Community Wildfire Protection Plan

For At-Risk Communities in the Fairbanks North Star Borough, Alaska

Phase I

Prepared for: Fairbanks North Star Borough

Prepared by: State of Alaska-Division of Forestry,
Fairbanks Area Office

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As Administrator of a Land Management Agency or Land Owner Organization represented in the Fairbanks North Star Borough Wildland Fire and Fuels Management Coordinating Committee, I concur with the Coordinating Committee recommendations to implement the Fairbanks North Star Borough Community Wildland Fire Protection Plan.

Fairbanks North Star Borough

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Mayor

State of Alaska
Department of Natural Resources
Division of Forestry

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Area Forester

State of Alaska
Department of Natural Resources
Division of Mining Land and Water

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Northern Region Manager

Steese Volunteer Fire Department

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Mitch Flynn, Fire Chief

List of Interagency Planning Team Members

This plan was prepared by the following Interagency Planning Team:

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Fairbanks North Star Borough Community Wildfire Protection Plan

Executive Summary

The Fairbanks North Star Borough Community Wildfire Protection Plan (CWPP) is a collaborative effort that has been developed as a result of the 2003 Healthy Forest Restoration Act (HFRA) which directs communities at risk of wildfire to develop a risk assessment and mitigation plan. Guidance for the Fairbanks North Star Borough Community Wildfire Protection Plan is based on Preparing a Community Wildfire Protection Plan: A Handbook for Wildland Urban Interface Communities (March 2004) and the Alaska Wildland Fire Coordination Group CWPP outline (draft 2005).

Alaska has faced two back to back record breaking fire seasons. The majority of the fires occurred in the interior. The fire season of 2004 was the largest on record with over 6.7 million acres burned. The 2004 wildland fires burning within the FNSB included the Boundary Fire (537,098 acres), Tors Fire (31,114 acres) and Wolf Creek Fire (210,233 acres). The 2004 fire season resulted in several evacuations of subdivisions and residences within and near these fires. The 2005 season was not far behind with 4.3 million acres making it the third largest on record. Heavy smoke was the norm for both summers.

Prior to 2005, no consolidated or comprehensive plan had been developed to prioritize wildfire risk reduction projects. Projects were developed independently of each other and did not address overall community risk. A comprehensive plan was needed so that future risk reduction projects were allocated to the areas identified as the highest risk, resulting in the most effective distribution of limited funding.

Comprehensive Plan: The State of Alaska, Division of Forestry, Fairbanks Area and Fairbanks North Star Borough have partnered with local, state, and federal agencies to develop strategies, share resources, and consolidate wildfire risk planning to address the threat of wildfire to the Fairbanks North Star Borough residents. In 2005, the Fairbanks North Star Borough and the State of Alaska, Division of Forestry, Fairbanks Area (DOF) signed a cooperative agreement to complete mapping of hazardous fuels for the entire Fairbanks North Star Borough and to complete a comprehensive Community Wildfire Protection Plan (CWPP). The goal of the CWPP is to develop and prioritize a thorough list of risk reduction projects in the high risk areas identified by the exposure model.

The exposure model was built within ArcGIS (ESRI, Redlands, CA), a Geographical Information System (GIS) environment. This enabled multiple sources of information to be incorporated into the four main modeling components: Hazard Fuels, Ignition Risks, Values of Concern, and Suppression Difficulty. The final Wildfire Exposure map is the result of combining these components to determine the relative risk to wildfire across the landscape within the Fairbanks North Star Borough.

The CWPP and Exposure Model will be accomplished in two phases with Phase I covering Fairbanks, North Pole, Ester, Fox and portions of the Chena Hot Springs road. Phase I is scheduled for completion in the spring of 2006. Phase II covers the rest of the borough is scheduled for completion in the spring of 2007. Public meetings will be held to gather comments from the public, community leaders, agencies, organizations and emergency service personnel on their concerns and priorities regarding wildfire risks and projects to reduce that risk. Based on all of these inputs, a wildfire risk mitigation plan will be developed.

Introduction

Background and History

Fairbanks North Star Borough was established on January 1, 1964 by the act of the Alaska State Legislature. The Borough includes both the cities of Fairbanks and North Pole. The FNSB encompasses 7,361 square miles (4.7 million acres). This is the fourth largest borough in the state. The current population is listed at 82,000. The 2000 U.S. Census Bureau census showed a population increase by 53% from 1980 to 2000. With recent expansions in the military and mining, the population is continuing to grow.

The threat to Fairbanks from wildland fire has been increasing. Suppression of wildfires over the last fifty years has promoted the development of continuous fuel beds of highly flammable black spruce leading to and within the Fairbanks community. Within the last fifteen years the state, borough, and private land owners have developed many subdivisions in areas surrounding Fairbanks. The rapid expansion of urban areas into the black spruce forests surrounding Fairbanks in the last five years has put many residents in harms way. This expansion has created a wildland urban interface that is difficult to protect and is growing in size and complexity.

Additionally, many of the hardwood forests that were created as a result of timber harvest in the early pioneer days or fires prior to beginning of fire suppression in the 1950's are now converting to highly flammable black spruce forests. These factors have increased the threat to Fairbanks, while under certain conditions, stretching the capabilities of existing fire fighting forces. Declining fire suppression preparedness budgets have acerbated the fire threat problem.

In the 2000 fire season, where the State Division of Forestry-Fairbanks Area responded to 65 fires scattered though out their fire protection area, it was clearly demonstrated that there was a need for GIS information system and a critical need for fire planning for all areas impact by fire. After this fire season, it was recognized that the database and satellite imagery coverage was incomplete or non-existent greatly reducing the usefulness of GIS.

In 2001, Division of Forestry received a $600,000 NASA grant to acquire satellite imagery and develop hazardous fuels mapping technology using satellite imagery. Starting in the summer of 2002 to the project end in September 2005, over 15,000 square miles of Spot5 imagery 2 ½ meter resolution was acquired and ortho-rectified by the Division of Forestry. Over 2100 square miles of high-resolution imagery was acquired for all 15 villages and towns in the Tanana Valley with the exception of Fairbanks and North Pole. The villages and towns in the project area are Northway, Tetlin, Tok, Tanacross, Dot Lake, Healy Lake, Delta Junction, Salcha, Two Rivers, Nenana, Anderson/Clear, Healy, Minto, Manley and Tanana. Fairbanks and North Pole were covered under another complimentary project: "Community Planning for Wildland Fire Protection with GIS Applications".

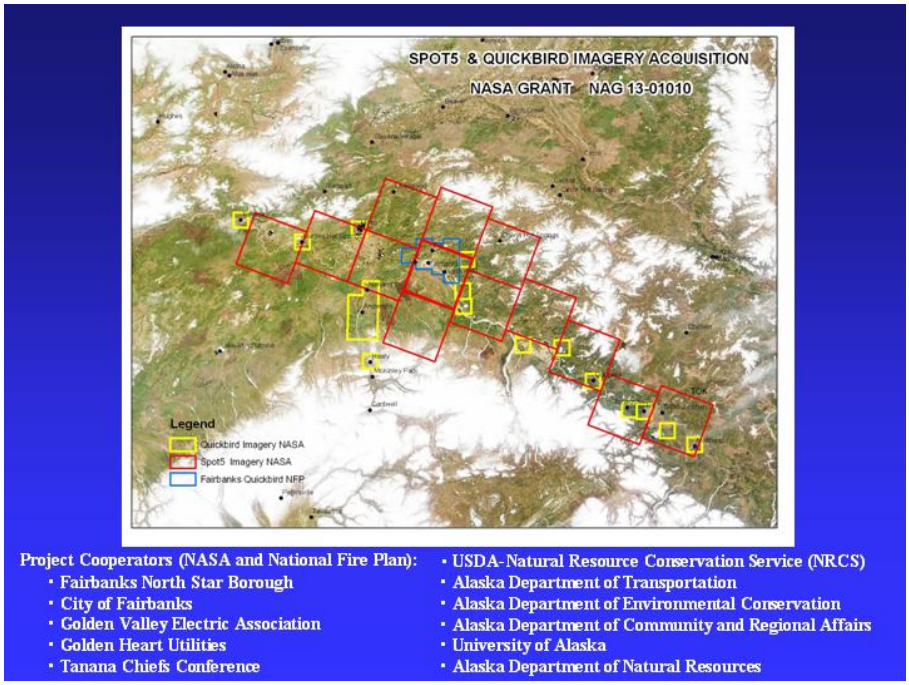

Figure 1 Spot 5 QuickBird Imagery

By the end of the project eleven different cooperators joined in on the license allowing them unrestricted use of the imagery. Fairbanks North Star Borough, Tanana Chiefs Conference and USDA Natural Resource Conservation Service provided additional funding to DOF to purchase additional imagery. The original proposal called for broad distribution of the imagery to a wide variety of users. This was the greatest success of this project. Each user received ortho-rectified imagery and developed the imagery to their particular use. In particular, fire suppression agencies and fire departments benefited by having imagery available for fire operations. Satellite imagery was heavily used during the 2004 fire season.

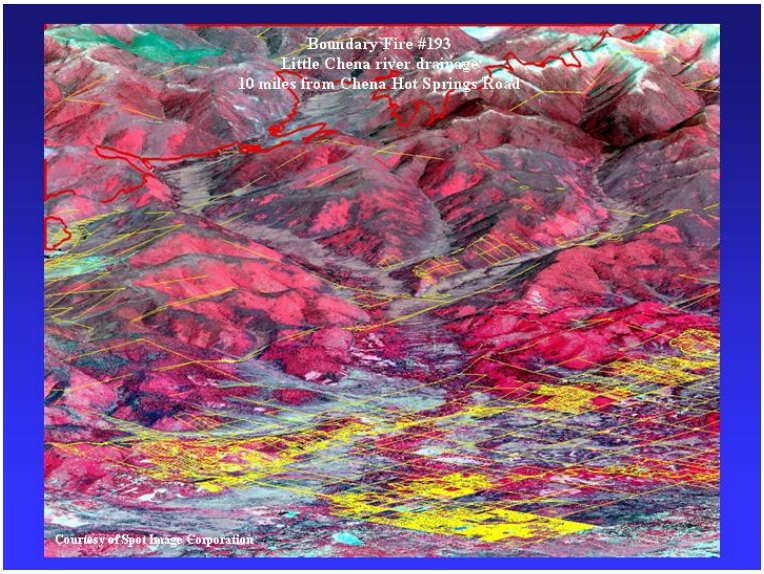

Figure 2 Imagery was used to visualize the landscape in front of the fire.

During the 2004 fire season, over 706 fires were recorded statewide of which 424 were human caused and 259 were lightning. The fires burned 6,724,146.6 acres (8.59 times the 10 year average acres). The Division of Forestry recorded 398 fires for 2,216,207 acres burned. The 2004 season started slow due to a wet spring. May rains were heavy. The weather began to change after the first week of June with a warm drying trend that lasted the rest of the summer.

