# State of Alaska

Department of Natural Resources
Division of Forestry

# Wildland Fire and Aviation Basics

# THE BASICS

DIVISION OF FORESTRY WILDLAND FIRE AND AVIATION

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Wildland Fire Basics
Updated
April 2008


*Cover Photo 1: Forestry vehicles parked near the Parks Highway Fire, 2006. Credit: Unknown*
*Cover Photo 2: Helicopter with bucket over the Caribou Hills Fire, 2007. Credit: © Used by permission, DLaForest*
*Inside Photo: Alaska Division of Forestry wildland fire engines in Montana, 2007. Credit: Engine Crew Member*

# THE BASICS

STATE RESPONSIBILITY FOR FIRE PROTECTION

## PURPOSE

The goal of the Division of Forestry Fire and Aviation Program is to provide safe, cost-effective, and efficient fire protection services and related fire and aviation management activities to protect natural resources and human life on State, private, and municipal lands, commensurate with the values at risk.

The objectives of the Division of Forestry are to:

- Protect human life
- Emphasize aggressive and effective initial attack suppression operations on Critical and Full protection level fires that threaten life and property
- Protect developed public and private property and cultural resources
- Promote an interagency approach to managing wildland fire
- Minimize cost and resource damage consistent with the values at risk
- Promote personal and public responsibility to reduce the threat of wildland fires
- Prevent unplanned, human-caused ignitions
- Promote public understanding of fire management programs and objectives
- Organize and maintain a fire management capability to apply the highest standards of professional and technical expertise
- Investigate all human-caused fires

*Site protection along the Taylor Highway. Credit: Unknown*

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# Alaska Statute Related to the Wildland Fire Program

**Alaska Statutes Section 41.15.010 - 41.15.240 mandates the Department of Natural Resources the responsibility to manage the wildland fire program for the State of Alaska. Department of Natural Resources Department Order 113 delegates this responsibility to the Division of Forestry.**

# THE BASICS

IMPORTANT ASPECTS OF THE FIRE AND AVIATION PROGRAM

## INTERAGENCY COORDINATION/ COOPERATION

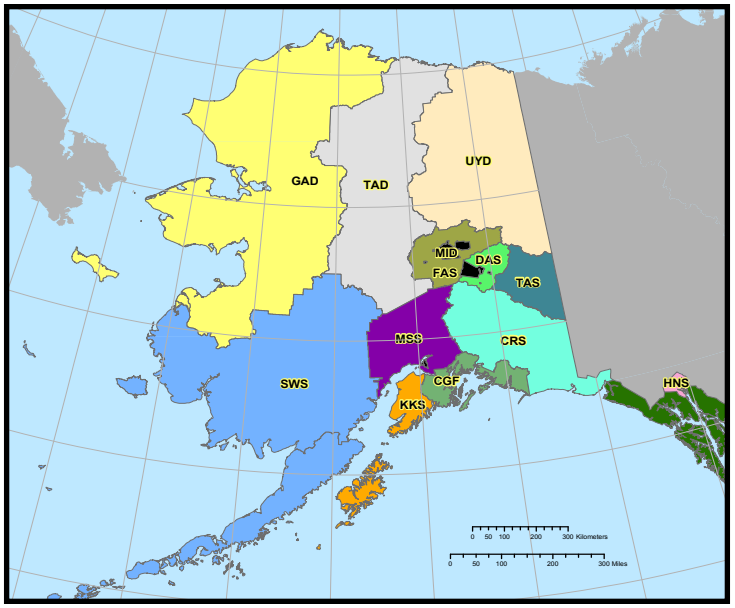
Fire management planning, preparedness, suppression operations, prescribed fire, and related activities are coordinated on an interagency basis with the full involvement of the Alaska Division of Forestry (DOF) and its State, Federal and local government cooperators. Alaska is divided into three fire protection areas through formal agreements between the State and the Federal government. The Division of Forestry, Bureau of Land Management, and the USDA Forest Service fight fires within their protection areas on all land ownership, which reduces the duplication of facilities and services.


None of the agencies in Alaska have all of the resources required to accomplish the fire protection job on their own. The Division of Forestry has cooperative agreements with the Departments of Agriculture and Interior, and numerous local government and structure fire departments to help get the job done. The Division of Forestry and Federal agencies routinely use each other's personnel and resources to both manage and fight fires. This is efficient and cost effective.

The three suppression agencies are responsible for their own preparedness costs in order to be ready to fight fire on all lands in their protection area, regardless of ownership. When fire activity occurs, the appropriate suppression agency responds to the fire, guided by the level of protection selected by the land owner/manager in the Alaska Interagency Fire Management Plan. At the end of the fire season, the agencies cross-bill each other for the suppression costs based on ownership. The State of Alaska is responsible for the suppression costs on all State, private and municipal lands.

The "closest forces" concept is most effective in catching fires while they are small because the agency closest to the fire responds first. In some areas of the state, the closest forces are local government and structure fire departments. These forces assist DOF in responding to wildland fires when their higher priority of structure protection allows. Wildland firefighting and structure firefighting are very different and require different training and equipment.

The interagency response to wildland fires statewide is coordinated by the Alaska Interagency Coordination Center (AICC) located in Fairbanks. This center is jointly staffed and managed by State and Federal employees, and coordinates the mobilization of interagency personnel and resources to fires statewide. Duplication of separate facilities for State and Federal suppression agencies is avoided, resulting in fast and efficient response to wildland fires.

