Alaska

ALASKA

I. INTRODUCTION

The state of Alaska is a vast area of approximately 375 million acres, of which 220 million acres is vulnerable to wildland fire. The state can be divided into four major fire regimes.

Southeast - This area, commonly referred to as the panhandle, is a sparsely populated, sparsely roaded area dominated by mountains, glaciers, snow fields, and salt water. A closed needle-leaf forest consisting of spruce, hemlock and cedar dominates the vegetation. The area receives an average of 200 inches of precipitation per year. There are an average of 38 fires/year for approximately 200 acres/year. Aircraft and boats are necessary to support most fires. Fires are typically on steep, rocky terrain and in logged areas. Burning intensity is generally low to moderate. Fires are almost exclusively human caused. This area includes the Tongass National Forest and the cities of Juneau, Haines and Ketchikan.

Western Alaska/Arctic Coastal Plain - This area has low lightning occurrence and rare human caused fires. Precipitation ranges from 6 inches in the arctic to over 60 inches in the Aleutian Islands. The average number of wildland fires in 42/year. The vegetation is generally tussock tundra and brush. Burning intensity and resistance to control are low to moderate. The Seward Peninsula has experienced large (75,000 acre +) fires in the past. The area is generally sparsely populated with few roads, small towns or villages and minimal infrastructure. This area includes Nome, Bethel, Kotzebue, King Salmon and Dillingham.

South-Central - This area south of the Alaska Range is in the transition zone between the continental climate of the Interior and the maritime climate of the Gulf of Alaska. Most fire starts are human caused, however lightning does play a role. The precipitation averages 60 inches/year. The area averages 188 fires/year. The vegetation includes tussock tundra, black and white spruce and deciduous trees such as paper birch, aspen and poplar. There is a significant amount of bug killed spruce in the area. Fire intensity ranges from moderate to extreme. Approximately 75% of the states population lives in this area, which includes Anchorage, the Matanuska-Susitna (Mat-Su) Valley and the Kenai Peninsula. Wildland urban interface is a serious problem in this area. In 1996 the Millers Reach Fire burned 37,700 acres and 544 structures.

Interior - The Interior is defined as the area between the Brooks Range and the Alaska Range, ranging from the Alaska/Canada border on the east to Western Alaska. This area is commonly referred to as an “Arctic Desert” averaging 6 to 12 inches of precipitation/year. The vegetation includes tussock tundra, black and white spruce, and hardwoods such as paper birch, aspen and poplar. Topography is generally flat to rolling with timber line commonly below 3,500 feet. Long stretches of low humidity, temperatures in the 80s to 90s and extensive lightning can lead to many fire starts and large fires. Burning intensity and resistance to control are moderate to

extreme. This area averages 252/year. While the area is vast and mostly unroaded, there are major concentrations of population around Fairbanks, Delta, Tok, Nenana and other areas, including the Alaska Highway Corridor. Support of fires in this area will require extensive aviation support.

II. ORGANIZATION

Land Ownership - The Alaska Statehood Act (1959), the Alaska Native Claims Settlement Act (ANSCA) of 1971 and the Alaska National Interest Lands Conservation Act (ANILCA) of 1980 are all significant influences to the pattern of land ownership/management in Alaska. Land managers or owners an IMT might have to deal with include the U.S. Forest Service, Bureau of Land Management, National Park Service, Bureau of Indian Affairs, U.S. Fish and Wildlife Service, State of Alaska-Department of Natural Resources, the U. S. Army, U.S. Air Force, one of 12 Native Regional Corporations, one of 100's of Native Village Corporations and private property owners.

Suppression Responsibilities - There are four entities with wildland fire suppression responsibilities in Alaska. They are the U.S. Forest Service, the State of Alaska-Division of Forestry, the Bureau of Land Management-Alaska Fire Service and local government fire departments. These agencies are tied together through cooperative or mutual aid agreements. BLM is responsible for fire protection on all DOI, Native and DOD-withdrawn lands in the state. U.S. Forest Service is responsible for protection of National Forest Lands. The State of Alaska-Division of Forestry is responsible for fire protection on state, private and municipal lands.

In an effort to avoid duplication and inefficient use of resources the state and federal suppression agencies have divided the state into protection responsibility areas where the responsible agency protects all lands regardless of ownership. The BLM protects the northern portion of the state, the state protects the southern portion of the state and the USFS protects the southeastern portion of the state.