Atmospheric instability was prevalent by mid June. During June 14 and 15 there were recorded 17,000 lightning strikes igniting 47 fires. Rainfall was well below normal for June 15 through August 31st. Fairbanks received 38% of normal rainfall. The 2004 season had the greatest number of lightning strikes ever recorded; over 150,000 strikes, three times greater than normal.

The largest fire statewide was the Boundary Fire which started 50 miles north of Fairbanks on June 13 and burned 537,098 acres. This fire cost nearly $20 million dollars to suppress. Other large fires in the borough included Tors at 31,114 acres, and Wolf Creek Fire at 210,233 acres. The Wolf Creek fire cost more than $2.5 million. Due to these and many other fires in the interior the particulate sensor in Fairbanks recorded 1000 micrograms per cubic meter of air particulates on June 28th. A normal particulate reading is 65. This was the highest recording ever in Alaska. During the 2004 fire season, Fairbanks experienced the most days smoked in: 42 days, surpassing the previous 19 day record.

In a Heartland news article (December 26, 2004), Michael Richmond the Fire Weather Program Manager with the National Weather Service Office in Fairbanks relayed that if the record north east winds that had helped to spread the Boundary Fire toward town had continued, the fire would have moved into the Goldstream Valley, a heavy populated area.

The first large scale fire evacuations of settlements on the outskirts of Fairbanks occurred. Three separate evacuations affected numerous subdivisions: Haystack, Olnes East and West, Bear's Den, Vault, Himalaya and the Steese highway.

The combination of the warmest summer on record, below normal rain fall, wind, and continuous fuel beds created the perfect fire storm. Continuous fuel beds and the expansion of subdivisions into these fuel beds were the leading factors for the large fires that threatened many settled areas surrounding Fairbanks.

Fortunately, no one was seriously hurt and few structures were lost. It served as a reminder to us that the ecosystem of the interior is fire based. Fire can not be permanently kept from the forests of the interior. On many fronts, the fire season served as a wake up call for Fairbanks.

2004 Fire Season Analysis and Reports

After the 2004 fire season, the Fairbanks North Star Borough formed the Wildland Fire Commission at the recommendation of the Mayor, Jim Whitaker. The Commission had 60 days (ending March 4th) to hear testimony, gather information, and make a report to the mayor and the assembly.

The wildland fire suppression agencies also held public meetings at the various communities seeking public input on the 2004 season. As a result of these meetings and an interagency

review of the fire season, the Division of Forestry prepared "Analysis and Report on the 2004 Fire Season within the Fairbanks Area State Fire Protection". The report recommended several changes necessary to meet the increasing wildfire threat to borough residents.

The FNSB Wildland Fire Commission report and the DOF report recommended a number of risk mitigation projects:

- The imminent threat from continuous fuel beds, dramatic increases in urban development in black spruce areas, and continued forest succession of hardwoods stands into black spruce/conifer forests, mandates that an "Integrated Risk Assessment and Fuel Reduction" program be initiated. An assessment program will establish threat levels across the urban interface and prioritize integrated fuel reduction projects based on level of risk. Hazardous fuel reduction was the top priority for both reports.

- A map of hazardous fuels is needed by fire managers to effectively plan fire suppression and to anticipate threats to the nearby subdivisions. Fuels maps are also an integral part of the threat assessment project. Fuels mapping technology has been greatly improved in recent years with new automated software. Support with personnel and hardware is needed to complete the fuels mapping.

- The evacuations overloaded the fire public information system. This was the single largest complaint received at public meetings. The fire perimeter information and evacuation information distribution to the public was inadequate increasing confusion among the public. During the height of the incident, thousands of phone calls were generated daily, overwhelming the phone lines and limited staff. An increase in public information and evacuation information distribution capabilities is needed.

- Fire evacuations happen quickly, sometimes within hours. A turn-key public information system is needed to give the public adequate notice of the impending threat and to respond to the public's need for information.

- An important component of distributing public information is a Geographic Information System (GIS) website that would display current fire perimeters and provide needed current fire information and evacuation directions. This system would meet the public's information needs and reduce the phone call loads to dispatch.

- The borough emergency services department is seeking grants for Community Wide Notification System. The Division of Forestry strongly supports this effort. Cooperative agreements would be written to define how such a system would be incorporated in fire evacuations directed by the Incident Commander.

- Current and accurate fire perimeter location requires good mapping. Fires are currently mapped by several different methodologies which are not well integrated into GIS. New mapping technology integrating laptops, satellite imagery and Geographic Positioning System (GPS), need to be instituted. Fire boundary locations and related mapping products need to be more efficiently integrated into one GIS map coverage instead of the

several paper and electronic versions that are currently in use. This single coverage would provide fire managers and the public with the best information available.

- Over the years, declining budgets have reduced fire suppression aviation resources and personnel. To meet the increasing threat, initial attack response needs be improved by reinstituting the aviation suppression resources lost to budget cuts, particularly an additional heavy retardant ship. A helicopter study conducted several years ago determined that 3 additional helicopters would annually save the state significant helicopter costs and significantly reduce escaped fires.

- Increase initial attack effectiveness by increasing technology support. Imagery integrated with GPS and GIS coverage will provide the edge that fire fighters need to catch fires in critical and full suppression urban areas. Fire managers used imagery with the Fairbanks North Star Borough parcel data base to estimate potential fire spread and subdivisions that would be threaten. This imagery was used to develop strategic suppression tactics and evacuation plans. GIS support from both the state and borough are needed. The FNSB parcel data base had inaccuracies, i.e. not all homes were shown on the data base, which is critical information needed by fire fighters. Improvements are needed to the FNSB parcel data base.

- Fire behavior analysis is needed to assist in predicting fire spread and potential threat to subdivisions that will be threatened by a moving fire. Personnel and software support is needed.

- Subdivisions located in hazardous fuels should be encouraged to provide defensible space. Such encouragement could be provided by zoning, a tax break, or a hazard tax to be distributed to fire departments, or insurance rate changes that reflect risk, etc.

Wildland –Urban Interface

The Wildland Urban Interface (WUI) is commonly described as the zone where structures and other features of human development meet and intermix with wildland or vegetative fuels. Communities within the WUI face significant risk to life, property and infrastructure. Wildland fire within the WUI is one of the most dangerous and complicated situations firefighters face. Joint fire planning places a priority on working collaboratively with communities in the WUI to reduce their risk from large scale wildfire. Methods of reducing the risk of wildland fire include:

- Reducing the amount of fuels in the interface area
- Fragmenting or breaking up continuous wildland fuels;
- Improving fire suppression capabilities and fire response infrastructure;
- Reducing the incidences of human caused fires;
- Informing the public through education and outreach of proper Firewise programs practices;
- Involving individual landowners in implementing Firewise program measures on their own property.

As more people purchase homes, run businesses and visit places within and near the WUI, the threat to structures and private property from wildland fire increases. Wildland firefighting

agencies and local fire departments cannot always adequately protect the growing number of structures, especially in a sprawling wildland urban interface area or where developments are remote or hidden within the wildlands. *It is therefore critical that the landowners assume responsibility of protecting their property against wildfires.* The flammability of black spruce and the increased development in black spruce, highlights the importance of following wildland fire safety principles (firewise). Practicing firewise safety can make the difference between returning to an intact home or a smoldering pile of ashes.

Fire Policies and Programs

Alaska Interagency Fire Management Plan
The plan, covering thirteen geographical areas of state, was developed under the oversight of the Alaska Interagency Fire Management Council between 1980 and 1988 to provide a coordinated and cost effective approach to fire management on all lands in Alaska. All fire management decisions by land managers and owners are based on values warranting protection, protection capabilities, fire fighter safety and or land and resource management needs. Before the plans were developed, existing policy required the immediate suppression of all wildfires. In 1988 the original 13 Interagency Fire Management Plans were consolidated into one Interagency Wildland Fire Management Plan (AIWFMP) which covers the entire state. The statewide fire planning effort's goal has been to provide an opportunity through cooperative planning for land manager /owners to accomplish individual fire related land use objectives in the most cost-effective manner. The AIWFMP requires an annual pre-season land manager owner review of the fire protection needs on lands under their management authority. The fire protection levels are Critical, Full, Modified, or Limited management option. The options selections are based on land manager owners' values to be protected as well as land and resource management objectives. The categorization and ensuing prioritization ensures that human life, private property and identified resources receive an appropriate level of protection with the available firefighting resources. All of the area within Phase I of the CWPP is classified as Critical, Full or Modified where aggressive initial attack of all fires is required.

The Healthy Forests Restoration Act (HFRA). Title III of HFRA provides guidance for developing CWPP. Communities with CWPP may receive significant benefit in the future should funding be appropriated for fuels reduction and fire prevention. HFRA provides clear guidance for what should be developed in a CWPP.

Community Wildfire Protection Plans

The Fairbanks North Star Borough Community Wildfire Protection Plan (CWPP) is a collaborative effort that has been developed as a result of the 2003 Healthy Forest Restoration Act (HFRA) which directs communities at risk of wildfire to develop a risk assessment and mitigation plan. Guidance for the Fairbanks North Star Borough Community Wildfire Protection Plan is based on "Preparing a Community Wildfire Protection Plan: A Handbook for Wildland Urban Interface Communities" (March 2004) and the "Alaska Wildland Fire Coordination Group CWPP outline" (draft 2005).

In 2002 DOF-Fairbanks Area received a National Fire Plan grant to complete fuels reduction silvicultural treatment research at Cache Creek. Also in 2002 DOF-Fairbanks Area received a federal Wildland Urban Interface grant to conduct fuel reduction in the Little Chena drainage. In 2004 the FNSB received a Congressional earmark of nearly $ 1 million for wild fire mitigation. Since that time additional congressional earmarks are scheduled to be received by FNSB for the purpose of wildfire mitigation.

Prior to 2005, no consolidated or comprehensive plan had been developed to prioritize wildfire risk reduction projects. Projects were developed independently of each other and did not address overall community risk. A comprehensive risk assessment and risk reduction plan was a high priority established in FNSB and DOF 2004 fire reports. A CWPP is needed so that future risk reduction projects are allocated to the areas identified as the highest risk, resulting in the most effective distribution of limited funding.

Comprehensive Plan: The State of Alaska, Division of Forestry, Fairbanks Area and Fairbanks North Star Borough have partnered with local, state and federal agencies to develop strategies, share resources, and consolidate wildfire risk planning to address the threat of wildfire to the Fairbanks North Star Borough residents. In 2005, the Fairbanks North Star Borough and the State of Alaska, Division of Forestry, Fairbanks Area (DOF) signed a cooperative agreement to complete mapping of hazardous fuels for the entire Fairbanks North Star Borough and to complete a comprehensive Community Wildfire Protection Plan (CWPP). The goal of the CWPP is to develop and prioritize a thorough list of risk reduction projects in the high risk areas identified by the exposure model.