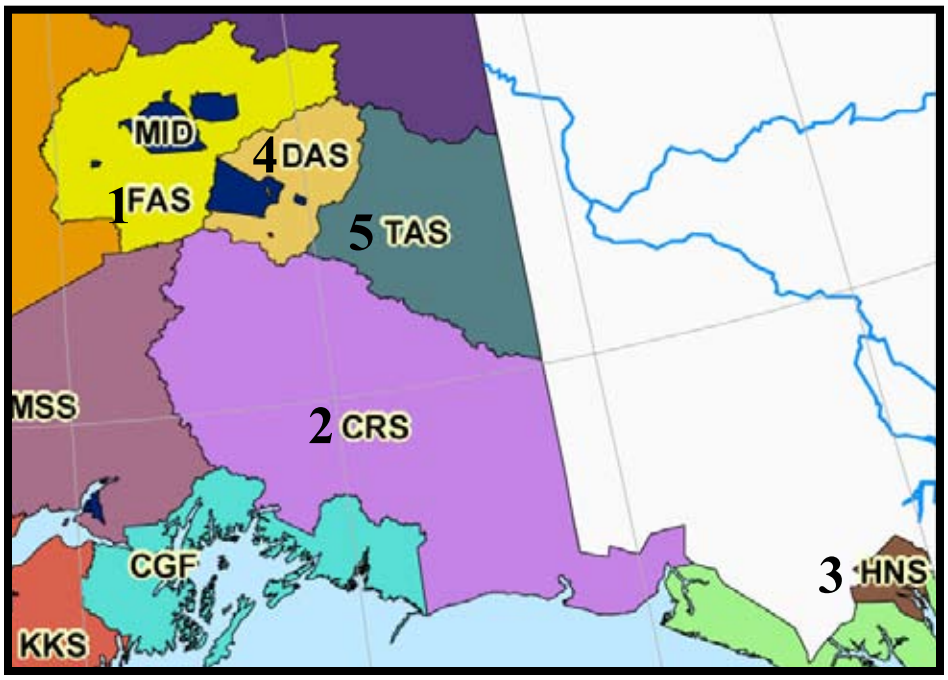



*Above: State and Federal Suppression areas. See p. 5-6.*
*Below: Coordination with fire departments. Credit: Unknown*

# THE BASICS

IMPORTANT ASPECTS OF THE FIRE AND AVIATION PROGRAM

## STATE PROTECTION AREAS



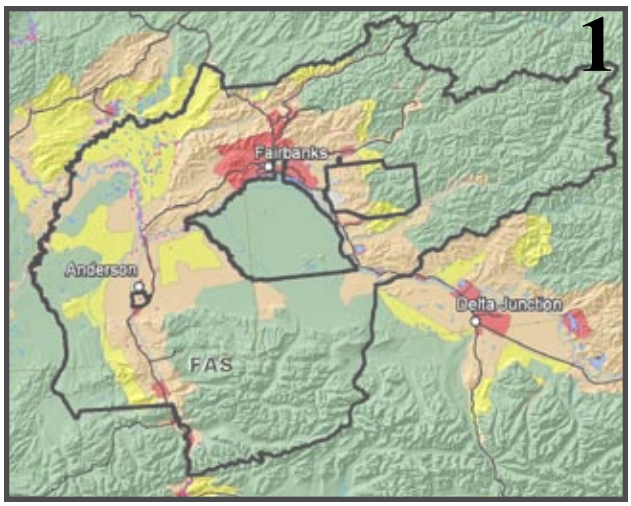

1- Fairbanks Area (FAS)

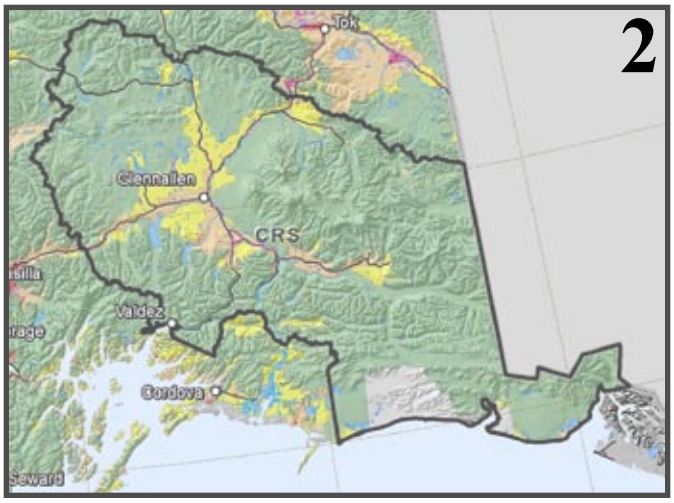
2- Valdez-Copper River Area (CRS)

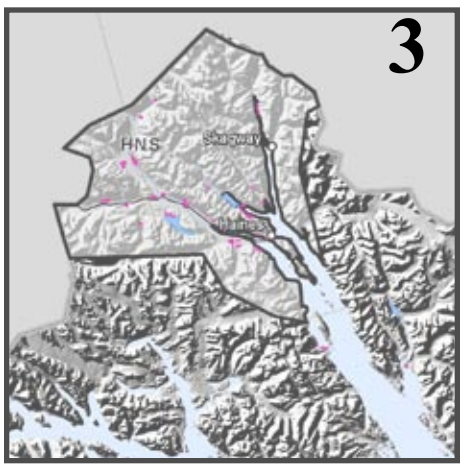
3- Northern Southeast Area (HNS)

