and other metals that may be exposed after the burn.

An After Action Review will be conducted post-burn.

**APPENDICES**

**Maps: Vicinity and Project**

**Technical Review Checklist**

**Complexity Analysis**

**Job Hazard Analysis**

**Fire Behavior Modeling Documentation or Empirical Documentation (unless it is included in the fire behavior narrative in Element 7; Prescription)**

**F. Site Photos**

A: MAPS

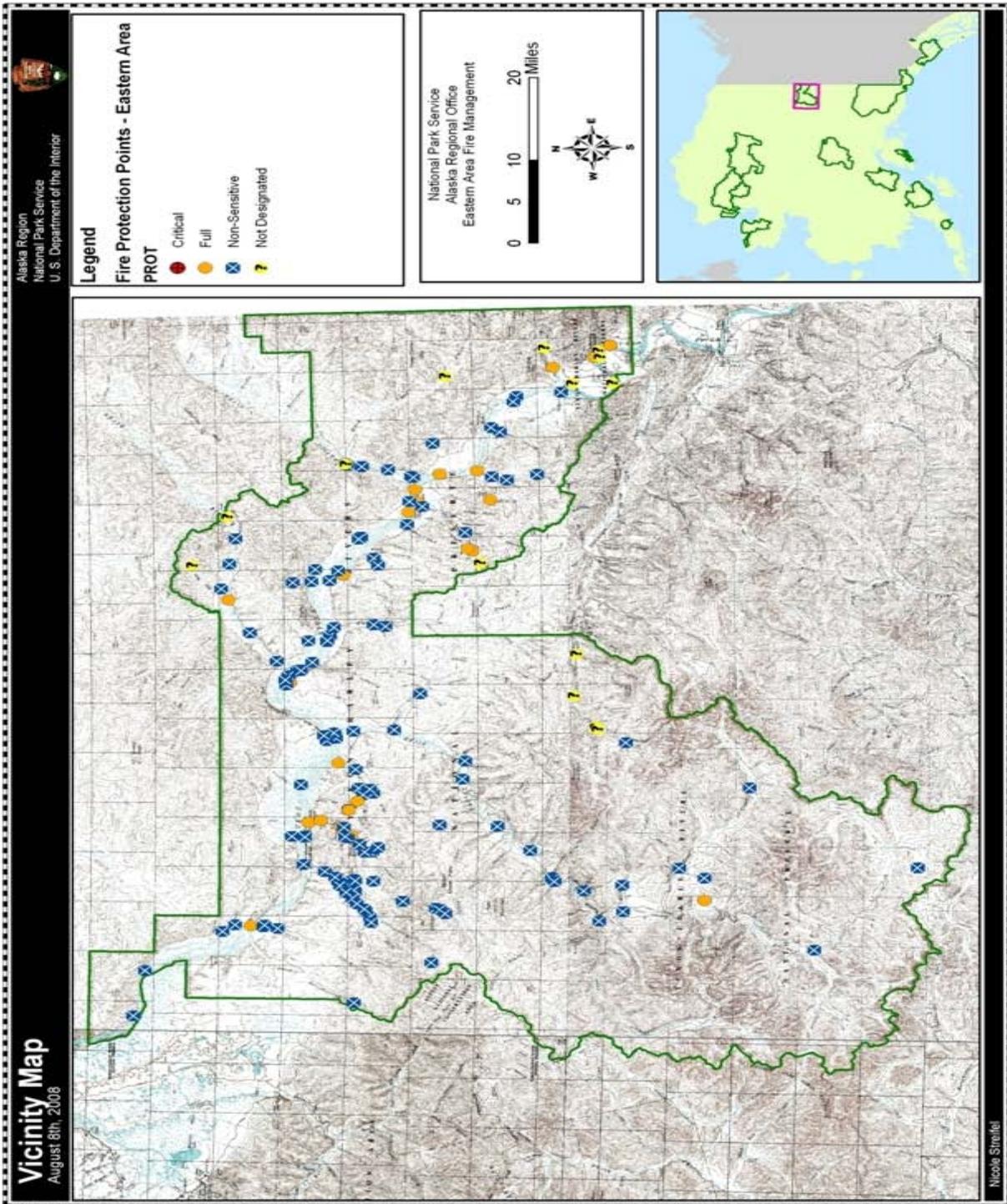


Figure 16: Vicinity Map

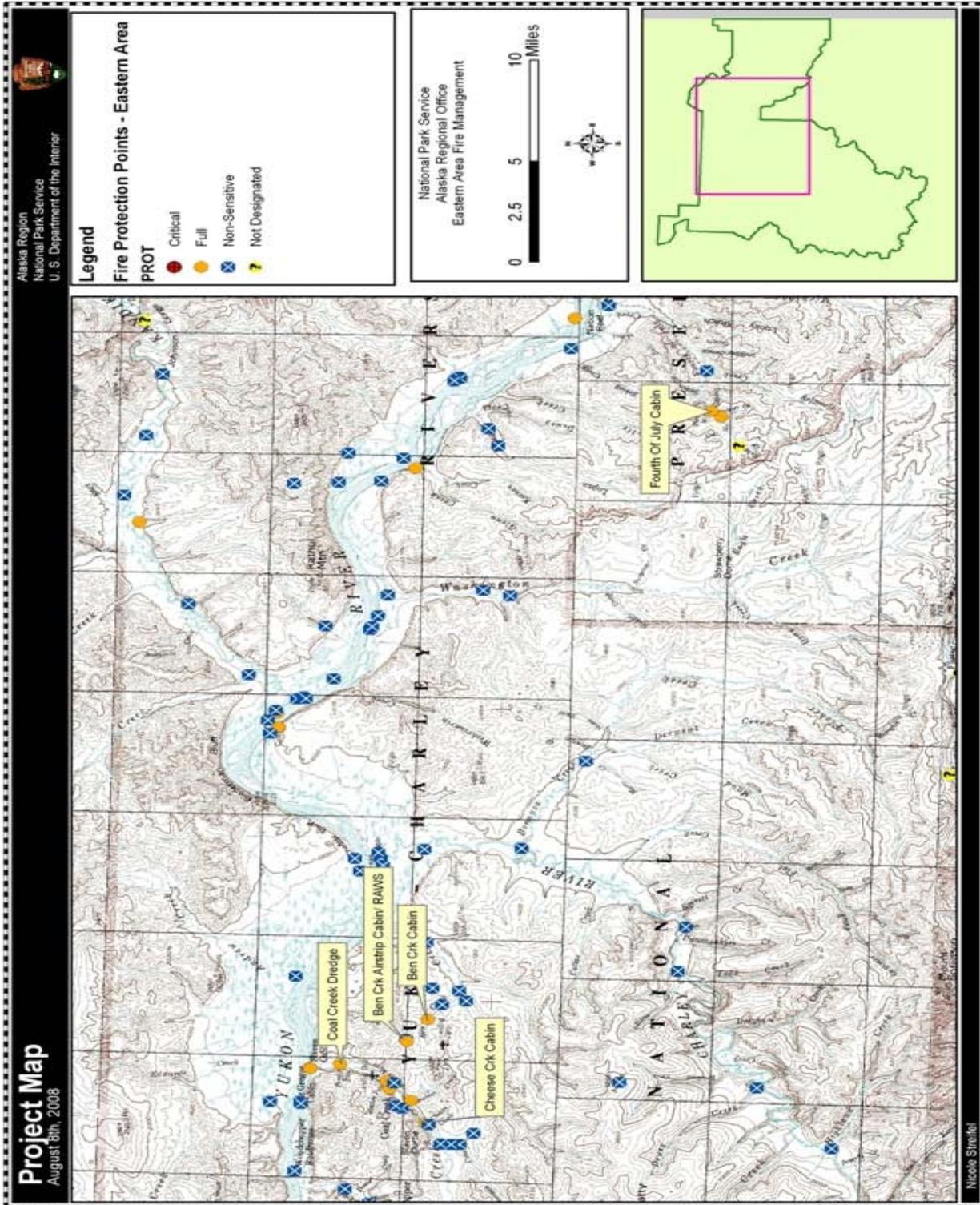


Figure 17: Project Map

**TECHNICAL REVIEWER CHECKLIST**

PRESCRIBED FIRE PLAN ELEMENTS:	S /U	COMMENTS
Signature page	S	
GO/NO-GO Checklists	S	
Complexity Analysis Summary	S	Rational should discuss any of the larger issues that could not be mitigated to a LOW ranking
Description of the Prescribed Fire Area	S	Need to better describe the project boundary. The contingency plan references spots outside the burn unit. Is the burn unit or unit boundary the 1 acres treated area?
Goals and Objectives	S	
Funding	S	Note: Mark Musitano had a good metric of taking the estimated cost and adding a percentage to it. Was this done in this estimate?
Prescription	S	
Scheduling	S	No Alaska DEC restrictions in YUCH?