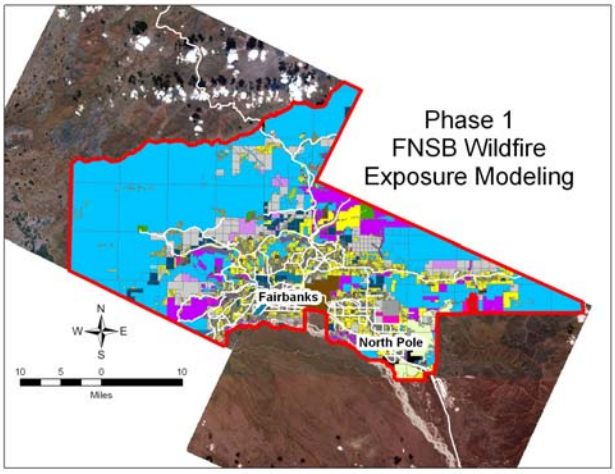

Figure 3 Phase 1 FNSB Wildfire Exposure Land Status Map

The exposure model was built within ArcGIS (ESRI, Redlands, CA), a Geographical Information System (GIS) environment. This enabled multiple sources of information to be incorporated into the four main modeling components: Hazard Fuels, Ignition Risks, Values of Concern, and Suppression Difficulty. The final Wildfire Exposure map is the result of combining these components to determine the relative risk of wildfire across the landscape within the Fairbanks North Star Borough

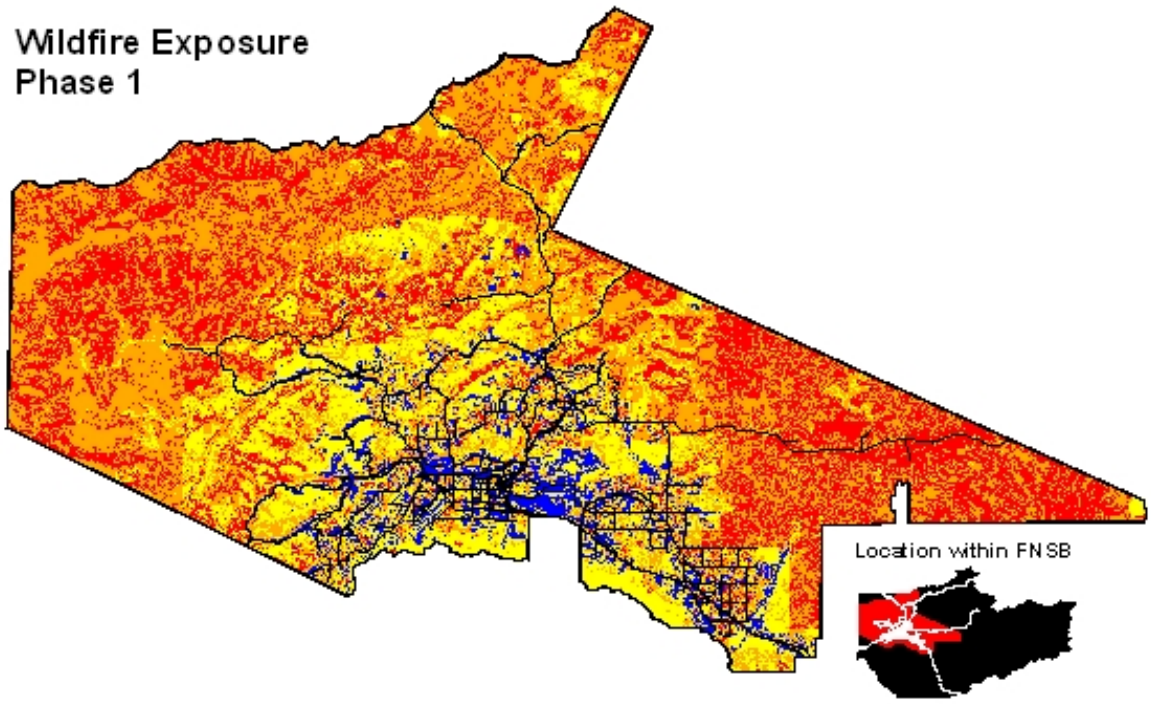

Figure 4 Wildfire Exposure Map location of Phase I

A CWPP gives communities within the FNSB a greater opportunity to receive federal funding for local forest management and hazardous fuels mitigation programs. It can be used by Firewise working groups, individual homeowners, fire departments, fire management personnel and others involved in wildfire planning and mitigation efforts. Completion of this CWPP will allow the FNSB hazardous fuels reduction projects to be carried out under the Healthy Forest Restoration Act of 2003.

Planning Process

The Fairbanks North Star Borough CWPP has been developed as an on-going collaborative process to reduce the risk of wildfire to the residents of the borough. The CWPP will serve as an active management tool as well as a consolidated community guide to wildfire mitigation.

Cooperators

The Fairbanks North Star Borough, State Division of Forestry-Fairbanks Area, Volunteer Fire Departments, State Division of Mining, Lands, and Water, University of Alaska, and community groups are participants in this effort. A Fire Risk Assessment Team (FRAT) composed of Division of Forestry fire specialists, Fairbanks North Star Borough Emergency Operations managers and local fire department representatives was assembled to guide development of the

Exposure Model and develop and prioritize risk reduction projects and allocate funding to those projects.

Goals and Objectives

1. Protect potential losses to life, property and natural resources from wildfire
2. Build and maintain active participation
3. Set realistic expectations for reducing wildfire risk
4. Identify and prioritize actions for fire protection
5. Access and utilize federal and other grant dollars
6. Identify incentives for fire protection and community participation
7. Promote visible projects and program successes
8. Monitor the changing conditions of wildfire risk and citizen action over time

Task 1: A cooperative agreement completed between Fairbanks North Star Borough (FNSB) and State of Alaska, Department of Natural Resources, Division of Forestry (DOF) for Community Wildfire Protection Plan (CWPP). The DOF will conduct a CWPP. DOF will organize a "fire risk assessment team" (FRAT). The FRAT and DOF will help conduct a wildfire risk assessment, conduct community meetings and develop a mitigation plan.

Task 2: A cooperative agreement completed between Fairbanks North Star Borough (FNSB) and State of Alaska, Department of Natural Resources, Division of Forestry (DOF) for Mapping Hazardous Fuels for the Fairbanks North Star Borough. DOF will conduct fuels mapping resulting in a map of all the fuel types with in the borough. A map of hazardous fuels is needed by fire managers to effectively plan fire suppression and to anticipate threats to the nearby subdivisions. Fuels maps are also an integral part of the risk assessment plan.

The CWPP and Exposure Model will be accomplished in two phases with Phase I covering Fairbanks, North Pole, Ester, Fox and portions of the Chena Hot Springs road. Phase I is scheduled for completion in the spring of 2006. Phase II covers the rest of the borough and is scheduled for completion in the spring of 2007. Public meetings will be held to gather comments from the public, community leaders, agencies, organizations and emergency service personnel on their concerns and priorities regarding wildfire risks and projects to reduce that risk. Based on all of these inputs, a wildfire risk mitigation plan will be developed. Fire risk reduction projects will begin after the planning phase.

It was determined by the Fire Risk Assessment Team that the focus of Phase I will be to prioritize a thorough list of risk reduction projects that can be addressed with federal wildfire mitigation funds. During Phase II, the FRAT will develop priorities for risk reduction projects of Phase II areas, but will also complete a comprehensive analysis for both Phase I and Phase II areas. Additional cooperative agreements will be necessary between FNSB and DOF for DOF to conduct fuel treatments and other fuel reduction projects based on the prioritized risk reduction projects established by the FRAT.

Mitigation Plan-Phase I
The Mitigation Plan is part of the CWPP that lays out in detail the risk reduction projects identified by the FRAT. It is found in more detail on page 38 of this document. The mitigation plan will be directed towards the following risk mitigation strategies:

- Public education through presentations, website, booths, television, radio, etc.
- Reducing wildfire risk including hazardous fuels silvicultural treatments on borough, state lands, university lands, and federal lands
- Direct homeowner education through firewise home assessments
- WUI cost share programs to assist home owners with their wildfire fuels reduction needs.
- Improving suppression effectiveness and response time
- Working to support forest health through forest management and reforestation

Community Participation

The FNSB CWPP is a strategic plan developed to prioritize areas for treatment on federal, state, and private lands and to provide all landowners a broad spectrum of risk reduction options. The process of developing a CWPP helps a community clarify and refine wildland fire hazard priorities for the protection of life, property, and critical infrastructures in the WUI. The community determines the location of the WUI as well as the fire hazards.

Community involvement allows local knowledge and understanding of the risks faced by the community to be integrated and opens discussion of the risk mitigations options. The community involvement process includes identifying, reviewing, and summarizing existing activities, resources and planning needs pertinent to wildland fire protection for the local community.

Community Profile

Location
Fairbanks North Star Borough is located in the heart of the Interior Alaska. The FNSB is the second largest populated region in Alaska. The city of Fairbanks lies at the conjunction of the Richardson, George Parks, Steese and Elliott highways. These highways serve to link Alaska with the Lower 48 states and Canada. The Alaska Railroad connects Fairbanks by rail to the tidewater at Anchorage and Seward and provide both freight and passenger services. Communities and cities encompassed by the FNSB include the City of Fairbanks, City of North Pole and the communities of College, Fox, Salcha, Ester, and Fox.

Climate
Soil Survey of North Star Area, Alaska reports that the area is distinctly continental climate with large variation in temperature from winter to summer. The climate is due mainly to the response of the landmass to the changes in solar heat. The sun is above the horizon 18 to 21 hours in June and July. Temperatures of 80 F or higher occur on about 10 days each summer and the average maximum temperature is in the 70 F. Precipitation (rain) is at a minimum in the spring and at a

maximum in August. During the summer, thunderstorms occur on an average of eight days. The storms are more frequent over the uplands to the north and to the east of Fairbanks.

Permafrost
Soil Survey of North Star Area, Alaska also reports that perennially frozen ground (permafrost) underlies alluvial fans, bottoms of drainage ways in the uplands, north-facing slopes and parts of the flood plains. Permafrost is absent on moderately to steeply sloping south facing hillsides and in places on the flood plains along the Tanana, Chena, Tatalina and Chatanika Rivers. The occurrence of permafrost requires special consideration when constructing fuel breaks. Fuel breaks will be designed to mitigate potential problems with permafrost.

History
In 1901 Captain E. T. Barnette established a trading post on the Chena River. A settlement grew. The discovery of gold drew thousands of gold seekers to about 13,000 by 1910. During World War I gold mining and the population declined. Ladd Field which is now Fort Wainwright Army Base was constructed in 1938. This promoted the influx of military population to the Fairbanks area. With the development of Eielson Air Force Base, the military personnel increased in 1950 to 5,419 military personnel. The discovery of oil on the North Slope and the building of the oil pipeline brought economic expansion to the Fairbanks. The State of Alaska Department of Labor has produced a table of population projection for the FNSB showing a growth to 104,533 by the year 2018.

Populations
Based on 2000 Census there are 82,840 people residing in Fairbanks North Star Borough. FNSB is located in Interior Alaska on the Tanana and Chena River. The total area encompassed by FNSB is 4.7 million acres.