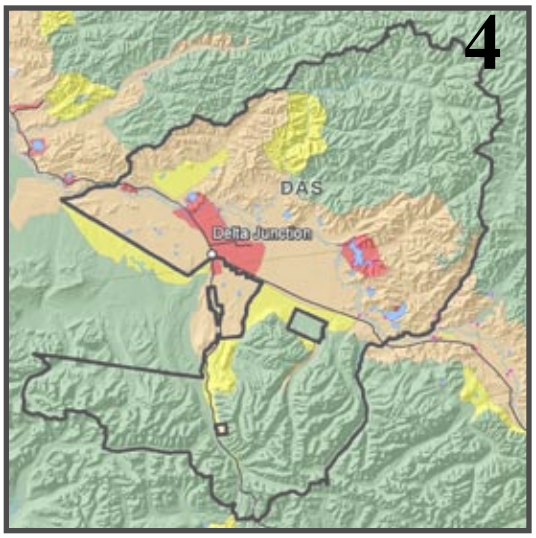
4- Delta Area (DAS)

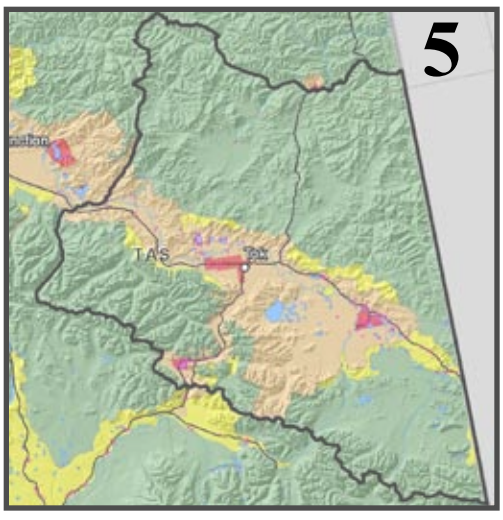
5- Tok Area (TAS)