Pre-burn Considerations	S	
Briefing	S	
Organization and Equipment	S	
Communication	S	
Public and Personnel Safety, Medical	S	
Test Fire	S	
Ignition Plan	S	
Holding Plan	S	
Contingency Plan	S	Are you going to order aircraft through AFS Tanana Zone or Upper Yukon Zone
Wildfire Conversion	S	
Smoke Management and Air Quality	S	
Monitoring	S	
Post-burn Activities	S	
Appendix A: Maps	S	Need to have site specific project maps available
Appendix B: Complexity Analysis	S	
Appendix C: JHA	S	
Appendix D: Fire Prediction Modeling Runs	S	
Other	S	Good addition of the medical plan. Though the medical plan looks like it was developed for winter operation

S = Satisfactory                      U = Unsatisfactory

**Recommended for Approval:**

**Not Recommended for Approval:**

Larry Weddle/Acting FMO AWAFFM RXB2/Yes

8/20/2008

Technical Reviewer

Qualification and currency (Y/N)

Date

Approval is recommended subject to the completion of all requirements listed in the comments section, or on the Prescribed Fire Plan.

**C: COMPLEXITY ANALYSIS**  
**Complexity Rating Worksheet**

Instructions: This worksheet is designed to be used with the Prescribed Fire Complexity Rating descriptors on Page 6.