Landowner	Acres	Square Miles
State of Alaska	730,071	1141
Private	167,109	261
FNSB	69,046	108
Educational	19,272	30
Military	11,467	18
Federal	5034	8
Joint Management	4862	8
Other	585	1

Table 1 Phase I FNSB Landowners

Economy /Infrastructures
About 50% of the total employment is in government services.

Mining: Mining was the reason for Fairbanks' beginnings and remains an important factor in its development. In 1997 the Fort Knox gold Mine located near Cleary Summit was commissioned as a conventional open-pit hard rock mine. Other mining activity includes True North located with FNSB and the Pogo mine located near Delta. In 2002 there were approximately 832 new mining claims filed in the Fairbanks Recording District.

Tourism: About 325,000 visitors pass through Fairbanks each summer. Tourism is a significant element in the economy of Fairbanks.

Oil Refinery: Petro Star North Pole refinery was built in 1985. It is a 15,000 barrel per day refinery that produces kerosene, diesel, and jet fuels. The refinery taps directly into the Trans-Alaska Pipeline. Operations: The North Pole Refinery draws its crude oil directly from the Trans-Alaska Pipeline. Petro Star refines its products, tests their quality and pumps them into holding tanks for distribution. Petro Star distributes its products throughout interior and northern Alaska. Its customers include rural Alaska communities, such as Anaktuvuk Pass and Wiseman; military bases such as Ft. Wainwright, Ft. Greely and Eielson Air Force Base; commercial customers such as Usibelli Coal Mine and Alyeska Pipeline; and the North Slope industrial market. As a fully automated refinery, the plant can be run by a single operator. The North Pole refinery operates 24 hours a day, 365 days a year.

Trans-Alaska Pipeline: The Trans-Alaska Pipeline was designed and constructed to move oil from the North Slope of Alaska to the northern most ice-free port Valdez, Alaska. The Trans-Alaska Pipeline passes through Fairbanks North Star Borough.

- Length: 800 miles.
- Diameter: 48 inches.
- Crosses three mountain ranges and over 800 rivers and streams.


Figure 5 2004 Wildland fires near the Trans-Alaska pipeline

Military: There are two military bases within FNSB: Ft Wainwright and Eielson Air Force Base. Ft Wainwright is the home of the 172nd Infantry Brigade. In 2003 the military population was 4,490 on Ft. Wainwright. In addition, there are 877 Department of Defense civilians and 418 non-DOD civilians employed on post. Eielson air Force Base is located 26 miles southeast of the City of Fairbanks and is home to the 354th Fighter Wing. Eielson AFB has about 3000 active duty military people, 600 Guard members and about 4000 family members. Military aircraft from around the world conduct military training in the air space over FNSB during Cope Thunder.

University of Alaska, Fairbanks: The University of Alaska Fairbanks is the nation's northernmost Land, Sea, and Space Grant university and international research center, advances and disseminates knowledge through creative teaching, research, and public service with an emphasis on Alaska, the North, and their diverse peoples. **Land Management Department**: The land owned and managed by the University of Alaska was originally granted to the University by the federal government in accordance with two Acts of Congress dated March 4, 1915, and January 21, 1929. This property and other trust land which was subsequently deeded to the University by the State of Alaska, is for the exclusive use and benefit of the University of Alaska, and therefore, is not state public domain land. The University develops leases and sells land to generate revenue for the University's Land Grant Trust Fund (Fund). Proceeds from the Fund are used for, among other things, the Alaska Scholars Program, natural resources related education and research, Fund inflation proofing, and the effective management and development of the University's land portfolio.

Transportation: Airline services offer dozen daily jet flights between Fairbanks and Lower 48. Cargo jets also utilize the Fairbanks International Airport for refueling.

Natural Resources Values Timber: **Tanana Valley State Forest** In 1983, the legislature created the 1.8 million-acre Tanana Valley State Forest that stretches from Manley to

Tok including areas within Fairbanks North Star Borough. The Tanana Valley State Forest's 1.81 million acres lie almost entirely within the Tanana River Basin, located in the east-central part of Alaska. The forest extends 265 miles, from near the Canadian border to Manley Hot Springs. It varies in elevation from 275 feet along the Tanana River to over 5,000 feet in the Alaska Range. The Tanana River flows for 200 miles through the forest. Almost 90 percent of the state forest (1.59 million acres) is forested, mostly with paper birch, quaking aspen, balsam poplar, black spruce, white spruce, and tamarack. About half of the Tanana Basin's productive forest land (1.1 million acres) is located within the state forest. About 85 percent of the forest is within 20 miles of a state highway.

The forest is open to mining, gravel extraction, oil and gas leasing, and grazing, although very little is done. Timber production is the major commercial activity. The Bonanza Creek Experimental Forest, a 12,400-acre area dedicated to forestry research, is also located within the state forest.

The Tanana Valley State Forest offers many recreational opportunities including hunting, fishing, trapping, camping, hiking, dog mushing, cross-country skiing, wildlife viewing, snow machining, gold panning, boating, and berry-picking.

Wildlife: The **Minto Flats State Game Refuge** encompasses approximately 500,000 acres and is located about 35 miles west of Fairbanks between the communities of Minto and Nenana. The refuge was established by the Alaska Legislature in 1988 to ensure the protection and enhancement of habitat, the conservation of fish and wildlife, and to guarantee the continuation of hunting, fishing, trapping, and other compatible public uses within the Minto Flats area.

Minto Flats is a large wetland complex lying along a northerly loop of the middle Tanana River in interior Alaska. The area is fed by waters from the Tatalina, Chatanika, and Tolovana rivers and Goldstream and Washington creeks. It drains into the Tanana River in a generally southwest-west direction. The flats are bounded on the north by an escarpment which rises abruptly from the lowlands. The Tanana River forms the southern boundary.

Minto Flats exhibits most of the weather characteristics typical of Interior Alaska's continental climate. Low precipitation, warm summers, and intensely cold winters are the rule. The area is noted for its northerly and easterly winds, which are markedly stronger and more persistent than in surrounding areas. Low temperatures are similar to those experienced in Fairbanks, but severe wind chill factors often accompany them.

The mosaic of ponds, oxbows, stream channels, and various wetland and upland vegetation types provides excellent habitat for waterfowl, big game, and furbearers, as well as anadromous and resident fish species. The area has traditionally been and remains an important area for harvesting fish, wildlife, and other resources for Athabaskan Indians and others living in Minto and Nenana, and also serves as an important fish and wildlife use area for Fairbanks North Star Borough residents.

Subsistence: About 1.3 million pounds of wild foods are harvested annually in the FNSB.

Historical Gold mining: There is still active mining in the area and glimpses of the former bonanzas can be seen along the Steese Highway in the tailing piles leftover by the gold dredges. Davidson Ditch represents the remnants of a project undertaken during the years 1924 to 1929 to bring water to the Fairbanks area gold mining operations. The operation was carried out under Fairbanks Exploration Company (F.E.), a subsidiary of United States Smelting, Refining and Mining Company (U.S.S.R. & M.). The ditch was a 90-mile-long conduit designed to divert water from the Chatanika River at a point below the junction of Faith and McManus Creeks to hydraulic sluicing (stripping) operations at Cleary and Goldstream, just north of Fairbanks. The project also included a 0.7 mile long tunnel near Fox, and 6.13 miles of inverted siphons along the way

Recreation:

State of Alaska: Chena River State Recreation Area is over a quarter million acres, approximately 30 miles northeast of Fairbanks. There are two state park units north of Fairbanks. Both of these units sit on the banks of the Chatanika River. On the Elliott Highway is Lower Chatanika State Recreation Area. Farther north on the Steese Highway, and the smaller of the two, is Upper Chatanika State Recreation Site. Harding Lake State Recreation Area, 45 miles south of Fairbanks on the Richardson Highway, is one of the longest standing park facilities in the Alaska State Park system, having been established in 1967. Birch Lake SRA is located next to Birch Lake (south of Fairbanks on the Richardson Highway). Salcha River State Recreation Site is located at Mile 323.3 of the Richardson Highway.

Fairbanks North Star Borough: Chena Lake Recreation Area covers over 2,000 acres and has two distinct personalities; the Lake Park, with a 260 acre lake the River Park, covering 4 miles of the Chena River and River Park is stretched along 4 miles of the south bank of the Chena River

Bureau of Land Management: Steese National Conservation Area is located 70 miles northeast Alaska, was designated to protect wildlife habitat, including crucial caribou calving ground and home range, and Dahl sheep habitat. The 1.2 million-acre NCA includes Pinnell Mountain National Recreation area and Birch Creek Mountain National Wild River (NWR).

White Mountain Recreation Area: This million-acre recreation area features 250 miles of trails for dog mushing, snowshoeing, cross-country skiing and snowmobiling and about 50 miles of trails geared to summer recreation. Two summer campgrounds are located at either end of the Nome Creek Road. Access for floating Beaver Creek National Wild and Scenic River is at the lower end of the road.

Protection Capabilities

The State Division of Forestry- Fairbanks Area has statutory authority to protect forested lands from wildfire on state, private and borough lands. The DOF has a cooperative agreement

with the BLM Alaska Fire Service (main office located on Ft. Wainwright) under which the federal government protects state and private lands in the northern area outside the DOF jurisdiction in exchange for the state protect federal jurisdiction and Native lands. DOF-Fairbanks Area is responsible for wildland fire protection of approximately 9 million acres between the Chatanika River drainage in the north and Cantwell to the south; and from Nenana in the west to the Yukon Charley Rivers National Preserve in the east. The Fairbanks area is a combination of rolling hills, low mountains and tundra flats. The flats dominate the south and west parts. Hills and low mountains are in the north and east.

DOF-Fairbanks Area has both helitack and road side suppression forces. Each year about April 25, a medium helicopter is contracted to provide fire suppression services until mid July. This contract can be extended under high fire danger conditions. During high fire danger, fire suppression forces are supplemented with additional medium or light helicopters depending on their availability and other fire priorities statewide. The main helibase is capable of handling two medium size helicopters, with over flow areas available at the state-leased land at Fairbanks International Airport. Road side suppression forces consist of three Type 7 engines, four Type 6 engines and three Type 3 engines. Type 7 engines carry 100 gallons; Type 6 brush engines carry 250 gallons and Type 3 engines carry 500 gallon. Several flat bed trucks and pickups are used by the warehouse and support. Portable retardant systems are available that can readily be set up on remote airfields. Fairbanks Area Forestry technicians are trained in roadside engine attack and helitack. Roadside, helitack or both may respond to an incident depending on the initial fire size up. During high fire danger days, the force may be augmented with trained emergency firefighters. The Alaska Fire Service contract smokejumpers are available at Fort Wainwright. Retardant air tankers and air attack airplanes are also available at Fort Wainwright.

The Fairbanks Area Forestry suppression personnel consist of Fire Management Officer, Assistant Fire Management, Dispatch staff, Prevention staff and Fire Operation Staff. The Fire Management Officer, Robert Schmoll and Assistant Fire Management Officer Paul Keech approximately 20 forestry technicians. Seventeen initial attack personnel are available five days per week. On weekends, staffing is determined based on predicted fire danger. Dispatch is open from 8:00 am to 6:00 pm. A duty officer is available after regular hours.