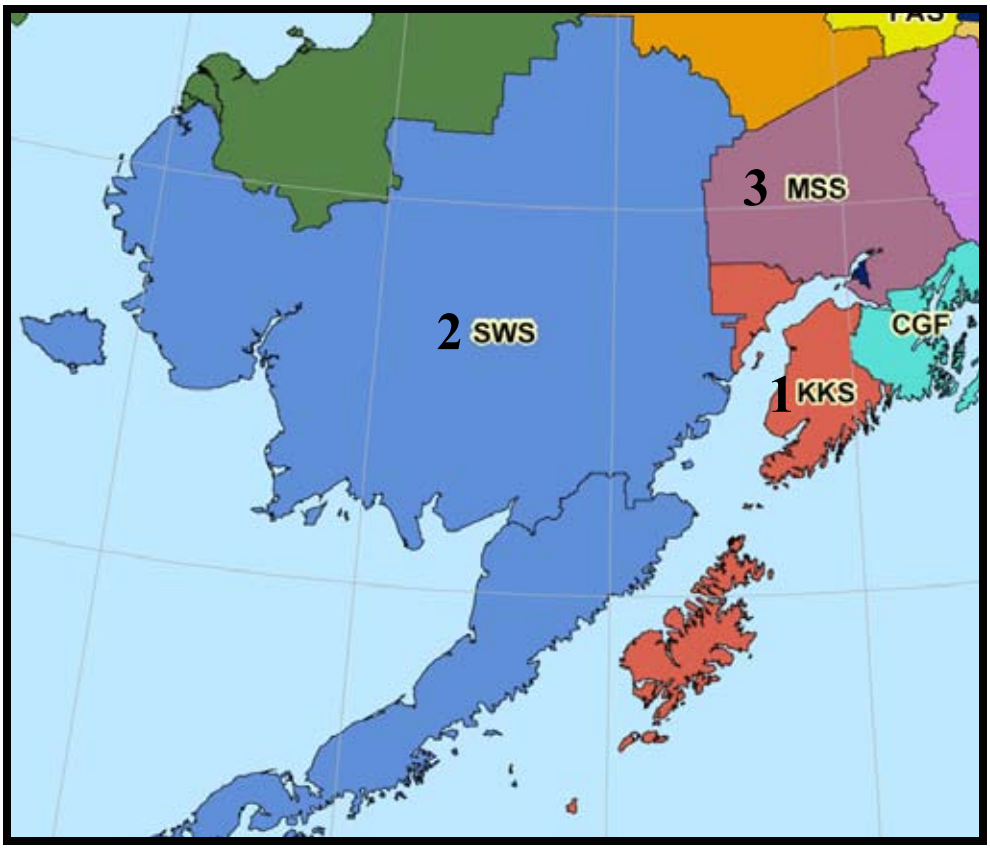



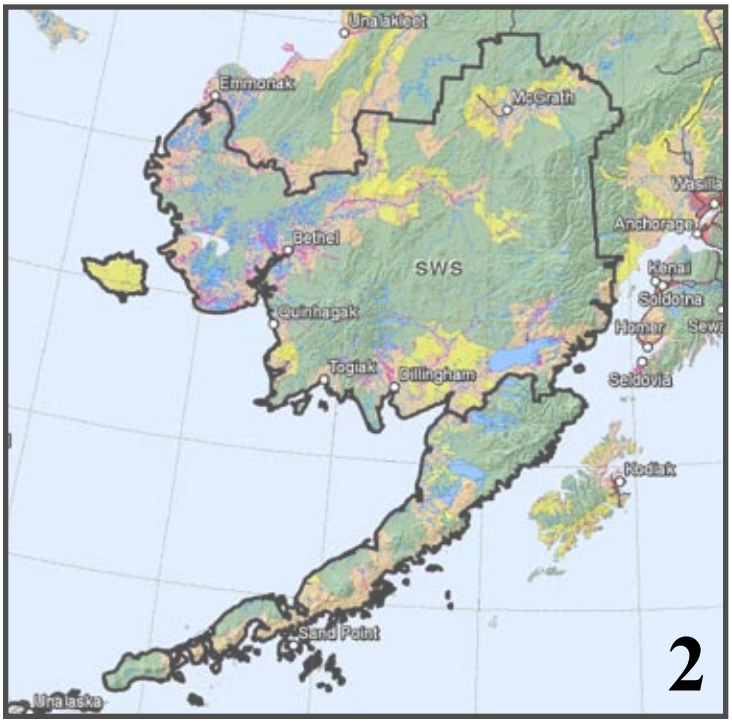
# THE BASICS

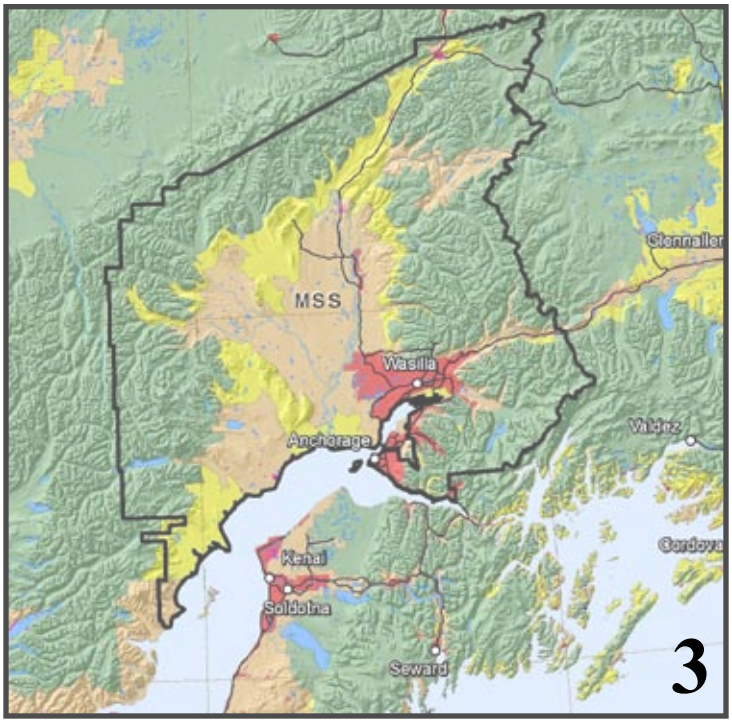
IMPORTANT ASPECTS OF THE FIRE AND AVIATION PROGRAM

## STATE PROTECTION AREAS








1- Kenai-Kodiak Area (KKS)

2- Southwest Area (SWS)

3- Mat-Su Area (MSS)

# THE BASICS

IMPORTANT ASPECTS OF THE FIRE AND AVIATION PROGRAM

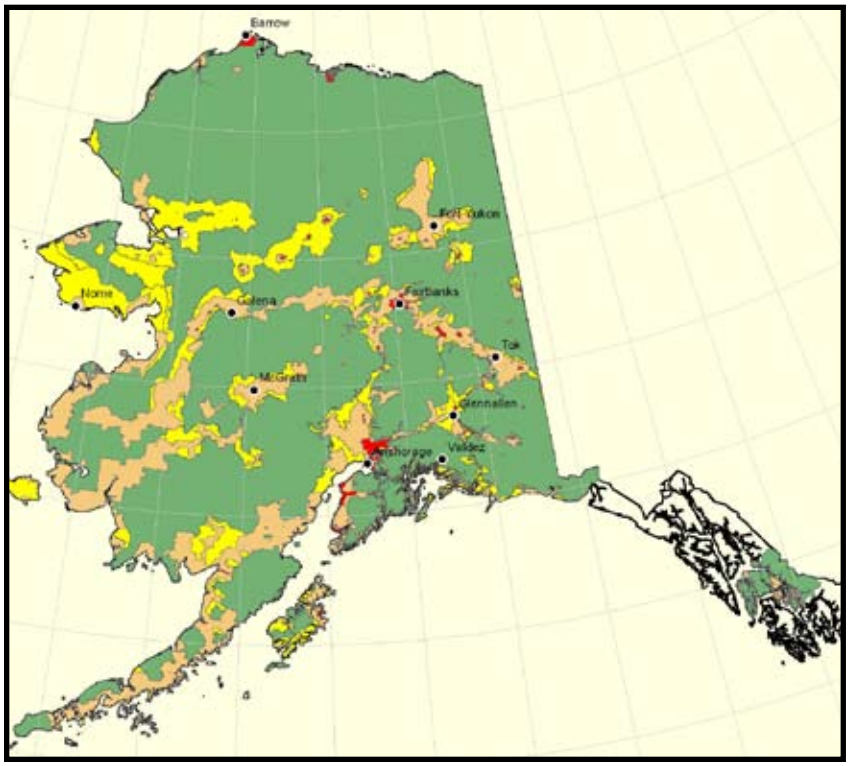
## AIWFMP

# Alaska Interagency Wildland Fire Management Plan

The State of Alaska has adopted the AIWFMP as the fundamental guideline for managing wildland fire in Alaska. The plan was developed and signed in the 1980s to provide a coordinated and cost effective approach to fire management on all lands in Alaska. The fire plan is nationally recognized as a success.