Project Name: Preserve wide Pile Burns

Number: YUCH-001

Complexity elements:

**1. Potential for Escape**

Risk	Rationale
<b>Preliminary Rating:</b> <i>Low Moderate High</i>	Burning while fuels have residual moisture, or conditions prevent spread from outside the pile.
<b>Final Rating:</b> <i>Low Moderate High</i>	No change
Potential Consequences	Rationale
<b>Preliminary Rating:</b> <i>Low Moderate High</i>	If a holdover occurs once fuels are snow-free, (three weeks or more after ignition) there is a moderate possibility for an escape fire to burn nearby non-residential structures.
<b>Final Rating:</b> <i>Low Moderate High</i>	No change
Technical Difficulty	Rationale
<b>Preliminary Rating:</b> <i>Low Moderate High</i>	Operation is simple with no span of control issues
<b>Final Rating:</b> <i>Low Moderate High</i>	No change

**2. The Number and Dependency of Activities**

Risk	Rationale
<b>Preliminary Rating:</b> <i>Low Moderate High</i>	The only Fire Management activity in the Preserve at the time of ignition will be this project. Activities are sequential and independent.
<b>Final Rating:</b> <i>Low Moderate High</i>	No change
Potential Consequences	Rationale
<b>Preliminary Rating:</b> <i>Low Moderate High</i>	The only Fire Management activity in the Preserve at the time of ignition will be this project. No coordination issues.
<b>Final Rating:</b> <i>Low Moderate High</i>	No change

Technical Difficulty	Rationale
<b>Preliminary Rating:</b> <i>Low Moderate High</i>	Minimal difficulty in coordinating the required activities.
<b>Final Rating:</b> <i>Low Moderate High</i>	No change

3. Off-Site Values

Risk	Rationale
<b>Preliminary Rating:</b> <i>Low Moderate High</i>	Minimal risk to improvements, private, or other agency lands
<b>Final Rating:</b> <i>Low Moderate High</i>	No change
Potential Consequences	Rationale
<b>Preliminary Rating:</b> <i>Low Moderate High</i>	The expected fire behavior should cause minimal or no damage to off-site values, improvements, private or other agency lands. No restrictions on visitor use are expected during project implementation.
<b>Final Rating:</b> <i>Low Moderate High</i>	No change
Technical Difficulty	Rationale
<b>Preliminary Rating:</b> <i>Low Moderate High</i>	Protection of the off-site values requires some special management. All piles will be mopped up, cold trailed, and declared out before burn staff final departure from the site.
<b>Final Rating:</b> <i>Low Moderate High</i>	Concern mitigated by on site hose lay.

4. On-Site Values

Risk	Rationale
<b>Preliminary Rating:</b> <i>Low Moderate High</i>	There is no risk to values within the burn pile area itself.
<b>Final Rating:</b>	No change

<i>Low Moderate High</i>	
<b>Potential Consequences</b>	<b>Rationale</b>
<b>Preliminary Rating:</b> <i>Low Moderate High</i>	There are no potential consequences within the burn pile area itself.
<b>Final Rating:</b> <i>Low Moderate High</i>	No change
<b>Technical Difficulty</b>	<b>Rationale</b>
<b>Preliminary Rating:</b> <i>Low Moderate High</i>	The real challenge is the initial and continuing ignition and burning of the piles.
<b>Final Rating:</b> <i>Low Moderate High</i>	No change

5. Fire Behavior

<b>Risk</b>	<b>Rationale</b>
<b>Preliminary Rating:</b> <i>Low Moderate High</i>	Expected fire behavior is minimal.
<b>Final Rating:</b> <i>Low Moderate High</i>	No change
<b>Potential Consequences</b>	<b>Rationale</b>
<b>Preliminary Rating:</b> <i>Low Moderate High</i>	Due to extremely wet fuel conditions in the project area, consequences for even extreme fire behavior from the piles is negligible.
<b>Final Rating:</b> <i>Low Moderate High</i>	No change
<b>Technical Difficulty</b>	<b>Rationale</b>

6. Management Organization

<b>Risk</b>	<b>Rationale</b>
<b>Preliminary Rating:</b> <i>Low Moderate High</i>	This operation will require only a single level of supervision; personnel will easily transition into holding rolls once ignition is over.
<b>Final Rating:</b> <i>Low Moderate High</i>	No change

Potential Consequences	Rationale
<b>Preliminary Rating:</b> <i>Low Moderate High</i>	Consequences related to supervision or communications are expected to be minimal.
<b>Final Rating:</b> <i>Low Moderate High</i>	No change
Technical Difficulty	Rationale
<b>Preliminary Rating:</b> <i>Low Moderate High</i>	All team members will come from local unit, some with years of local experience.
<b>Final Rating:</b> <i>Low Moderate High</i>	No change

7. Public and Political Interest

Risk	Rationale
<b>Preliminary Rating:</b> <i>Low Moderate High</i>	There is no public or political interest in this project.
<b>Final Rating:</b> <i>Low Moderate High</i>	No change
Potential Consequences	Rationale
<b>Preliminary Rating:</b> <i>Low Moderate High</i>	Adverse outcome will attract little or no interest.
<b>Final Rating:</b> <i>Low Moderate High</i>	No change
Technical Difficulty	Rationale
<b>Preliminary Rating:</b> <i>Low Moderate High</i>	No special notifications of the public are needed.
<b>Final Rating:</b> <i>Low Moderate High</i>	No change

8. Fire Treatment Objectives

Risk	Rationale
<b>Preliminary Rating:</b>	Objectives of reducing fuels by burning piles is easily achieved.