An IMT in Alaska, usually works for the responsible protection agency; BLM, AK-DOF or USFS. WFSAs and delegations will come through the protection agency Fire Management Officer (FMO). The Incident Management Team is supervised and evaluated by the protection agency FMO. The level of involvement in the preparation of the WFSA and interaction with the IMT from the land owner/manager varies from daily to non-existent.

Alaska Interagency Fire Management Plan - Wildland fire operations in Alaska are managed under the Alaska Interagency Fire Management Plan. This plan identifies four defined options of suppression response consistent with values at risk and resource objectives. The option area boundaries do not generally follow agency administrative boundaries but rather follow geographic or vegetative features. The four suppression options in decreasing priority are:

A. Critical: This protection option provides the highest priority to actions on fires that threaten human life, inhabited property, designated physical developments and areas such as National Historic Landmarks.

Fires in this option receive immediate, aggressive, sustained action with the goal of protecting human life, inhabited property and minimizing acres lost.

B. Full: This protection option was established for the protection of cultural and historical sites, uninhabited private property, high value natural resource areas and other high value areas that do not involve the protection of human life or inhabited property. Fires in this option receive immediate, aggressive, sustained action with the goal of protecting high value sites and minimizing acres lost.

C. Modified: This option is the most flexible available to land managers. The intent of the option is to provide a high level of response during those portions of the season when fire growth and intensity potentials are high, and a lower level of response when shorter days, increased precipitation and lateness of the season make fire growth potential low. Also, during periods of fire suppression resource shortage, these fires will have a lower priority for suppression resources than fires in the Critical or Full areas. Fires in this option receive suppression actions necessary to achieve land manager objectives. Generally, this means using natural barriers, indirect lines and firing operations while sacrificing acres for control.

D. Limited: Fires in this option are generally allowed to burn freely because:

- Suppression costs would exceed value of resources protected
- The environmental effects of suppression would exceed the impacts of the fire.
- Fire exclusion would be detrimental to the fire dependent ecosystem.

Fires is this area are normally allowed to burn with no action taken other than surveillance.

III. FUELS, WEATHER AND TOPOGRAPHY.

Fuels - The interagency fire community in Alaska utilizes the Canadian Forest Fire Danger Rating System (CFFDRS) for both fire danger prediction and fire behavior predictions.

The CFFDRS is a complex prediction system. IMTS ordered to Alaska should consider ordering an FBAN familiar with CFFDRS. The system utilizes the moisture content of surface fuels and the moisture content of certain duff layers to indicate levels of fire intensity.

The Fine Fuel Moisture Code (FFMC) represents the moisture content of litter and cured fine fuels. It expresses the ease of ignition and flammability. FFMC is sensitive to hourly changes in wind, rain, and temperature. The time lag is 2/3 day.

The Duff Moisture Code (DMC) represents the moisture content of loosely compacted duff (5-10 cm. deep) that determines resistance to control. DMC is sensitive to rain, RH and temperature. The time lag is 12 days.

The Drought Code (DC) represents the deep duff layer (10-20 cm deep) that determines resistance to extinguishment. It indicates seasonal drought. DC is sensitive to rain and temperature. Time lag is 52 days.

The interrelationships between FFMC, DMC, DC and wind speed produce the following outputs:

Initial Spread Index (ISI) represents a numerical rating of fire spread immediately after ignition. It fluctuates with wind speed and time of day. ISI is a combination of wind and FFMC.

Build Up Index (BUI) represents total fuel available for combustion. In the absence of rain, BUI fluctuates little throughout the day. BUI is a combination of DMC and DC.

Fire Weather Index (FWI) represents the intensity of a spreading fire, FWI is a combination of ISI and BUI.

These codes and indexes are interrelated, so the final product (FWI) doesn't give a complete picture of daily fire potential. FBANs and Operations personnel should have an understanding of the various indexes and their implications for fire behavior.

1. Tussock Tundra (CFFDRS Model 0-1b (Standing Grass))

   This fuel type is characterized by continuous grass cover with no more than occasional trees or shrub clumps that do not appreciably affect fire behavior. It has been characterized as a bunchgrass prairie where all of the space between the bunches are filled in with a thick cushion of other plants. The proportion of cured or dead material in tussock tundra has a pronounced effect on fire spread and must be estimated carefully. Tussock tundra in found on extensive areas of gently rolling land in western Alaska and on shallow slopes of many mountain valleys in the interior. Permafrost (permanently frozen ground) typically occurs beneath the tussock tundra. A thick organic layer is present between the permafrost and the surface fuels.