Extensive interface with rural fire departments occur regularly within Fairbanks Area Forestry boundary. Fairbanks Area Forestry has established cooperative agreements between Fairbanks Area Forestry and the rural fire departments within the FNSB. The local fire departments provide back up for Division of Forestry and suppress many wildland fires each year within their own areas of responsibility. Fairbanks Area Forestry also works cooperatively with Alaska Fire Service (AFS) for initial attack support. AFS upon request provides smoker jumpers and Hotshot crews. Overhead and aircraft are shared during high fire danger and overload periods.

Fire Service Jurisdiction

Not all areas of the Fairbanks North Star Borough are under Fire Service protection. The table below is based on the 2000 Census.

Fire Service Jurisdiction	Population	Square Miles
Cities of North Pole and Fairbanks	31,821	37 sq miles
Fire Service Areas combined	40,960	244 sq miles
Areas without fire protection	9,889	7,080 sq miles

Table 2 Fire Service Jurisdiction

There are nine structural fire departments within the borough. Of the nine fire departments four are considered volunteer. The volunteer fire departments consist of Chena Goldstream Fire and Rescue; North Star Volunteer Fire Department; Ester Volunteer Fire Department; and Steese Volunteer Fire Department. Fairbanks City Fire Department, University of Alaska Fire Department, North Pole City Fire Departments, Eielson AFB Fire Department, and Fort Wainwright Fire Department are paid fire departments.

Station	Stations	Acres	Square Miles
Chena Goldstream	4	38,353	78
North Star	5	57,333	91
Ester	1	17,233	27
University	2	11,982	19
North Pole	1	2595	4
Fairbanks City	2	2960	33
Steese	3	19,862	31
Eielson AFB	2		
Fort Wainwright	3	15,687	25
Unprotected	0	7,608	12

Table 3 FNSB Phase 1 Fire Departments and Unprotected Area

Emergency Management

Fairbanks North Star Borough Emergency Operations is responsible for coordinating emergency management through out the Borough. Fire Departments are often the first responders for not just fire but natural and human caused disasters as well. Division of Forestry is statutorily responsible for wildland fire suppression and any operations associated with that suppression. FNSB Emergency Management Operations has been designated by DOF for conducting fire evacuations under the direction of the assigned Incident Commander for the fire and following DOF Fire Evacuation Procedures.

Hazardous Fuel Silvicultural Treatments

Fire Ecology & Silviculture

Prior to 1950 when large scale fire suppression began, fires were allowed to burn across the landscape. Fires were started by lightning strikes and burned either small or large amounts of acreage depending on the fuel bed and fire weather. The result was a vast diversity of forest age classes in a mosaic thrown over the landscape.

When wildfires burn across the landscape, it kicks the forest back successionally to age zero. The result for many fires is site conversion from black spruce to hardwoods and willows. Immediately after the fire the site begins to warm due to the removal of forest canopy, consumption of insulating moss, and the blackening of the forest floor from the burn increasing warming from the sun. This warming cycle significantly increases nutrient recycling. With the melting of the permafrost, the site productivity also increases dramatically.

The warmed burned area rich in nutrients becomes an ideal environment for the growth of pioneering forest species such as birch, aspen and willow. The burn also provides mineral soil seedbeds which allow these species to easy establish themselves. They quickly occupy the site. Because of abundant nutrient recycling, the species experience fast growth putting on several feet of growth in a single season.

Because new succulent growth is rich in nutrients, the new forest becomes a major food source for a vast diversity of wildlife from voles and foxes to moose and wolves. The habitat value has dramatically increased with opening and warming of the forest by the removal of the previous black spruce forest canopy.

After about 30 years the hardwood forest canopy begins to close in and the increased shade provides an environment conducive to establishment and growth of conifers, both white and black spruce. With a heavy understory of up to 15,000 stems per acre of spruce, the forest floor is further cooled and insulating moss layers begin to develop. The cooling of the site continues, permafrost layers begin to develop creating a poor environment for nutrient recycling and root growth of dominant canopy of hardwoods. Due to this cold environment, pioneering species of hardwoods and willows begin to die and are gradually replaced by black spruce. The habitat value and diversity of wildlife species is greatly diminished. The succession of the forest back to black spruce takes about 80 years. Due to the flammability of black spruce the process of succession is easy started with a lightning strike.

With the start of fire fighting in 1950, the natural fire cycle and the creation of a diversity of forest age classes across the landscape was slowed. Occasional fires would escape suppression and large fires would result, but in the overall, the forest grew older as a whole. The forest tended to be one age with a lack of successional diversity. The overall forest health had diminished. Continuous fuel beds were created, leading to more difficult fire suppression. On unusually hot dry seasons, like 2004, the continuous fuel beds promoted and continue to promote very large fires. In the extreme years the ecosystem will rebalance itself.

Unfortunately, these large fires create large areas of single age classes, instead of the mosaic of age classes that had existed prior to fire suppression. In about 80 after succession has recycled the forest back to black spruce, large continuous fuel beds are once again created and very large extreme fires occur. The goal of silviculture is to break up the fuel beds by creating a diversity

of forest age classes and forest species associated with those age classes. Early successional hardwood stands by their very nature are not very flammable and serve as a natural fire break.

Silviculture is the art and science of managing forests. A forester uses tools such as timber harvest or fuel treatments to achieve management goals. In the case of boreal forest management, the goal of forest management is to provide a diversity of age classes. Forest management tools of harvest or fuel reduction are designed to duplicate the natural succession cycles as closely as possible. This is accomplished by opening the forest, warming the forest floor, and where appropriate burning slash to promote warming, nutrient recycling and seedbed creation.

Hazardous fuel reduction objectives

Hazardous fuels reduction is a silvicultural treatment that seeks to create age class diversity by removing the forest canopy and starting the succession cycle. Hazardous fuels treatments focus specifically on areas of heavy fuel buildup and breaking up continuous fuel beds. The goal is to promote the creation of hardwood and willow stands that are more fire resistant and provide better habitat. Some poor sites, especially north facing slopes, do not easily convert to hardwoods and are replaced by black spruce. For fire suppression purposes the removal of the black spruce fuels alone has a positive impact on fire suppression.

Fire managers allocate fuel reduction treatments in strategic locations to breakup fuel types to provide a fuel break to continuous fuel beds that lead to or surround settled areas. The exposure map identifies high risk areas and is used by fire managers to provide a comprehensive and strategic allocation of fuel treatments.

The Division of Forestry has begun to strategically cut down black spruce stands in 2003. Cache Creek has been used as a research area for studying the process and results of fuel reduction programs. Spring 2003 DOF identified the Little Chena Valley north of the 18 Mile Chena Hot Springs Road as one of the greatest and most likely risks to Fairbanks. Fairbanks Area Forestry fire manager, Robert Schmoll said that the DOF had started looking closely at ways to reduce fire risk after the 2001 West Fork Fire near the end of Chena Hot Springs Road.

Hazardous fuel reduction projects are not intended or designed to provide access or trails. Even though the forest will be opened, downed trees will make travel on ATVs difficult if not impossible. Some treatments may occur on steep side slopes and since a running surface has not been designed into the treatments, they are unsuitable for sustaining ATV traffic.

Hazardous fuel reduction methods

There are a variety of fuel reduction methods that a land owner or fire manager can employ depending on their goals and objectives. Around homes and structures shaded fuel breaks have been the method of choice due to aesthetic qualities after the reduction is complete. The forest fuels are dramatically thinned and residual trees are left on a wide spacing. Limbs on the residual trees are removed up to 6 feet to eliminate ladder fuels that allow ground fires to readily move into the crown. Unfortunately these treatments are accomplished by hand and are expensive, typically costing over $4,500 per acre. The shaded fuel breaks have been found to

promote drying of the understory increasing fire behavior in the fine fuels. Because the forest has been opened, access is better for fire fighters and water application is particularly effective against fine fuel fires. A large negative to shade fuel break is lack of site conversion. Because the forest canopy is not completely removed, sun light does not warm the soil as well and mineral seed beds are not created. The result is that the forest remains as a spruce stand. A shaded fuel break is not nearly as effective in slowing a rolling fire as treatments where all the fuels are removed.

For public lands and interested private land owners, where aesthetics next to homes is not as important as achieving the greatest reduction in fire risk, mechanical treatments offer the most cost effective methods to fuels reduction and site conversion. Mechanical treatment open the site, remove all fuels, start soil warming, and provide the best opportunity for conversion of the site to hardwoods and willows.

There are several different methods of mechanical treatment, the most useful for the interior forest types are: 1.) shearing black spruce off at ground level with a shearblade mounted on a dozer and piling, 2.) knocking down black spruce and chopping into 18" pieces with drum chopper mounted behind a dozer, 3.) grinding black spruce with a masticating head mounted on a skidder, and 4.)mowing black spruce with a hydroaxe mounted on a skidder. Each type of treatment offers differ benefits and drawbacks.

Before recommending mechanical treatment methods on a large scale project, State Division of Forestry recognized the need to research the cost/benefits of the different methods and the potential for enhancing site conversion. A National Fire Plan grant was applied for and funding was received in 2002. The research project was a joint venture with University of Alaska-Fairbanks with the goal of comparing the cost of the different treatment methods, their effectiveness in creating site conversion, and the potential of producing economic by-products such as bio-fuel, from the treatment residue.

The research area is located within the Tanana Valley Forest at mile 10 of the Cache Creek Logging Road. The location off the Cache Creek Logging road was chosen because it met the needs / requirements of the research: accessible, close to residential area (reduce wildland fire risks), State forest lands, small diameter trees (spruce, hardwoods etc) and a history of fire. In the late 50's this area was the scene of a large wildland fire. The signs of the fire are still evident by the charred stumps and charcoal layer in the soil. The site was predominantly black spruce prior to the burn. Soon after the fire, hardwoods became the dominant species. Since then, the area has been converting back to spruce as seen by the dense under story of small diameter spruce trees.

State Division of Forestry-Fairbanks Area and a UAF graduate student established research vegetative plots in treatment areas at 10 mile of the Cache Creek road. The study will be composed of seven 5-acre treatments plots: 1) control (no treatment), 2) Hand falling and pile burning, 3) Mastication (with rubber tires), 4) Shear blade (dozer with tracks) and leave material; 5) Shear Blade and burn material windrowed material and 6) Shear Blade and chip, and 7)drum chop. Tom St.Claire is publishing his master's thesis on this project this spring.

Figure 6 Hand fell, pile, burn piles.

The hand fall, pile and burn treatment cost $2,700 per acre. This was an exceptionally low price as normal hand falling, stacking, and burn costs $4,500 per acre. This treatment left trees on 16 foot spacing. Birch revegetated from stump sprouts and aspen seeded in on the areas where the piles were burned.