Alaska is the only state that has implemented one interagency fire plan that covers all land ownerships. Reliance on the fire plan greatly aids fire managers because decisions on which areas to protect and at what levels are already made. The fire plan categorizes all wildland fire-prone lands into four different Fire Management Options: Critical, Full, Modified, and Limited.

The AIWFMP dictates the prioritization of initial attack resources. If a fire escapes initial attack, a Wildland Fire Situation Analysis (WFSA) is prepared by fire managers and land managers/owners. The WFSA incorporates the fire situation, safety concerns, resource analysis, suppression alternatives, and cost analysis in the decision criteria. Land managers and fire managers then select an alternative to manage the large fire in a safe, cost effect manner that meets resource objectives without jeopardizing public safety.




Each year, land owner and land managers review the Management Options with fire suppression personnel to identify plan implementation problems and operational concerns. If the land managers/owners determine that an Option change is necessary, a request is made to the local suppression organization prior to March 1st of the next fire season.

**Critical Management Option – (Red)** Created to give the highest priority for suppression action on wildland fires that threaten human life and inhabited property.

**Full Management Option – (Orange)** Protects cultural and historical sites, uninhabited private property, and high-value resource areas.

**Modified Management Option – (Yellow)** Lands in Modified generally receive the same level of protection as those in the Full Management Option in the early fire season (a conversion date of July 10th). After the conversion date fires in Modified are evaluated as Limited.

**Limited Management Option – (Green)** Limited Management Option lands are generally very remote, difficult to protect, have lower resource value, and as such receive limited fire suppression. Monitoring and individual site protection consistent with agency policy are typical strategies.

# THE BASICS

IMPORTANT ASPECTS OF THE FIRE AND AVIATION PROGRAM

## WILDLAND FIRE SAFETY

*Safety of firefighters and the public is the highest priority. All fire and aviation activities related to the suppression of wildland fires will reflect this commitment. The Division of Forestry has a very good safety record, and the attitude is reflected in all levels of the organization.*

LOOKOUTS

COMMUNICATIONS

ESCAPE ROUTES

SAFETY ZONES

*Night fire on the Taylor Complex, 2004. Credit: Sarah Saarloos*

## 10 Standard Fire Orders

**Fire Behavior**

1. Keep informed on fire weather conditions and forecasts.
2. Know what your fire is doing at all times.
3. Base all actions on current and expected behavior of the fire.

**Fireline Safety**

4. Identify escape routes and make them known.
5. Post lookouts when there is possible danger.
6. Be alert. Keep calm. Think clearly. Act decisively.

**Organizational Control**

7. Maintain prompt communications with your forces, your supervisor and adjoining forces.
8. Give clear instructions and insure they are understood.
9. Maintain control of your forces at all times.

If 1-9 are considered, then...

10. Fight fire aggressively, having provided for safety first.

## 18 Watch Out Situations

1. Fire not scouted and sized up.
2. In country not seen in daylight.
3. Safety zones and escape routes not identified.
4. Unfamiliar with weather and local factors influencing fire behavior
5. Uninformed on strategy, tactics, and hazards.
6. Instructions and assignments not clear.
7. No communication link between crew members and supervisors.
8. Constructing line without safe anchor point.
9. Building line downhill with fire below.
10. Attempting frontal assault on fire.
11. Unburned fuel between you and the fire.
12. Cannot see main fire, not in contact with anyone who can.
13. On a hillside where rolling material can ignite fuel below.
14. Weather gets hotter and drier.
15. Wind increases and/or changes direction.
16. Getting frequent spot fires across line.
17. Terrain or fuels make escape to safety zones difficult.
18. Feel like taking a nap near fireline.

# THE BASICS

IMPORTANT ASPECTS OF THE FIRE AND AVIATION PROGRAM

## FIRE TRAINING AND WEATHER FORECASTING

In 1984 the State of Alaska adopted the National Interagency Incident Management System Incident Command System concept for managing its fire suppression program. The Incident Command System (ICS) guiding principles are followed in all wildland fire management operations. All State departments adopted ICS in 1996 through the Governor's administrative order. Personnel are trained in specific ICS positions and meet national standards. This allows DOF to call upon fire professionals from across the nation when needed, and makes Alaskan firefighters marketable to Lower-48 fires. A cost saving is directly realized by not having to train and staff to a "worst case" level for fire response.


*Alaska Type 1 Incident Management Team travels to incident in the Lower-48, 2006. Credit: Maggie Rogers*

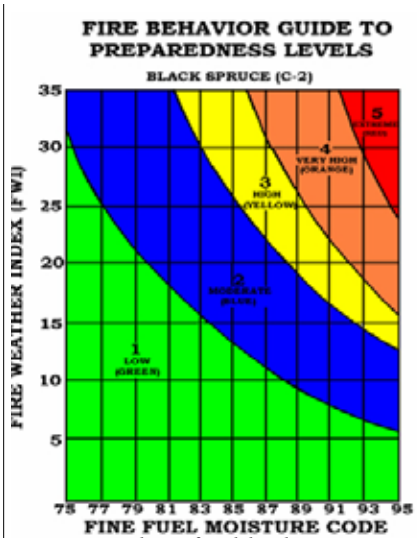
The Division of Forestry has adopted the National Wildfire Coordination Group (NWCG), Wildland Fire and Prescribed Fire Qualifications System Guide (PMS 310-1) as the basis for its wildland fire qualifications system. Personnel must meet the appropriate training, experience, fitness, and qualifications (Red Card) requirements for all fire and aviation tasks assigned. Training is also provided to meet other mandated requirements such as Hazardous Materials and blood-borne pathogens, etc.