   Fire Behavior in Tussock Tundra.

   Tussock tundra is a flashy fuel. A 30% relative humidity, with a moderate wind will produce 3-foot flame lengths. A 15% RH with a 15 mph wind will result in flame lengths of 10 feet. The terrain simplicity of tussock tundra is a major advantage in suppression considerations. Tussock tundra is usually found on flat ground or on the lower 1/3 of gentle slopes. The depth of tundra burning is dependent on the dryness of the organic layer under the surface fuels.

2. Shrub Tundra (CFFDRS Model O-1a (Matted Grass))

Low shrubs such as blueberry and Labrador Tea, with occasional shrub birch or willow present dominate the shrub tundra fuel type. It is characterized as a treeless area of low or dwarf shrubs with moist conditions and sparse fuel. This model is used for fire behavior predictions because there is no CFFDRS model for this fuel type. The fire behavior predictions of the O-1a model closely approximate observed fire behavior in the tundra shrub fuel complex.

Fire Behavior in Shrub Tundra.

Fires are not common in this fuel type, due to moist conditions and sparse fuels. Fire is generally a smoldering fire of low intensity. When there is a large component of compacted dead grasses and sedges mixed with the shrubs, fires can burn with more intensity under dry conditions. Direct attack with hand tools and pumps is effective. Retardant is also effective unless there has been an extended period of dry weather.

3. Boreal Spruce-Feather Moss (CFFDRS Fuel Model C-2)

This fuel type is characterized by pure, moderately will stocked black spruce stands on lowland and upland sites on moist, poorly drained sites and typically underlain with permafrost. Tree crowns extend to or near the ground and dead branches are typically draped with bearded lichens. The flaky texture of the tree bark is pronounced. Maximum heights in mature stands seldom exceed 30 feet. Low to moderate volumes of down woody material are 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, but they are of little hindrance to surface fire spread. A compacted organic layer commonly exceeds a depth of 20-30 cm.

Fire Behavior in Boreal Spruce-Feather Moss

This is the problem fuel type in Alaska. Black spruce forests have a mattress-like layer of moss, lichens and dead material on the forest floor. The ground fuels are either dead or contain enough flammable substances to carry fire when dry. When the fire stays on the ground it is relatively easy to suppress. When it is burning hot and starts to involve the standing trees, it has intensities comparable to California brush fires. The surface fuels carry the fire with a crown fire following some distance behind the fire front, giving the impression of an independent crown fire. The black spruce branches will ignite from the surface fuel and carry flames directly into the crowns. The layering of the lower branches provides nearly continuous fuel from the forest floor to the tree crowns.

The key to black spruce crowning is the surface fuel and the low moisture content of the black spruce needles. The trees are always moisture starved, making the canopies ready to burn at any time. When the RH drops into the 40% range, individual torching will occur. If the wind speed is greater than 10 mph, anticipate a slow moving crown fire with a surface fire ahead of the crown fire. As the RH falls into the 30% range, fire intensity increases and with wind speeds of 10-20 mph, or higher, expect a full-blown running crown fire with extensive spotting. An RH of less than 30% is always a dangerous situation. Crown fires are almost certain, and the fire is too intense for direct attack. Any wind component with less than 30% RH will cause spotting across all but the widest of fuel breaks. Black Spruce will exhibit extreme fire behavior when temperatures exceed 80 and the RH falls below 30%. Feather moss is an excellent indicator of fuel moisture as it crumbles when dry, and is resilient when RH is increased. A significant change can be observed in a 20-minute drying period.

4. Spruce Lichen Woodland (CFFDRS Fuel Model C-1)

This fuel type is characterized by open, park-like black spruce stands occupying well-drained uplands. Forest cover occurs as widely spaced individuals and dense clumps. Tree heights vary considerably but branches uniformly extend to the forest floor and layering is extensive. Woody surface fuel accumulation is very light and scattered. Shrub cover is sparse. The ground surface is fully exposed to the sun and covered by a nearly continuous mat of reindeer lichens.

Fire Behavior in Spruce Lichen Woodland.

Fire behavior is spruce lichen woodland does not exhibit the intensity or rate of spread found in the boreal spruce fuel type. There will be single trees and clumps of trees torching with short-distance runs in the large patches of continuous boreal spruce. The shallow organic layer in this fuel type is the key difference between it and the boreal spruce model. Control and mop up operations are much easier in the Spruce-Lichen fuel type.