Figure 7 Mastication Treatment

The mastication treatment costs $4,830 per acre, a fairly typical price for this type of treatment. Hydroaxe treatments, although not studied in this research, have a comparable cost to mastication. The regeneration results were poor in that all the trees are ground by the masticating head and left on the forest floor. This waste material was up to 12” thick in some locations and averaged 7” deep. The residue insulated the soil reducing the warming of the site, did not provide a good seedbed, and resulted low birch or aspen revegetation.

Figure 8 Shear blading.

The shearing was accomplished with a Rome KG shearblade mounted on a D8 dozer. The treatment of shear only with no windrowing, cost $350 per acre but resulted in the poor vegetation regeneration due to the shading provided by downed trees. The sheared trees cured in the sun and provided a fuel source. This fuel treatment provides some fire behavior gain over standing forest, but the fuel is still on site and is not the optimum treatment.

Figure 9 Burning windrows

The shear, windrow, and burn were also accomplished with the Rome KG shearblade mounted on a D8 dozer. This treatment requires a double pass to windrow the trees, increasing the cost to $450 per acre. Experienced cost on large shear blading projects run about $200 per acre on flat ground. Forest technicians from the Division of Forestry burned the windrows in an afternoon which cost $100 per acre. The windrowing alone opened the site and produced regeneration.

The regeneration significantly improved on the burned windrow areas. **This treatment was chosen as the optimum treatment because the cost to produce the desired affects of site conversion to hardwoods and for removing all the fuels was the lowest.**

The shear, windrow, and burn were also accomplished with the Rome KG shearblade mounted on a D8 dozer. This treatment requires a double pass to windrow the trees, increasing the cost to $450 per acre. The windrows were then chipped with a tub grinder at a cost of about $3,000 per acre. The chips were removed as a by product for use as a road amendment. The removal of the fuels and opening of the site provided good solar warming. Regeneration was good but not as good as the windrow and burn treatment.

Figure 10 Drum chopper.

The drum chopping involved a 6 foot drum chopper pulled by a D6 dozer. It costs $450 per acre. It did not adequate chop the trees due to snow keeping the blades on the chopper from reaching downed trees. The results were inadequate. Even though the fuel was left on the site, there was some fire behavior gain because the trees were knocked down. Also regeneration was poor due to downed trees shading the site.

TREATMENT	COST PER ACRE	REGENERATION-SITE CONVERSION	FUEL TREATMENT
Hand fell, pile, and burn piles	$2,700	Fair	Good
Mastication	$4,830	Very Poor	Fair
Shear	$350	Poor	Fair to Poor
Shear, windrow and burn	*$550*	*Very Good*	*Very Good*
Shear, windrow and chip	$3,440	Good	Very Good
Drum Chopper	$450	Poor	Fair to Poor

Table 4 Fuel Treatment Summary Table

The research project also explored developing products from the treatment residues. The goal was to reduce fuel treatment costs by producing a usable by-product. Products include possible road amendments (Chunk wood) to apply on erosion areas and high maintenance sites along selected areas on Cache Creek road in the state forest. The waste wood from the shearblade windrows were ground with a drum grinder in September 2005 and applied to high erosion areas of the Cache Creek road. Further analysis of the use of waste wood as a road amendment will be completed after 2006 spring breakup. Another product is bio-mass fuel. Treatment residue will be trucked to a bio-mass fired boiler at Kenny Lake to test burnability and BTU content in the summer of 2006.

Other bio-mass fuel and by-product opportunities will be explored. State Division of Forestry-Fairbanks Area received a National Fire Plan grant in 2005 to inventory the black spruce stands in the Fairbanks Area to determine the quantity of black spruce that maybe used as a bio-fuel to feed power generators in Fairbanks. Also test burns in Fairbanks power plants will be investigated to determine the feasibility of treatment residue as a bio-fuel. Treatment residue will also be tried at a new pelletizing mill in Delta. An analysis and feasibility report of the economics of the different products will be completed.

The ability of the partners to identify sustainable resource models (e.g. bio-mass fuel generation, wood product generation, etc.) that are complementary to and result from wildfire mitigation activities will be critical to the long term plans of the FNSB. The likelihood is small that enough federal funding will be made available across time to successfully clear the sufficient acreage to minimize the risk to many areas within the FNSB. To that end, self sustaining activities that act in concert and provide financial support for continued mitigation activities will be explored by the partners.

Wildfire Risk Assessment and Exposure Modeling

The State of Alaska, Division of Forestry, Fairbanks Area and Fairbanks North Star Borough have partnered with local, state and federal agencies to develop strategies, share resources, and consolidate wildfire risk planning to address the threat of wildfire to the Fairbanks North Star Borough residents. In 2005, the Fairbanks North Star Borough and the State of Alaska, Division of Forestry, Fairbanks Area (DOF) signed a cooperative agreement to complete mapping of hazardous fuels for the entire Fairbanks North Star Borough and to complete a comprehensive

Community Wildfire Protection Plan (CWPP). The goal of the CWPP is to develop and prioritize a thorough list of risk reduction projects in the high risk areas identified by the exposure model.

The exposure model was built within ArcGIS (ESRI, Redlands, CA), a Geographical Information System (GIS) environment. This enabled multiple sources of information to be incorporated into the four main modeling components: Hazard Fuels, Ignition Risks, Values of Concern, and Suppression Difficulty. The final Wildfire Exposure map is the result of combining these components to determine the relative risk to wildfire across the landscape within the Fairbanks North Star Borough.

The hazardous fuel type maps, the four modeling component maps and the final wildfire exposure map can be used as an interactive tool that allows DOF fire managers, foresters, fire chiefs, emergency response managers, fire scientists, and others to assess the effects of fire risk mitigation and prevention measures. Such measures include hazardous vegetation modification, Firewise home protection, planning building developments, and suppression response improvements on reducing wildfire risk to the community. DOF is developing a mapping website that will display satellite imagery, parcel ownership, maps developed in the exposure model and maps of proposed risk reduction projects.

The components that contribute to wildfire exposure are categorized into the following components:

- **Hazard Fuels**
- **Ignition Risks**
- **Values of Concern**
- **Suppression Difficulty**

Hazard fuels describes the potential intensity of a fire and provides a relative measure of the risk of various fuel types; **ignition risk** is defined as the potential for a fire ignition at particular locations: **values of concern** are cultural and resource values being exposed (or threatened) from wildfire; and **suppression difficulty** is the initial attack capability of suppression forces based on accessibility and response time.

Each of the components listed above are calculated from the environmental factors and cultural conditions that contribute to each. Vegetation, habitation, buildings, land use, terrain, weather, suppression response, and fire history are among the environmental and cultural conditions that contribute to fire exposure. Exposure modeling is the process of combining these factors and components to calculate or predict the threat posed by wildfire.

The wildfire exposure rating is a relative ranking of the threat of wildfire. The map products and reports were used for the following purposes:

- Mitigation design and prioritization,
- Emergency response planning
- Homeowner awareness
- Community planning
- Risk assessment

Model Design

The initial wildfire model structure and design process began in 2005. During the process, various other communities' wildfire risk models were reviewed for applicability to the interior. One of the models considered was developed by Municipality of Anchorage Fire Department. For the Fairbanks North Star Borough model, the Fire Risk Assessment Team and DOF fire behavior specialists identified the key concepts that should be addressed by the fire exposure model for Fairbanks North Star Borough:

- The Values of Concern component of the model should reflect the focus of this project on the preservation of life and property.
- Fuel Hazard should be quantified in a manner that is consistent with the established fire behavior models
- Hazard fuels should be calculated for each fuel type based on fire line intensity as expressed by British Thermal Units (BTU's) per foot per second.
- The model should be based on standard fuel type description developed by DOF from Viereck Vegetation Classification System and Canadian Forest Fire Danger Rating System (CFFDRS).
- Slope hazard weights on fire line intensity should be calculated with categorized slope influence.
- The parameters in the Suppression category should be developed and weighted based on actual resource capability and access, and estimated suppression response times.
- The Ignition Risk category should incorporate parameters that reflect probability of fire ignition based on historical DOF prevention statistics of fire start types.
- Fire behavior would be calculated based on worst case scenario for weather and fuel moisture conditions.

Model Components

The factors that contribute to the Fairbanks North Star Model are grouped into four major components:

- **Hazard Fuels**
- **Ignition Risk**
- **Values of Concern**
- **Suppression Difficulty**

Hazard Fuels

Hazard fuels are the term used to describe the potential intensity and risk of the fire. Wildfire behavior models such as BeHave Plus provide methods to calculate and assess fire hazard based on a number of environmental factors (for further in depth information see document: Wildland Fire Exposure Model in the appendix)

Hazard Fuels Model
The Hazard model output is derived by applying fire behavior calculations using specific slope categories to those areas on the landscape that reflect those conditions. The vegetation classes are reclassified into various fuel types by fire behavior specialists. Fire line intensity is then calculated for the fuel types based on extreme weather for the various slope categories. Percent slope categories are then calculated from a digital elevation model (DEM). These two data sources are then added together to form a combined fuel type and slope category raster (continuous surface of pixels). The slope categories and fuel types are coded in a way that when added together, the combined fuel type and slope category for every point on the landscape can then be reclassed to reflect the calculated fire line intensity for that point on the landscape. The final map of fire line intensities for specific slope categories is the hazard from fires across the study area.

H = FLI by Slope

Hazard Fuels = Fire Line Intensity by Slope

Ignition Risk

Ignition risk is defined as the potential for a fire to be ignited at a particular location. A great number of cultural and natural factors influence the potential for ignition. The FRAT distilled a list of likely ignition factors into lightning, fuels accessibility and land use based on DOF historical fire statistics maintained by DOF (for further in depth information see document: Wildfire Exposure Model).

Each year State Division of Forestry compiles a list of wildland fire history and ignition categories. These fire statistics breakdown annual reported fires by start category, such as human or lightning caused. Human caused fires are further broken down by type with debris burning as the highest cause at 41% of all fires starts. A five year average was used to weight ignition risk. The FRAT and DOF fire specialists allocated the fire start categories geographically based on experience of DOF fire managers with reported fires. For instance, in the Debris Burning category most starts are caused by residential burning followed by Agricultural burning. The ignition risk weight for debris burning was geographically applied to private parcels, agricultural land, new subdivisions, etc. The FRAT and DOF GIS specialists allocated each fire start category geographically and weighted each category based on the percentage of fire starts each contributed to the five year average. The historical geographical location of fire starts was necessary to generate an ignition risk model and integrated into a spatial map.

Calculating Ignition Risk

The ignition risk output is calculated by adding together various factors that influence the probability of a fire being ignited at a certain location. Examples include activities associated with high ignition risk, having a large number of people in an area, or dense lightning activity. Some areas multiple factors that increase the probability of ignition at that site, while other areas will have a lower ignition risk because there are very few sources that could ignite a fire.

The Fairbanks North Star Borough (FNSB) zoning categories were used in the model to determine where high density residential areas are and agricultural activities may occur. The recreational zones were combined with camping areas and river corridors. Existing parcels from the FNSB parcel data base were subtracted from each of these categories to distinguish actively owned parcels from simply zoned areas.