<i>Low Moderate High</i>	
<b>Final Rating:</b> <i>Low Moderate High</i>	No change
<b>Potential Consequences</b>	<b>Rationale</b>
<b>Preliminary Rating:</b> <i>Low Moderate High</i>	Failure to meet objectives would have few or no adverse impacts on natural resources.
<b>Final Rating:</b> <i>Low Moderate High</i>	No change
<b>Technical Difficulty</b>	<b>Rationale</b>
<b>Preliminary Rating:</b> <i>Low Moderate High</i>	All Pre-burn monitoring will be done via the Ben Creek RAWS
<b>Final Rating:</b> <i>Low Moderate High</i>	No change

9. Constraints

<b>Risk</b>	<b>Rationale</b>
<b>Preliminary Rating:</b> <i>Low Moderate High</i>	The sites are in remote backcountry areas accessible only by helicopter.
<b>Final Rating:</b> <i>Low Moderate High</i>	No Change
<b>Potential Consequences</b>	<b>Rationale</b>
<b>Preliminary Rating:</b> <i>Low Moderate High</i>	Project can be implemented whenever it is in prescription.
<b>Final Rating:</b> <i>Low Moderate High</i>	No change
<b>Technical Difficulty</b>	<b>Rationale</b>
<b>Preliminary Rating:</b> <i>Low Moderate High</i>	Restricted access is the main difficulty in completing this project.
<b>Final Rating:</b>	No Change

<i>Low Moderate High</i>	
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10. Safety

Risk	Rationale
<b>Preliminary Rating:</b> <i>Low Moderate High</i>	Activities are standard for fire operations.
<b>Final Rating:</b> <i>Low Moderate High</i>	No change
Potential Consequences	Rationale
<b>Preliminary Rating:</b> <i>Low Moderate High</i>	Minimal potential for serious accident or injury.
<b>Final Rating:</b> <i>Low Moderate High</i>	No change
Technical Difficulty	Rationale
<b>Preliminary Rating:</b> <i>Low Moderate High</i>	Standard safety concerns with no special mitigations necessary

11. Ignition Procedures/Methods

Risk	Rationale
<b>Preliminary Rating:</b> <i>Low Moderate High</i>	Firing sequence and timing is not critical to meet project objectives. The entire project area is readily visible to the Ignition Specialist/Burn Boss.
<b>Final Rating:</b> <i>Low Moderate High</i>	No Change
Potential Consequences	Rationale
<b>Preliminary Rating:</b> <i>Low Moderate High</i>	Firing methods and procedures do not pose a safety concern to personnel, compromise project objectives, or increase the risk of an unexpected or adverse event.
<b>Final Rating:</b> <i>Low Moderate High</i>	No Change
Technical Difficulty	Rationale

<b>Preliminary Rating:</b> <i>Low Moderate High</i>	There is no need for special firing equipment, techniques, or patterns. Firing procedures are simple and ignition team is small.
<b>Final Rating:</b> <i>Low Moderate High</i>	No change

12. Interagency Coordination

Risk	Rationale
<b>Preliminary Rating:</b> <i>Low Moderate High</i>	The project does not involve another land management agency or jurisdiction.
<b>Final Rating:</b> <i>Low Moderate High</i>	No Change
Potential Consequences	Rationale
<b>Preliminary Rating:</b> <i>Low Moderate High</i>	Project can be completed as planned.
<b>Final Rating:</b> <i>Low Moderate High</i>	No Change
Technical Difficulty	Rationale
<b>Preliminary Rating:</b> <i>Low Moderate High</i>	No interagency issues.
<b>Final Rating:</b> <i>Low Moderate High</i>	No Change

13. Project Logistics

Risk	Rationale
<b>Preliminary Rating:</b> <i>Low Moderate High</i>	Some special logistical needs have been identified and mitigated. The need to fly personnel by charter plane into Coal Creek airstrip. The need to move equipment and supplies by helicopter. However supplies are readily available at Coal Creek.
<b>Final Rating:</b> <i>Low Moderate High</i>	No Change
Potential Consequences	Rationale
<b>Preliminary Rating:</b>	Problems related to logistics will not create an escaped fire or cause a safety concern.

<i>Low Moderate High</i>	
<b>Final Rating:</b> <i>Low Moderate High</i>	No Change
<b>Technical Difficulty</b>	<b>Rationale</b>
<b>Preliminary Rating:</b> <i>Low Moderate High</i>	Implementation will require some logistical support and preplanning performed by participants.
<b>Final Rating:</b> <i>Low Moderate High</i>	No Change

**14. Smoke Management**

<b>Final Rating:</b> <i>Low Moderate High</i>	There are no smoke concerns for this project
<b>Potential Consequences</b>	<b>Rationale</b>
<b>Preliminary Rating:</b> <i>Low Moderate High</i>	No smoke impacts will occur.
<b>Final Rating:</b> <i>Low Moderate High</i>	No Change
<b>Technical Difficulty</b>	<b>Rationale</b>
<b>Preliminary Rating:</b> <i>Low Moderate High</i>	No special operational procedures are required.
<b>Final Rating:</b> <i>Low Moderate High</i>	No Change

**COMPLEXITY RATING SUMMARY**

RISK OVERALL RATING: **LOW**

POTENTIAL CONSEQUENCES OVERALL RATING: **LOW**

TECHNICAL DIFFICULTY OVERALL RATING: **LOW**

SUMMARY COMPLEXITY RATING: **LOW**

***AK Fire and Fuels Monitoring Protocol Quick References***

**RATIONALE:**

Despite the remoteness of the project sites, this is a simple project with no special safety, operational, or fire behavior concerns.