5. Boreal Mixedwood - (CFFDRS Fuel Model M-1 (Leafless) and M-2 (Green)

This fuel type, consists of varying proportions of the following coniferous and deciduous species: black spruce, white spruce, quaking aspen, paper birch and balsam poplar. On any specific site, individual species can be present or absent from the mixture. In addition to the diversity in species composition, stand mixtures exhibit wide variability in stand structure and development, but are generally confined to moderately well drained upland sites. The leafless phase (M-1) occurs during the spring and fall, pre-green up and post-cured states. The green phase (M-2) occurs during the summer. The rate of spread is weighted according to the proportion of softwood and hardwood present in the stand. During the summer when the stands are in leaf, fire spread is greatly reduced with maximum spread only one-fifth of a spring fire burning under similar conditions.

Fire Behavior in Boreal Mixed Woods

This is a major fuel type and is not normally a problem fuel. Fire generally creeps in the surface fuels with crowning trees occurring less frequently than in boreal spruce. The hardwoods usually serve as a natural barrier and offer a firebreak in all but the rare periods of extended drought. A crowning spruce fire will normally drop to the forest floor when encountering a stand of hardwoods. It is critical to assess the amount of spruce in these closed stands. More than one IMT has been surprised by a "hard wood stand" than failed to act as a natural barrier.

6. White Spruce

White spruce stands often meet black spruce stands near lakes or streams and form a very different fuel situation than black spruce. The white spruce stands are on wetter sites and fire often does not pass through these sites. During most burning conditions, white spruce stands offer an opportunity to slow the fires progress. There is often a large loading of dead and down fuels and the fire is usually a smoldering surface fire, which may be difficult to extinguish. However, under dry conditions and especially with steep slopes or strong winds, fires of extreme intensity do occur. In years of extended drought conditions, white spruce stands should not be considered a fuel break or a safe refuge for firefighters.

IV. STRATEGY AND TACTICS

A. Strategic Considerations.

An IMT will utilize direction in the WFSA and Delegation of Authority to determine appropriate strategies. In the process of forming and choosing an appropriate strategy consider the following:

- Indirect attack is often the most viable strategy. Sacrificing acres for control is an accepted and generally preferred strategy.

- Utilization of natural barriers such as lakes, ponds, streams, rock outcroppings and changes in fuel types makes line construction quicker and more secure.

- Burn out of indirect line is necessary to secure perimeter.

- Timing of indirect line construction is critical. Ensure that adequate time is given to construct line and conduct burnout operations. Be aware that many miles of indirect line has been constructed, only to have weather conditions moderate enough to make burnout not viable.

- The difficulty of the terrain makes it infeasible to keep up with a running fire during direct attack.

- Both direct and indirect line construction are heavily dependent on aircraft support. Without adequate air support, direct attack is virtually impossible.

- During periods of extreme fire behavior, the only viable option is defense of critical sites, instead of containment of the main fire front.

B. Tactical Considerations.

- Utilize natural barriers, don't build line parallel to white spruce stands, hardwoods, water bodies or other barriers.

- Don't underestimate the time it takes for crews and other line personnel to move cross- country.

- Retardant is not always effective in tundra, where the fire can burn under the retardant.

- Mineral soil handline is almost never constructed due to the time it takes to dig handline in the thick organic mat.

- Handline construction is usually a combination of brush and tree removal, wetline and beating the flames out with burlap bags, spruce boughs or flappers.

- Water is necessary for mopup in almost all situations.

- Aerial ignition is preferable for burnouts, due to the length of time necessary for hand ignition.

- Spot fires and ragged, fingered fire edges are the norm.

- Dozer line works well, where allowed. Be aware of heavy equipment being stuck in waterways, bogs, etc.

- Cold trailing of black line is fast, effective and acceptable as a line construction method.

- Don't allow a little rain to fool you. More than one IMT has been rudely reminded how quickly fuels dry out.

V. CONSIDERATIONS UNIQUE TO ALASKA

A. Animal Hazards - Black and brown bears are common on fires throughout the state. Preventive measures such as clean camps, regularly backhauled garbage and avoidance of bear trails are essential to bear safety. Coordination with the Alaska Department of Fish and Game is necessary to deal with problem bears. Moose, especially cows with calves, are also a real safety hazard.

B. Water - It should be assumed that all natural water sources are infested with Giardia and not suitable for human consumption.

C. Fire Shelters - Fire Shelters are required PPE in Alaska. *Use of the fire shelter is limited by areas of the state that have thick organic mats where deployment of the fire shelter would be appropriate.* Firefighters must be made aware of where and when a fire shelter should be used.