The FNSB roads database was queried to select the various road classifications, and then buffered by 100 feet on both sides. Based on ignition statistics, arterial and major roads were lumped together, with local, minor, and alleys being selected separately. Various travel corridors were utilized in the modeling. The trails database includes the FNSB trails, the state trails, as well as RS2477 trails. Additional layers include power lines from GVEA, the railroad, and the pipeline corridor. The area of ignition risk was considered to be immediately adjacent to each of these features, so each feature was buffered in GIS by 50 feet on both sides. Transfer station locations will be buffered by 500 feet.

The lightning density map was calculated from lightning occurrence data from the Alaska Fire Service (AFS) from 1986- 2005. This raster was then reclassified into low, medium, and high lightning density categories.

The ignition risk maps are reclassified into weights based on their attributes. Land use risk – weight map is generated from the land use raster layer. The accessibility risk map is created from a union on the roads, trails, power lines, and rivers risk weight maps. The fuels risk map is generated by reclassifying the fuels types into risk weights. The ignition risk weight (I) is calculated as an additive function of the fuels risk (Fr), land-use risk (Lr) and access risk (Ar). Lightning probability was calculated using the lightning history map (Ltg).

$$I = Fr + Lr + Ar + Ltg$$

Ignition Risk = Fuels Risk + Land-Use Risk + Access Risk + Lightning

Values of Concern

Values are a relative weighting of the cultural values at risk from wildfire. Public Safety and the destruction of property are the most important issues in wildland urban interface. Therefore the risk to life and property should be the greatest significant contributor to exposure rating. Secondary is the threat to resource values. The values at risk are calculated based on various

parameters: improvement, parcel size, and land use (for in depth information see document Wildfire Exposure Model).

Calculating Values of Concern

The values of concern model output are calculated by adding together factors selected by the FRAT. These values are intrinsic values such as life and property and are not ranked by dollars. The FNSB zoning database was used to select areas zoned by high density and single family residential zones. Existing parcels from the FNSB parcel database owned by private individuals were subtracted from these areas in order to distinguish actively owned parcels from simply zoned areas.

The FNSB parcel data base was analyzed in order to distinguish between private and commercial parcels and existing improvements and no improvements. Parcels equal to or less than 5 acres did not distinguish where an improvement was located, and the entire parcel was treated the same. Because the parcel database does not show the location of improvements, parcels larger than 5 acres with an improvement assumed the structure to be located in the centroid of the parcel. These areas were distinguished from the remaining portions of those parcels.

Public lands, including state, federal, and municipality lands, were selected from the most recent land ownership layer available. Power lines and pipelines were important infrastructure and buffered by 50 feet on each side.

All these layers were converted to rasters and entered into the weighted overlay function as described above.

$$V = Se + Lo + In$$

Values of Concern = Existing Structures + Land Ownership + Infrastructure

Suppression Difficulty

Suppression is the relative difficulty of putting a fire out once it has started. Wildland fire suppression in the Fairbanks North Star Borough is provided by State of Alaska Division of Forestry and nine structural fire departments within their particular fire service districts. The FRAT determined the effect on fire suppression with increasing distance from access, water sources, fire stations, etc. These distances for each particular sub-component were buffered in GIS and weighted.

The ability to suppress a fire was determined by adding together factors that determine the relative difficulty of suppressing a wildfire. These factors were considered under a worst case scenario under the assumption that no additional resources outside of jurisdictional boundaries would be available for initial attack support (for in depth information see document Wildfire Exposure Model).

Response Time
Response Time is calculated based on an estimated time it would take for initial attack resources to arrive at any incident located within Phase I area.

Suppression
Response Radius

Suppression response radius					
Response time	Class	>25 min	20 - 25 min	10 - 20 min	< 10 min
Helicopter response radius	Distance	> 30 miles	20-30 miles	4-20 miles	4 miles
Engine response radius	Distance	>19 miles	15-19 miles	8-15 miles	8 miles

Table 5 Suppression Response Radius

Calculating Suppression Difficulty

The layers for calculating suppression are the following: **Response Time** (Rt); **Road Access** (Ra), **Availability of Resources** (Ar); and **Water Sources** (Ws). Suppression Difficulty is calculated by adding the following raster layers.

$$S = Ws + Rt + Ra + Ar$$

Suppression Difficulty = Water Sources + Response Time + Road Accessibility + Availability of Resources

Wildfire Exposure-Cumulative Fire Risk

Wildfire exposure is the cumulative wildfire risk as determined by each model component. All four components are added to together to give the overall risk. Each of the four factors was weighted for their contribution to the overall risk. The final exposure map will display a relative scale of the areas that are at most risk to areas of lower risk. The Fire Risk Assessment Team will use the map to identify and prioritize the highest risk areas in need of the most attention for risk reduction projects. Risk reduction projects will be designed around reducing the highest priority risk areas.

Risk Factor Contribution to the Exposure Model

RISK FACTORS		RISK FACTOR INPUTS			
		Fireline Intensity	*Slope*		
Fuels Hazard					
		Land Use	*Access Risk*	*Lightening*	*Fuels Risk*
Ignition Risk					
		Existing Structures	*Land Ownership*	*Infrastructure*	
Values of Concern					
		Response Time	*Availability of Resources*	*Water Source*	*Road Accessibility*
Suppression Difficulty					
Cumulative Fire Risk					

Table 6 Wildfire Exposure Risk Diagram

$$W = H + I + V + S$$

Wildfire Exposure = Hazard Fuels + Ignition Risk + Values of Concern + Suppression Difficulty

Mitigation Plan -Phase I

Overview-Phase I and II

The CWPP, Exposure Model, and hazardous fuels mapping will be accomplished in two phases with Phase I covering Fairbanks, North Pole, Ester, Fox and portions of the Chena Hot Springs road. Phase I is scheduled for completion in the spring of 2006. Phase II, covering the rest of the borough, is scheduled for completion in the spring of 2007. Public meetings will be held to gather comments from the public, community leaders, agencies, organizations and emergency service personnel on their concerns and priorities regarding wildfire risks and projects to reduce that risk. Based on all of these inputs, a wildfire risk mitigation plan will be finalized. Fire risk reduction projects will begin after the planning phase.

It was determined by the Fire Risk Assessment Team that the focus of Phase I will be to allocate the first Congressional earmark funds of approximately $1million to fuels mapping, fire risk planning, improving suppression response with better maps and GIS data, and hazardous fuel reduction projects. The majority of funding would be allocated to prioritized hazardous fuels reduction projects. The FRAT also determined that the remainder of the Congressional earmark funds, approximately $1.5 million would be allocated to risk reduction projects in Phase II areas and comprehensive projects that cover both Phase I and II. The Phase II plan will not only develop priorities for risk reduction projects for Phase II areas, a comprehensive analysis will be completed for both phases to better allocate remaining funds and determine priorities for future funds. Additional cooperative agreements maybe written between FNSB and DOF for DOF to conduct fuel treatments and other risk reduction projects based on the funding allocations established by the FRAT.

Risk Reduction Goals and Objectives

The risk of wildfire to the community is composed of four components: hazardous fuels, ignition risk, values of concern, and suppression difficulty. Risk to the community can be reduced by mitigating risk in any of the four components. The goal of selected risk reduction projects is to reduce the greatest amount of wildfire risk to the community.

The Fire Risk Assessment Team was called upon to develop objectives and set priorities about which risk reduction projects will give the greatest return for the time and funds invested. The FRAT also considered the list of recommendations proposed by the 2004 fire reports when developing projects.

GOAL: Reduce The Risk Of Wildfire To The Community Through The Most Cost Effective Risk Reduction Projects.

Objective #1: Establish an Exposure Model for the Borough that Rates Risk and Complete the Community Wildfire Protection Plan.

A. Map Hazardous Fuels in the Borough.

DOF will conduct hazardous fuels mapping using eCognition software and Spot5 satellite imagery. The final product will be a map of the fuel types with in the borough. A map of hazardous fuels is needed by fire managers to effectively plan fire suppression and to anticipate threats to the nearby subdivisions. Fuels maps are also an integral part of the risk assessment plan.

B. Complete a Community Wildfire Protection Plan.

The DOF will complete a CWPP for the Fairbanks North Star Borough. DOF will organize a "fire risk assessment team" (FRAT) composed of fire specialists from DOF, emergency management managers from FNSB and a fire department representative. The FRAT and DOF will develop an exposure model, conduct a wildfire risk assessment, establish risk reduction projects and priorities, conduct community meetings, and develop a mitigation plan.

Objective #2: Reduce the Risk of Hazardous Fuels to the Community Through Hazardous Fuel Reduction Silvicultural Treatments.

A. Treat Hazardous Fuels to Provide a Fuel Break Surrounding the Community. The FRAT determined that hazardous fuel reduction treatments were the top risk reduction project. They estimated that these projects would provide the greatest overall risk reduction to the community. Hazardous fuel reduction was also the top priority established in the 2004 fire reports. The first series of fuel reduction treatments are recommended to be shear blading and piling black spruce on public lands based on the prioritized list of projects, subject to execution of future cooperative agreements between the FNSB and DOF. Shearing & piling are done in the winter months. Piles are allowed to season during the summer months. The piles from the clearing are burned by fire crews in late fall just before snowfall. Burn plans and Department of Environment smoke permits will be obtained before burning. Burning will be timed to reduce smoke impacts to the community. The treatments will average 300' wide and provide a fuel break against approaching large wildland fire. An another goal of this silvicultural treatment is to encourage the conversion from black spruce to significantly less flammable birch, aspen and willow, which will also provide improved habitat.

The treatment sites were placed along avenues of hazardous fuels that lead to FNSB communities. The treatment areas are along the north side of Old Murphy Dome road, Cache Creek, Goldstream Valley near Martin's Siding, near Little Chena river on Chena Hot Spring road. During Phase II, treatment projects will be considered that breakup continuous fuel beds both inside and outside of both the Phase I and II areas. The treatment sites for Phase I have been prioritized for mitigation as follows:

1. Old Murphy Dome Road 500 acres
2. Goldstream Valley 250 acres
3. Little Chena River 250 to 500 acres

B. Treat Hazardous Fuels Surrounding Waste Transfer Sites. The FRAT also determined that hazardous fuels surrounding the FNSB waste transfer sites were an important priority for reducing hazardous fuels. These dumpster sites are subject to several dumpster fires each year. Removing hazardous fuels around these locations will greatly reduce the risk of dumpster fires escaping to the adjacent wildlands. Black spruce fuels around the dumpsters require treatment. Due to the size of the treatment area it is not practical to shear blade these sites. A hydroaxe or masticating head treatment is more appropriate for these areas.

C. Support and Encourage the Treatment of Hazardous Fuels Around Resident's Homes. An important component of fuels reduction is around each resident's home. Firewise is a program that educates the public as to the types of treatments that they need to do to protect their home from wildfire. This topic is covered in more depth in Objective #3.