Moderate logistical complexity is due to fixed wing access to Coal Creek, and helicopter access to project sites.

Prepared by: \_\_\_\_\_

Date:

Approved by: \_\_\_\_\_  
(Agency Administrator)

Date:

**D. Job Hazard Analysis**

United States Department of Interior NATIONAL PARK SERVICE	1.WORK PROJECT/ACTIVITY Prescribed Fire	2.LOCATION YUCH Preserve	3.UNIT Yukon-Charley Rivers National Preserve
JOB HAZARD ANALYSIS (JHA)	4.NAME OF ANALYST James Savage	5.JOB TITLE AFMO	6.DATE PREPARED 8/14/2008
7. TASKS/PROCEDURES	8. HAZARDS:	9. ABATEMENT ACTIONS ENGINEERING CONTROLS * SUBSTITUTION* ADMINITSTRATIVE CONTROLS * PPE	
1. Hand Ignition	A. Proximity to intense heat and erratic fire behavior.  B. Smoke, sparks, cinders.  C. Noise of fire obscures verbal warnings.  D. Burning fuel dripping from torch – operator burned.  E. Ignitions in wrong location.  F. Poor footing, heavy fuels accumulation.	A. Use Personal Protective Equipment (PPE), maintain close supervision, use handheld radios, and lookouts. Thorough briefing on expected fire behavior. Adjust ignition patterns as needed to reduce exposure and fire behavior.  B. Avoid very dense smoke; wear PPE; rotate personnel out of worst areas.  C. Handheld radios for all ignition personnel.  D. Igniters stay alert to location of torch flame. Close air vent on drip torch when not igniting. Wear proper PPE.  E. Thorough briefing of ignition plan. Know location of other igniters and personnel. Radios for all igniters. Close supervision.  F. Constant awareness; identify hazard areas; slow down.	
2. Helicopter Operations	A. Mechanical Failure, Mid-Air Collision, Engine Noise, Rotors Striking Personnel; Cabin Fire  B. Improper Loading of Crew and Gear  C. Sling Load Issues (Hooking, Faulty Parts, Electrical Shock and Improper Manifesting)  D. Unimproved Helispots	A. Regular power and engine checks; Pilot and Crew aware of known aerial hazards and stay alert for other aircraft and unknown aerial hazards; Wear earplugs; Don't approach aircraft until instructed by Pilot or crewmembers and stay away from the tail rotor even when rotors are not turning; Always wear proper PPE (Nomex clothing, 8" leather boots, flight helmet, nomex or leather gloves).  B. Correctly manifest gear and personnel; have another qualified crewmember double check manifest; make sure hazmat is properly packaged and pilot is aware of hazmat; make sure all crewmembers have safety briefing of helicopter.  C. Perform equipment check (swivel, net, cargo hook, lead lines, long line, belly hook (manual and remote release), and cargo net); wear gloves and let hook hit ground to discharge electricity; know external load capacity of helicopter and correctly manifest all items (including net, cargo hook, long line, cargo, etc...); keep eyes on load in flight until clear of personnel;  D. Don't pressure pilot to land at site he/she is not comfortable with; Perform high and low level recon of potential landing site; Improve site upon landing and station a crewmember to call out wind direction/speed.	
10. SUPERVISOR'S SIGNATURE	11. TITLE FMO/Burn Boss	12. DATE	

**Job Hazard Analysis Instructions**

The Job Hazard Analysis (JHA) shall identify the location of the work project or activity, the name of employee(s) writing the JHA, the date(s) of development, and the name of the appropriate supervisor approving it. The supervisor acknowledges that employees have read and understand the contents, have received the required training, and are qualified to perform the work project or activity.

Blocks 1, 2, 3, 4, 5, and 6: Self explanatory.

Block 7: Identify all tasks and procedures associated with the work project or activity that have potential to cause injury or illness to personnel and damage to property, material, or environment. Include emergency evacuation procedures.

Block 8: Identify all known or suspect hazards associated with each respective task/procedure listed in block 7. For example:

- e. Research past accidents/incidents
- f. Discuss the work project/activity with participants.
- g. Observe the work project/activity.
- h. A combination of the above.

Block 9: Identify appropriate actions to reduce or eliminate the hazards identified in block 8. Abatement measures listed below are in the order of the preferred abatement method:

- f. Engineering Controls (the most desirable method of abatement). For example, ergonomically designed tools, equipment and furniture.
- g. Substitution. For example, changing to non-flammable, non-toxic, biodegradable solvents.
- h. Administrative Controls. For example, limiting exposure by reducing the work schedule.
- i. PPE (least desirable method of abatement). For example, using hearing protection when working with or close to portable machines (chain saws, rock drills, portable water pumps).
- j. A combination of the above.

Block 10: The JHA must be reviewed and approved by a supervisor. Attach a copy of the JHA as justification for purchase orders when procuring PPE.

Block 11 and 12: Self explanatory.

**JHA – Emergency Evacuation Instructions**

Work supervisor and crew members are responsible for developing and discussing field emergency evacuation procedures (i.e., medical plan) and alternatives in the event a person(s) become ill or injured at the worksite and needs to be expediently transported from the scene.