D. 24 hour sunlight - The fact that the sun does not "set" results in a 24-hour burning period with little nighttime humidity recovery. Operations, including air, can be conducted round-the-clock for most of June and July.

E. Retardant Use - Retardant is usually limited to initial attack operations. Dedication of retardant aircraft to ongoing project fires is rare.

F. Type 2 Crews - Most of the Type 2 Crews available are Emergency Fire Fighters (EFF) from the rural communities and villages throughout the state. Crew size is 16 persons.

G. Logistics - Few, if any, national contracts. Long distances by both air and road from supply bases to incident locations. Communication infrastructure is limited.

H. Paracargo - Paracargo is available for supply of remote sites or remote portions of large fires.

I. Permafrost - Much of fire prone Alaska is underlain with permafrost (permanently frozen ground). Fireline, hand or mechanized, must be carefully considered and located in conjunction with resource advisors. Fire line rehabilitation must be accomplished early to avoid serious erosion.

J. Navigation - The lack of points of reference, the fact that the sun circles overhead rather than moves from east to west and the typically dense forest cover make line locating, spot fire locating, lookouts and general navigation difficult. It is very easy to become lost and lose any reference to the fireline, camp or other location.

VI. SUMMARY

An IMT arriving in Alaska will typically be faced with 24 hours of sunlight, a large population of mosquitoes, and the following:

- A large fire (25,000 +) with interface complexities.
- A need for both direct and indirect attack with many miles of line to construct, hold and mop-up.
- Extreme fire behavior in seemingly mild weather conditions and "green" fuels.
- Logistical problems not common to the lower-48.

- Highly changeable weather that is relatively poorly predicted.
- Fuel conditions that change rapidly and often.
- Limited resources for the size of the fire.

VII. FUNCTIONAL CHECKLIST

Command

- IC will receive a WFSA and Delegation from the suppression agency. You may also receive direction from the land manager/owner, depending on their time, energy and interest.
- Request resource advisors early for assistance with the fire plan, 638 contracting and other issues.
- Remember logistics may often limit your strategic options.
- Involve all jurisdictions with suppression responsibility in the command structure.
- Alaska may be the Last Frontier, but politicians and the media exhibit the same interests and predilections here as they do in the lower-48.
- Become familiar with the Alaska Interagency Crew Management Guide.
- Consider acquiring an Alaska Technical Advisor.

Operations

- Think and plan for indirect attack.
- Learn the basics of the Canadian Forest Fire Danger Rating System (CFFDRS).
- Prepare for variable weather and rapid changes in fire behavior that will challenge chosen strategies.
- Solicit and use local knowledge.
- Aviation and/or logistics may dictate your IAP.
- Alaska uses Aerial Supervision Modules for combined air attack/lead plane missions.
- Use spike camps to lessen walking and flying time to the line.
- Rain does not put fires out in Alaska. Rain and good mopup does.

Logistics

- Always have a minimum of three days food and water on site.
- National contractors do not exist in Alaska. You will need to be flexible and innovative in supporting the incident.
- Personal hygiene is a problem because of the shortage of shower units, wash stands, etc.
- The road network is limited.
- Lead time on non-cache items will be lengthy.
- Utilize paracargo for support to spike camps.
- Prepare camps, personnel, etc. for rain.

Planning

- Obtain an Alaska plans kit.
- Mapping is usually done aerially.
- 24 hours of daylight will affect operational periods, planning and staffing.
- Numerous spike camps will make briefings and debriefings difficult.
- Alaska specific ICS 209.

Finance

- Obtain an Alaska finance kit.
- Commissary is very different than in the lower-48.
- Local fire departments are almost exclusively under agreement with the State of Alaska-Division of Forestry (DOF). Obtain an advisor from DOF as soon as possible.
- Obtain an Alaska specific finance briefing and obtain existing handbooks.

Safety

- Camp sanitation is a problem.
- Animal hazards. Be prepared and prevent problems.
- Limitations to the use of fire shelters.
- Extensive air operations.

- Fatigue problems due to 24-hour sunlight and difficult terrain.
- Unexploded ordinance on military lands.
- Become familiar with the Alaska Fire Medic Program.

Information

- Limited communications infrastructure.
- Any fire with a Type 1 IMT will have statewide interest and coverage.
- Local community information, meetings and presentations will be critical.
- Access to the fireline will be difficult and probably require aviation support. Consider pool for filming.