Personnel must be trained to national standards for each ICS job function, must be prepared to react immediately to a variety of dangerous situations, ensure that procedures and policies are followed, and that the most cost effective decisions are made. Seasonal employees budgeted for five months a year or less fill many of the critical fire positions. A top fire position may require up to 15 years of training and experience. Retention of such an individual is extremely important to maintain a cost effective and safe fire program.

A single decision can save the State millions of dollars, and often it must be made immediately by a highly quali-

## Weather Forecasting and Fire Danger Rating System

A network of weather stations and a dependable forecasting service are essential for daily decision-making and long-range predictions. Weather information is the basis for a sophisticated computer generated fire danger rating system. The Division of Forestry utilizes the Canadian Forest Fire Danger Rating System to predict the potential fire danger based on the current and predicted weather. This scientifically developed and proven system provides a variety of data used to predict fire behavior, preposition resources, formulate fire strategy, and develop tactics to fight a fire. This information is compiled and accessed through the Internet and can be accessed by the public on the Division of Forestry website at: http://www.dnr.state.ak.us/forestry




*Intensity class for black spruce, based on Fire Weather Index and Fine Fuel Moisture Code.*

*Remote Automated Weather Station*

# THE BASICS

IMPORTANT ASPECTS OF THE FIRE AND AVIATION PROGRAM

# PREPAREDNESS, DETECTION, SUPPRESSION

A successful initial attack can save the state millions of dollars in suppression costs. A trained, experienced, and well-equipped workforce is essential to locate and initial attack wildland fires while they are small. The cost of a successful initial attack averages $4 thousand dollars per fire compared to costly "project" fires that can cost from $3 million to $30 million dollars to suppress. One of DOF's top priorities is the aggressive and effective initial attack of wildland fires in the Full and Critical protection areas of the state.

Seasonal employees are the backbone of the fire suppression program. They are an experienced and qualified work force, many of whom have worked for DOF 10-15 years. Their expertise provides the basis for DOF's ability to expand from a few dozen employees to over a thousand within a day or two and be fighting fires immediately.

The Division of Forestry has 180 seasonal fire positions funded in its current budget. Depending on the position, funding would provide an average of 5.0 months. These employees fill a variety of fire protection positions, including those listed below.

### Examples of DOF Seasonal Job Positions

- Initial Attack Firefighter
- Airbase Manager
- Division Supervisors
- Engine Foreman
- Airplane Pilot
- Strike Team/Task Force Leaders
- Crewman-Engine/Aviation
- Air Attack
- Staging Area Manager
- Fire and Aviation Instructors
- Dispatcher
- Procurement
- Facilities Unit Leader
- Support Foreman
- Warehouse Worker
- Logistics Coordinator
- Payroll Clerk
- Prevention Specialist
- Field Office Assistant
- Operations Chiefs

## Preparedness

Preparedness is one of the most important aspects of the Division's Fire & Aviation Program. Division of Forestry's fire managers are responsible for providing a safe, cost-effective fire management program through appropriate planning, staffing, training, and equipment levels. No one can predict exactly where or when fires will occur, but there will be wildland fires. Firefighters, equipment, facilities, and all the support elements it takes must be ready before a wildland fire starts. Preparedness reduces the risk of escaped fires and saves the state money.

## Detection

The faster a fire is located, the quicker firefighters are on the scene. Bush pilots and commercial airlines report many fires, but a sophisticated lightning detection system identifies areas of concentrated lightning strikes where detection aircraft flights are then concentrated.

*Engines ready for call out. Credit: Unknown*

## Federal Excess Personal Property

Forestry takes advantage of the Federal Excess Personal Property program to acquire firefighting aircraft, vehicles and equipment. Use is restricted to 90-percent firefighting activities; no title is passed to the State, all expenses in maintaining equipment rests with the State, but the State avoids the cost of purchase for similar equipment.

*Converted excess military 4x4 pick-up to fire engine. Credits: Scott Christy*

# THE BASICS

IMPORTANT ASPECTS OF THE FIRE AND AVIATION PROGRAM

## AVIATION

*Left: Two CL-415 water-scooping air tankers draw water from a lake. Credit: Mike Bobo*
*Insert: PC-7 Air Attack Platform. Credit: Bruce Smith*

The Division of Forestry provides fire protection services on 150 million acres of land. Much of it is remote, inaccessible, and requires the use of airplanes and helicopters. The Division of Forestry contracts the majority of its aircraft resources from the private sector. Personnel from DOF manage and operate a combination of air tankers, helicopters, and miscellaneous fixed wing aircraft to deliver firefighters, mobilize emergency firefighters, move equipment and supplies, and drop fire retardant on fires. Close coordination between the State and Federal agencies maximizes the use of aviation resources. Cooperative State and Federal aviation management saves money.