Be prepared to provide the following information:

- k. Nature of the accident or injury (avoid using victim’s name).
- l. Type of assistance needed, if any (ground, air, or water evacuation)

**AK Fire and Fuels Monitoring Protocol Quick References**

- m. Location of accident or injury, best access route into the worksite (road name/number), identifiable ground/air landmarks.
- n. Radio frequency(s).
- o. Contact person.
- p. Local hazards to ground vehicles or aviation.
- q. Weather conditions (wind speed & direction, visibility, temp).
- r. Topography.
- s. Number of person(s) to be transported.
- t. Estimated weight of passengers for air/water evacuation.

These items listed above serve only as guidelines for the development of emergency evacuation procedures.

**JHA and Emergency Evacuation Procedures Acknowledgement**

As supervisor, I acknowledge that the following supervisors/crew leaders have participated in the development of this JHA and accompanying emergency evacuation procedures, and have also been briefed on the provisions, thereof, on March 23, 2007. They will brief their subordinates on this JHA prior to implementation of the burn.

\_\_\_\_\_  
Supervisor's Signature

\_\_\_\_\_  
Supervisor's Name

\_\_\_\_\_  
Burn Boss

Notification Checklist for FY 2008 Fuels Reduction Piles Prescribed Fire:

AGENCY:	TELEPHONE NUMBER:	Contacted by:	Contact Date and time	Comments
UYT Dispatch (AFS)	907-356-5555			
Eagle Office	907-547-2233			
Fairbanks Admin Center	907-455-0600			
<b>INDIVIDUALS:</b>				
Park Superintendent	907-455-0615			
Chief of Nat. Resources	907-455-0620			

Table 16: Notification Checklist

**E. FIRE BEHAVIOR MODELING DOCUMENTATION OR EMPIRICAL DOCUMENTATION**

For fire behavior modeling, a dwarf conifer with understory model (S 164) was used to represent the fuels model for fire behavior outputs and containment parameters.

Vegetation Type	Fuel Model NFFL/NFDRS	% of unit	# acres based on %	Estimated tons per pile
Debris Pile (Natural Debris )	Q/9	100	4.0	1
Surrounding Vegetation	D 121 C/2	N/A	N/A	N/A

Note: Estimated tons-per-acre for fuel models come from Consume 2.0 and Aids to Determining Fuel Models for Estimating Fire Behavior, Anderson.

**Consume Fire Modeling Program**

**Unit**   **Pile Burn**   **Unit /Permit #:**   YUCH-1

**Fuel Type:**   Activity - Piled

**General Information**

**Burn Date:**   9/1/2008   **Acres:** 4

**Pile Group Information**

**Pile Group Name:** Mechanical Thinning   **Number of Piles:**   50

**Pile Shape:**   1   **Valid ?:**   True

**Width 1 (ft):** 12.0   **Width 2 (ft):**   **Pile Quality:** Clean

**Height 1 (ft):** 6.0   **Height 2 (ft):**   **Pack Ratio:** 20

**Length 1 (ft):**   **Length 2 (ft):**   **Pile Soil (%):** 0

**Primary Species:**                      Sitka spruce                      70   %   **Density 1 (lb/cu ft):** 23.1

**Secondary Species:**   Quaking aspen30   %   **Density 2 (lb/cu ft):** 21.9

**Total Volume per pile (cu. ft.):**   452

**Loading per pile (lb):**                      2,057

**Total Consumption per group (lb):**92,586



Modules: SURFACE, SIZE, CONTAIN, SPOT, SCORCH, IGNITE

Description		YUCH Pile Burn Plan 2008
<b>Fuel/Vegetation, Surface/Understory</b>		
Fuel Model		tu4
<b>Fuel/Vegetation, Overstory</b>		
Canopy Height	ft	20
<b>Fuel Moisture</b>		
1-h Moisture	%	9
10-h Moisture	%	10
100-h Moisture	%	11
Live Herbaceous Moisture	%	100
Live Woody Moisture	%	150
<b>Weather</b>		
20-ft Wind Speed (upslope)	mi/h	1, 3, 5, 6, 7, 8, 9
Wind Adjustment Factor		0.4
Air Temperature	oF	70
Fuel Shading from the Sun	%	25
<b>Terrain</b>		
Slope Steepness	%	10
Ridge-to-Valley Elevation Difference	ft	1000
Ridge-to-Valley Horizontal Distance	mi	1
Spotting Source Location		RT
<b>Fire</b>		
Flame Height from a Burning Pile	ft	15
Elapsed Time	h	4
<b>Suppression</b>		
Suppression Tactic		Head
Line Construction Offset	ch	0
Resource Line Production Rate	ch/h	16
Resource Arrival Time	h	0
Resource Duration	h	10

Run Option Notes

Calculations are only for the direction of maximum spread [SURFACE].

Fireline intensity, flame length, and spread distance are always

(continued on next page)



Input Worksheet (continued)  
for the direction of the spread calculations [SURFACE].  
Wind is blowing upslope [SURFACE].  
Suppression input is for a single resource [CONTAIN];  
multiple values can be entered for any input variable.

---

### Output Variables

Surface Rate of Spread (maximum) (ch/h) [SURFACE]  
Flame Length (ft) [SURFACE]  
Area (ac) [SIZE]  
Perimeter (ch) [SIZE]  
Time from Report (h) [CONTAIN]  
Contain Status [CONTAIN]  
Contained Area (ac) [CONTAIN]  
Fireline Constructed (ch) [CONTAIN]  
Spot Dist from a Burning Pile (mi) [SPOT]  
Scorch Height (ft) [SCORCH]  
Probability of Ignition from a Firebrand (%) [IGNITE]

### Notes

This model does not take into residual moisture due to recent rain fall, melting snow, or pretreating fuels from hose lay. Thus the model overpredicts fire behavior outputs such as rates of spread, flame length and probability of ignition.



### YUCH Pile Burn Plan 2008

20-ft Wind mi/h	ROS (max) ch/h	Flame Length ft	Fire Area ac	Fire Perimeter ch	Time from Report h	Contain Status	Contain Area ac
1	0.8	1.4	1.2	12	0.8	Contained	1.4
3	1.3	1.7	2.3	17	1.2	Contained	2.8
5	2.0	2.1	4.5	25	1.7	Contained	5.8
6	2.5	2.3	6.1	29	2.1	Contained	8.2
7	3.0	2.5	8.1	34	2.4	Contained	11.3
8	3.6	2.7	10.5	39	2.8	Contained	15.2
9	4.2	3.0	13.4	44	3.3	Contained	20.1



### YUCH Pile Burn Plan 2008

< 20-ft	Fireline	Pile Burn	Scorch	Firebrand
< Wind	Constructed	Spot Dist	Height	Ignition
< mi/h	ch	mi	ft	%
1	13.5	0.0	5	35
3	18.8	0.0	6	35
5	27.5	0.1	8	35
6	32.8	0.1	8	35
7	38.7	0.1	9	35
8	45.2	0.1	10	35
9	52.2	0.1	10	35



## Discrete Variable Codes Used YUCH Pile Burn Plan 2008

### Fuel Model

tu4 Dwarf conifer with understory (S) (164)

### Spotting Source Location

RT Ridge Top

### Suppression Tactic

Head Head Attack



Modules: SURFACE, SIZE, CONTAIN, SPOT, SCORCH, IGNITE

Description		YUCH Pile Burn Plan 2008
<b>Fuel/Vegetation, Surface/Understory</b>		
Fuel Model		tu4
<b>Fuel/Vegetation, Overstory</b>		
Canopy Height	ft	20
<b>Fuel Moisture</b>		
1-h Moisture	%	11
10-h Moisture	%	10
100-h Moisture	%	11
Live Herbaceous Moisture	%	100
Live Woody Moisture	%	150
<b>Weather</b>		
20-ft Wind Speed (upslope)	mi/h	1, 3, 5, 6, 7, 8, 9
Wind Adjustment Factor		0.4
Air Temperature	oF	50
Fuel Shading from the Sun	%	55
<b>Terrain</b>		
Slope Steepness	%	10
Ridge-to-Valley Elevation Difference	ft	1000
Ridge-to-Valley Horizontal Distance	mi	1
Spotting Source Location		RT
<b>Fire</b>		
Flame Height from a Burning Pile	ft	15
Elapsed Time	h	4
<b>Suppression</b>		
Suppression Tactic		Head
Line Construction Offset	ch	0
Resource Line Production Rate	ch/h	8
Resource Arrival Time	h	0
Resource Duration	h	10

Run Option Notes

Calculations are only for the direction of maximum spread [SURFACE].

Fireline intensity, flame length, and spread distance are always

(continued on next page)



Input Worksheet (continued)  
for the direction of the spread calculations [SURFACE].

Wind is blowing upslope [SURFACE].

Suppression input is for a single resource [CONTAIN];  
multiple values can be entered for any input variable.

---

### Output Variables

Surface Rate of Spread (maximum) (ch/h) [SURFACE]

Flame Length (ft) [SURFACE]

Area (ac) [SIZE]

Perimeter (ch) [SIZE]

Time from Report (h) [CONTAIN]

Contain Status [CONTAIN]

Contained Area (ac) [CONTAIN]

Fireline Constructed (ch) [CONTAIN]

Spot Dist from a Burning Pile (mi) [SPOT]

Scorch Height (ft) [SCORCH]

Probability of Ignition from a Firebrand (%) [IGNITE]

### Notes

This model does not take into residual moisture due to recent rain fall, melting snow, or pretreating fuels from hose lay. Thus the model overpredicts fire behavior outputs such as rates of spread, flame length and probability of ignition.



### YUCH Pile Burn Plan 2008

20-ft Wind mi/h	ROS (max) ch/h	Flame Length ft	Fire Area ac	Fire Perimeter ch	Time from Report h	Contain Status	Contain Area ac
1	0.3	0.5	0.1	4	0.6	Contained	0.2
3	0.4	0.7	0.3	6	0.8	Contained	0.3
5	0.7	0.8	0.5	9	1.2	Contained	0.6
6	0.9	0.9	0.7	10	1.4	Contained	0.9
7	1.1	1.0	1.0	12	1.6	Contained	1.2
8	1.2	1.1	1.3	13	1.9	Contained	1.6
9	1.5	1.1	1.6	15	2.2	Contained	2.1



### YUCH Pile Burn Plan 2008

< 20-ft	Fireline	Pile Burn	Scorch	Firebrand
< Wind	Constructed	Spot Dist	Height	Ignition
< mi/h	ch	mi	ft	%
1	4.6	0.0	1	22
3	6.4	0.0	1	22
5	9.2	0.1	1	22
6	11.0	0.1	1	22
7	12.9	0.1	1	22
8	15.0	0.1	1	22
9	17.2	0.1	1	22