*Above Left: Fairbanks Forestry Helitack Crew. Credit: FAS*
*Above Right: Air tanker makes drop over Caribou Hills Fire, 2007. Credit: Paul Slenkamp*

# THE BASICS

IMPORTANT ASPECTS OF THE FIRE AND AVIATION PROGRAM

## EMERGENCY FIREFIGHTER CREWS

In addition to its permanent seasonal workforce, the DOF relies heavily on Emergency Firefighters (EFF). Emergency firefighters are hired on an as-needed, short-term basis, and are used to augment the DOF workforce in all areas of the firefighting job. Individual EFF are hired to function as initial attack firefighters, warehouse workers, aviation ramp workers, etc. Sixteen person village EFF crews are hired when large numbers of organized and trained firefighters are required. There are a total of 73, 16-person Type 2 EFF crews in Alaska. Predominantly from rural villages, these largely Alaska Native crews are trained to national firefighter standards, used for wildland firefighting in Alaska, and are available to be dispatched to the Lower-48. The Division of Forestry manages 29 of these crews, providing Incident Command System and wildland fire training, fitness testing, and Red Card issuance. An average of $6.4 million in wages is paid annually to Alaska's Emergency Firefighters, bolstering rural economies that often predominantly rely upon subsistence. The performance of Alaskan EFF crews is respected and valued in Alaska and in other states where they have fought fire. Encouraging, maintaining, and supporting the existing Emergency Firefighter crews is a priority for a solid fire program in Alaska. The ability to rapidly expand a small core organization to fight fires is critical. Training of the core staff, combined with strong cooperative agreements, provides the ability to expand rapidly with a safe, well functioning organization. Similarly, DOF also supplies personnel for Federal fire emergencies. Without the ability to exchange resources, DOF would be required to have a vastly larger and more costly fire suppression

*Emergency Firefighter crews. Credit: Unknown*

EFF crews supplement Type 2 firefighting crews in the Lower-48. In years when there is a heavy national demand for resources, Alaska EFF crews are sent to provide additional support.

*Left: Five, 20-person EFF crews prepare to board a jet to go to the Lower-48, 2006. Credit: Maggie Rogers*

*Above: Loading the jet. Credit: Maggie Rogers*

# THE BASICS

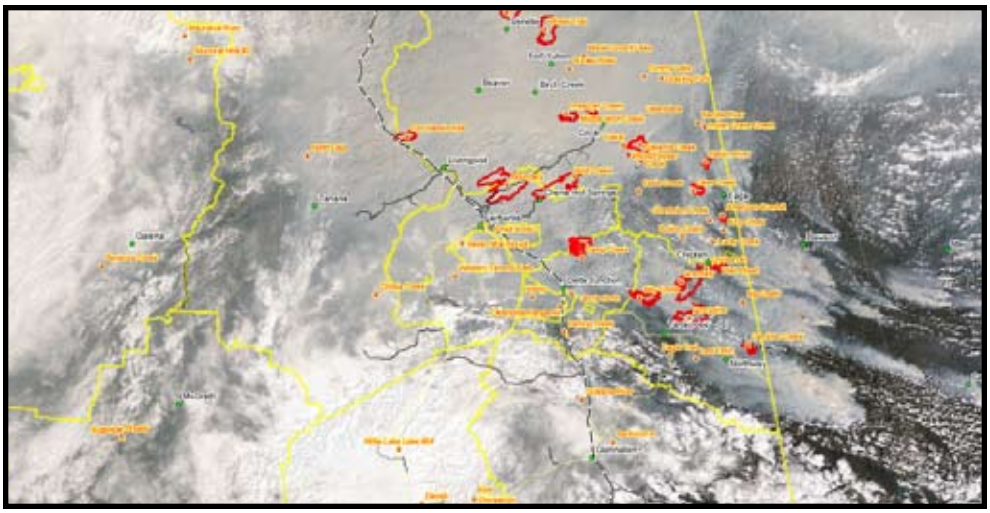
IMPORTANT ASPECTS OF THE FIRE AND AVIATION PROGRAM

## MANAGEMENT PRACTICES

Appropriate and effective management is critical to successful and cost effective results in wildland firefighting. Firefighters must get to a fire with the tools they need to fight it within a minimal period of time. Food, tents, vehicles, equipment, and medical supplies will be needed and must be mobilized to the fire, then demobilized and refurbished to be ready for the next fire call.

Alaska averages nearly 500 fires per year and DOF manages the majority of that workload. Because of immediate threat to life, these are the most critical fires to stop with aggressive and successful initial attack. As urban areas continue to expand into the wildland, this workload continues to increase.

Lightning is the primary cause of the large wildland fires across the Interior, producing as many as 8,000 strikes per day. It is not uncommon to have 50 to 80 lightning fires burning in different locations at the same time.



*Modis satellite imagery from July 3, 2004. Shows some of the many fires burning at once.*

Personnel and resources' (airplanes, helicopters, retardant, equipment, etc.) workload are directly impacted by the number of fires burning at the same time. As shortages of resources occur, priorities must be set to allocate personnel and equipment to fight the most critical fire first. Coordination occurs statewide by moving forces to the most critical areas as needed. Managing the workforce rapidly and efficiently results in more effective initial attack and suppressing wildland fires faster saving the State money by preventing larger fires.

In some of the organized boroughs and municipalities, landowners are taxed for fire services that are used mainly for structure fire protection. The wildland fire responsibility in the organized service areas is a shared responsibility between local government and DOF. The Division of Forestry provides critical wildland fire and Incident Command System training to structure firefighters and, in some instances, loans fire equipment and Federal Excess Personal Property fire engines to the local government and fire departments.