Discrete Variable Codes Used  
YUCH Pile Burn Plan 2008

Fuel Model

tu4 Dwarf conifer with understory (S) (164)

Spotting Source Location

RT Ridge Top

Suppression Tactic

Head Head Attack

**AK Fire and Fuels Monitoring Protocol Quick References**

Fuel Models Inside Project Area: Q (Pile)

Fuel Models Outside Project Area: gs1 (Low Load Dry Climate Grass

Project Name: Pile Burning

Prepared By/Date: /s/ James Savage 8/14/2008

Shrub)

Characteristics	Output type	Modeling Predictions Inside Project Area	Modeling Predictions Outside Project Area	Unit of Measure
CRITICAL FIRE INPUTS	1 Hr Fuel Moisture	Debris Pile	9	%
	Wind Speed	Debris Pile	0-10	MPH
	Slope	Debris Pile	10	%
KEY FIRE BEHAVIOR OUTPUTS	Rate of Spread (ROS)	Debris Pile	0.8-4.2	ch/hr
	Fireline Intensity	Debris Pile	11-60	BTU/ft/sec
	Flame Length	Debris Pile	1.4-3.0	Feet
	Probability of Ignition	Debris Pile	34	%
	Spotting Distance	Debris Pile	0.1	Miles
	Scorch Height	Debris Pile	5-10	Feet
FIRE SIZE	Projection Time	Debris Pile	4	Hours
	Forward Spread	Debris Pile	3.2-16.7	Chains
	Backward Spread	Debris Pile	0.1	Chains
FIRE CONTAINMENT	Method Of Attack	Debris Pile	Head	Head/Rear
	Max Escape Target	Debris Pile	10	Acres
	Max Containment Time	Debris Pile	2.1	Hours
	Total Line Building Rate	Debris Pile	16.0	Ch/hr
1. Choose greater total line building rate from inside and outside the project area		16.0		Ch/hr
2. Estimate potential number spot fires or slopovers at one time:			1	
3. TOTAL LINE BUILDING RATE NEEDED (multiply line 1 times line 2)			16.0	Ch/hr

Production Rates:

Ease of Access:

**POOR-FAIR-GOOD-EXCELLENT** (circle)

On Site Organization	Total # Planned On Burn	Total # Dedicated to Prescribed Fire	Total # Available for Spot Fire or Slopover Control	Line Building Production Rates		Spot Fire or Slopover Line Building Capacity
Overhead	1	1	1	4	Ch/hr	4
Firing Crew	1	1	1	4	Ch/hr	4
Holding	2	2	2	8	Ch/hr	8
4. TOTAL CAPACITY						16
3. TOTAL LINE BUILDING RATE NEEDED (from table above)					Ch/hr	16.0
5. DETERMINATION OF ADEQUATE HOLDING RESOURCES (Line 4 minus Line 3)					Ch/hr	0=Adequate Holding Forces

If number on line 5 is positive then adequate holding forces will be available. If number is negative, more holding resources are needed.

<b>MEDICAL PLAN</b>	1. Incident Name	2. Date Prepared	3. Time Prepared	4. Operational Period				
	Pile Burning	8/20/2008		8/20/2008-8/20/2018				
5. Incident Medical Aid Station								
Medical Aid Stations	Location			Paramedics				
				Yes	No			
Eagle	Eagle EMS 547-2300			X				
Eagle Village Clinic	Eagle Village 547-2243			X				
Circle Health Aid	Circle City 773-7425			X				
Eagle HQ	Eagle, possible EMS assistance 547-2233				X			
6. Transportation								
A. Ambulance Services								
Name	Address		Phone	Paramedics				
				Yes	No			
Eagle EMS	Eagle		547-2300	X				
State Troopers	Tok		883-5111	X				
State Troopers	Fairbanks		451-5100					
Guardian Air Ambulance Fairbanks	Fairbanks International, Fixed Wing Only		474-1746 800-997-3822					
Warbelows Air Ambulance	Fairbanks International, Fixed Wing Only		800-491-1247					
B. Incident Ambulances								
Name	Location			Paramedics				
				Yes	No			
7. Hospitals								
Name	Address	Travel Time		Phone	Helipad		Burn Center	
		Air	Grnd		Yes	No	Yes	No
Denali Center Memorial Hospital	1650 Cowles St. FBKS	1.5 hr each way		452-8181	X		X	
Eagle Village Clinic	Eagle	1 hr each way		547-2243	X			X
8. Medical Emergency Procedures								
<p>During field operations at least one individual qualified in first aid/cpr will be onsite with a ten person first aid kit. In the event of a medical emergency, aid will be rendered to the victim. If necessary there is a helispot appropriate for a light ship at the project sites.</p> <p>The nearest EMS will be contacted for immediate first aid and SAR procedures will follow standard protocol including calling Eagle Office and the Tok State Troopers. State Troopers will coordinate medivac.</p>								
9. Prepared by (Burn Plan Writer)				10.				
James Savage								

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## F. Site Photos

Ben Creek Airstrip Cabin



**Figure 18: Ben Creek Airstrip Cabin**

**Ben Creek Mine Complex**



**Figure 19: Ben Creek Mine Complex**

**Ben Creek RAWS**



**Figure 20: Ben Creek RAWS**

**Fourth of July Creek Complex**



**Figure 21: Fourth of July Creek Complex**