## Support Services

Every fire requires not only having firefighters but a large inventory of equipment and supplies that are dispatched to fires all over the state, returned, repaired, refurbished, and restocked. This is accomplished through a complex logistical support system that includes procurement, property management, and fire warehousing. Adherence to national standards are required for interchangeable support with federal agencies. Fast, accurate response is provided by a dispatching system of highly qualified personnel which must be in place and prepared.

The state bills federal cooperators for fighting fires which start on federal land under their protection, and the federal government bills the state in a reciprocal manner. Historically, this has provided a net reimbursement to the State's general fund of over $16 million annually. Recovering state costs depends entirely on accurate and complete management of contracts, payroll, procurement, bill paying, accounting, personnel regulations, statistics, property management, and audits by a trained and experienced administrative staff. The regular field employees must have a working knowledge fire business management principles.

# THE BASICS

IMPORTANT ASPECTS OF THE FIRE AND AVIATION PROGRAM

## EDUCATION AND PREVENTION

Approximately 86-percent of all wildland fires in Alaska are started by human carelessness, making prevention one of the most important aspects of the DOF program. Prevention activities are accomplished by Division personnel across the state through school visits by Smokey Bear and other public education programs. Enforcement of the Alaska Statutes is also very important, and DOF issues citations and collects fire damages based on the circumstances of the escaped, human-caused fire. An aggressive wildland fire prevention program can reduce the numbers of unwanted human-caused fires.

The Division of Forestry is actively promoting the FireWise concept in Alaska. FireWise is an educational program aimed at homeowners, land developers, zoning officials, and other groups with the goal of developing homes, subdivisions, and communities with the threat of wildland fire taken into consideration so they will survive wildland fires in the future. Information on FireWise and other fire related issued can be found on the Division of Forestry website: **http://www.dnr.state.ak.us/forestry/fire**.

*Below: Students testing the fire triangle in class.*
*Credit: Matt Weaver*


*Above: An Interagency display that promotes the creation of defensible space around structures and private property.*

# THE BASICS

IMPORTANT ASPECTS OF THE FIRE AND AVIATION PROGRAM

## INTENSITY AND COMPLEXITY OF FIRES

## Complexity

Situations that affect fire complexity are extreme fire behavior, types of resources threatened (i.e., urban areas or villages), the number of fires in particular area requiring suppression, evacuation of people, multiple agencies responding, etc.

The Boundary Fire, 2004, is a good example of a complex fire. Fire suppression included separate fire departments and numerous State and Federal firefighters. Many different agencies, organizations, local and national media, local and national political visits ocurred. Multiple evacuations required emergency services such as temporary housing, food, and medical services. The more complex a fire, the more important a pre-planned management response is to success.

*Above: Briefing for the Boundary Fire, 2004. Photo: Gary Chancey*
*Below: Public meeting during Boundary Fire. Photo: Gary Chancey*

## Intensity

Weather, fuel conditions such as moisture content in vegetation, depth of vegetative mat, and a myriad of other factors, affect fire intensity. Fire can spread as much as eight miles in a single hour. Firebrands can be transported up to a mile in advance of the main fire, causing new ignitions. Intensity of a fire can create severe fire conditions that require special management to effectively utilize technology, personnel, and resources.

*Below Left: Parks Highway Fire, 2006. Credit: FAS*
*Below Right: Forestry engines on Parks Highway Fire. Credit: Bruce Swaim*

# THE BASICS

THE FUTURE OF DOF FIRE AND AVIATION

## WHERE ARE WE GOING?

*Before and after photos of a structure that survived the Caribou Hills Fire, 2007.*

*Credits:*
*Left: Helitack*
*Right: Mike Hayes*

The State of Alaska continues to grow, and with that growth, more of the population is moving into the forested areas of the state where wildland fires occur. These areas are called the wildland/urban interface, and as the numbers of homes increase in the interface, so does the risk of a wildland fire threatening human life and improved property. The protection of life and property in the wildland/urban interface is the most important job DOF and its local government cooperators have. Because of the rise in both population and those participating in recreational activities, fire workloads are increasing while budgets have remained static, or in some cases, have declined.

Fires that destroy homes such as the Miller's Reach Fire in 1996, the Red Fox Fire near Tok in 2001, the numerous fire complexes of 2004 and 2005, the Parks Highway Fire in 2006, and the Caribou Hills Fire in 2007 are reminders that Alaska has a growing threat of wildland/urban interface fires. The stakes are high, involving human life and major property values. The skills needed are different from strictly wildland fire needs, involving hazardous substances, structure protection, and evacuation needs. The Division of Forestry has a major role, but clearly the responsibility to fight these fires is shared with local government and structure fire departments. Homeowners have a critical responsibility to take steps to make their properties FireWise and to help the firefighters protect their homes. Planning, coordination, and training need to occur among all parties for a swift, coordinated response when fires start. There will be more wildland/urban interface fires as Alaskans continue to settle outward from urban to less developed areas.

## Contacts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**Central Office**
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**Anchorage, AK 99501**
**(907) 269-8476**


*Structure protection on the Taylor Complex, 2004. Credit: Sarah Saarloos*

Alaska Division of Forestry: **http://forestry.alaska.gov/**
Alaska Interagency Coordination Center: **http://fire.ak.blm.gov**