Objective #3: Reduce the Risk of Wildfire to Life and Property by Education And Community Outreach

A. Support and Encourage the Use of Firewise Program.

The interior of Alaska is a fire base ecosystem. It was made to burn frequently. As subdivisions move into the wildlands, it is vitally important that settlers take it upon themselves to protect their life and property. They are the first line of defense against wildfire. Fire suppression agencies can be spread very thin in an escaped fire and may not be able to suppress fires around every structure. Residents that have provided their structures with defensible space stand the best chances of a home surviving a wildfire. They are helping fire fighters by giving them defensible in which they can make a final stand to protect their home.

The Firewise program details the necessary elements that homeowners should establish on their property to optimize home survivability. The basic elements of Firewise are: Modify fuels around the property by clearing at least 50 feet around all structures. In the area 100 feet from the home, prune and thin trees. Replace wood shingle roofs with fire resistant shingles. Keep gutters and roof valley free of leaves and needles. Keep the foundation of the home free of all debris and grass. Don't stack firewood piles next to the home. Wet down around the structure upon approach of a wildfire. Provide for safe evacuation before the fire approaches. A Firewise home assessment is available from the State Division of Forestry by contacting Kathryn Pyne at 451-2668. The State Division of Forestry, Interior Fire Chiefs, and Fairbanks North Star Borough will continue to support and encourage Firewise for the residents of the borough through advertisements, booths at public events, radio and television advertisements, etc.

The State Division of Forestry will continue to allocate federal cost share funds to residents to assist in Firewise as the funds become available. Many federal grants require benefit and cost analysis of proposed actions. The CWPP / risk assessment will help to outline those projects which will yield the greatest benefit. The development of risk assessments and the collection of community input on values will help in developing priorities.

B. Support and Encourage the Use of Firewise Program By Insurance Companies.

Home insurance companies are encouraging homeowners to use Firewise to increase the survivability of their homes. State Farm Insurance is providing Firewise home assessment at no cost to their customers. DOF will provide additional assessment education support as available resources permit. DOF will also provide exposure maps to the public and insurance companies on areas of higher risk to wildfire allowing concentrated focus of the program where it's needed most. FNSB will assist insurance companies with GIS support where feasible.

C. Provide Current Fire Information to the Public.

The evacuations in 2004 overloaded the fire public information system. This was the single largest complaint received at public meetings. The fire perimeter information and evacuation information distribution to the public was inadequate increasing confusion among the public. During the height of the incident, thousands of phone calls were generated daily, overwhelming the phone lines and limited staff. An increase in public information and evacuation information distribution capabilities was recommended in the 2004 fire reports. DOF-Fairbanks Area has sought funding for a full time public information officer (PIO) for statewide use. No funding has

been made available. DOF will rely on Resource Ordering a PIO when fire activity justifies the order. DOF improved the phone system to allow better response to phone traffic concerning fire information.

DOF is developing a mapping website to provide the public with current fire information, including important announcement information such as evacuations. The DOF mapping website will also display imagery with parcel database overlays, roads, protection levels. Maps from the CWPP, Exposure Model, hazardous fuels vegetation, and fuel treatment projects will be displayed on the website. As part of the public meetings for the CWPP, the public will be directed to the website to view the maps. The DOF is modifying the burn permit program to allow daily activated burn permits to be viewed by dispatcher, fire managers, fire departments and the public. This will help keep the public informed and reduce call volume to dispatch. Fire departments can check permit locations when receiving a smoke report, eliminating unnecessary calls to DOF dispatch. The development of this website meets one of the recommendations of the 2004 fire report.

D. Provide Timely Evacuation Information to the Affected Public.

Fire evacuations happen quickly, sometimes within hours. A turn-key public information system is needed to give the public adequate notice of the impending threat and to respond to the public's need for information. Evacuation information and evacuation maps will be posted on DOF's website. The FNSB Emergency Operations Department is obtaining a "Community Wide Notification System", an automated phone system that will allow the agencies to identify the evacuation area and start an automated call out to affected residents. A pre-recorded message is played explaining the nature of the emergency, the need to evacuate and the location of shelters. The system keeps calling until someone is contacted. A report is generated detailing the contact times or lack of contact. The Division of Forestry strongly supports this effort. Cooperative agreements would be written to define how such a system would be incorporated in fire evacuations directed by the Incident Commander. This was one of the recommendations of the 2004 fire reports.

Objective #4: Reduce the Risk of Escaped Fire By Improving the Effectiveness of Fire Suppression Resources.

The 2004 fire reports recommended increasing suppression effectiveness by increasing technology support by providing satellite imagery, current data and better maps to fire fighters. Better information and better maps helps the fire fighter make better decisions on the fire. These decisions have important safety consequences to fire fighters and the public.

A. Improve the Accuracy of FNSB Parcel Database

The FNSB parcel database was extensively used during the Boundary fire to determine which parcels had structures and which did not. There were many errors in the database. The first portion of this objective is improve the accuracy of the FNSB parcel database such that fire managers can display parcels that have structures so better fire suppression tactics can be employed. Also the location of the structure on the parcel is not mapped. When suppression forces arrive on the scene they do not know where the structure is located on the parcel. This

becomes important on large parcels in heavy smoke. Each structure location should be mapped to aid fire fighters in suppression response.

B. Provide Fire Departments, DOF Dispatch, FNSB Emergency Managers, and DOF Fire Managers with Improved GIS Data and Map Products.

Fire Departments currently have few or no maps of displaying roads, satellite imagery, parcel database, fire station locations, hydrant and draft locations, hazardous fuels, and powerlines. Locations of hydrants, buried tanks, dry hydrants, draft sources, bucket ponds for helicopter bucket work need to be mapped and provided to fire departments and fire fighters. Not all roads and trails have been completely mapped and none have been classified as to the size of engine these roads will accommodate. Roads and trails need to be mapped and access attributes determined. Maps need to be provided to each fire department, state forestry and emergency response office depicting roads, parcels, hazardous fuels and hydrants with satellite imagery background.

The 2004 fire report recommended integrating GPS and GIS coverages on a mobile laptop for use by incident commanders and engines in the field. This technology could greatly improve response time, increase effective allocation of fire fighting resources, and improve evacuations and safety of fire fighters. This technology needs to be developed and deployment to suppression forces should be considered in Phase II.

C. Acquire High-resolution Imagery of the Settled Areas of the Borough and Map Structure Locations.

Imagery has proven invaluable for fire managers for determining fire spread, strategic, tactical and evacuation planning during a rapidly expanding fire. Currently available satellite imagery is several years old and does not show all the new house and road construction. New high resolution imagery covering the urban interface should be acquired. This imagery will be used for mapping structure location, new roads and trails. It will also provide the most current information to fire managers.

Objective #5: Community Planning: Require Future State and FNSB Subdivisions to be Located in Hardwood Forest Reducing the Risk of Wildfire to Life and Property and Fire Fighters.

A. Require Future State and FNSB Subdivisions to be Located in Hardwoods.

With increasing growth in the borough, better building sites are demanding higher prices. The result is increasing subdivision development in black spruce forests. Restrictions on developing in highly flammable black spruce should be considered. Some state subdivisions on Old Murphy Dome are sited at the top of several black spruce valleys and can be described as nothing less than a disaster waiting to happen. Future state and FNSB subdivisions should be located in hardwood stands with property boundaries no less than 100’ from black spruce for most of the subdivision. The subdivision should be designed with fire safety in mind. Each purchaser should be required to institute firewise in higher risk subdivisions. State of Alaska Division of Mining, Lands, and Water is already being responsive to wild risk mitigation. They are incorporating firewise messages in their land disposal program including: firewise presentations

as part of the stakeholders meetings and packets; including fire management option description in the stakeholders' packets and reviewing the placement of parcels in terms of wildland fire risk.

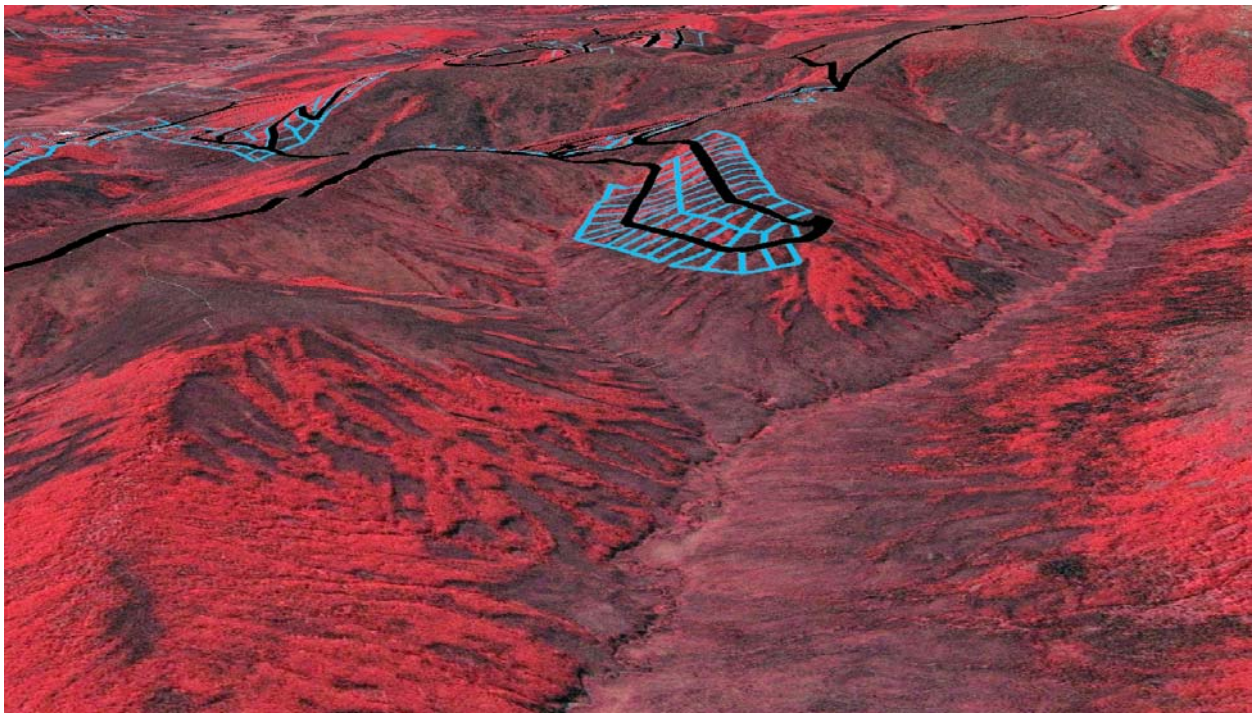

Figure 11 This subdivision shown in blue is located in black spruce and is at great risk from wildfire burning up the valley.

Funding Guidelines

In the spring of 2005, the Fairbanks North Star Borough received a $986,000 Congressional earmark from Senator Ted Stevens for wildfire mitigation projects in the Fairbanks North Star Borough. The purpose of the CWPP is developing Goals and Objectives for wildfire risk mitigation. The objectives are prioritized and funding allocated to the various priorities. The funding guidelines are approximate costs of the projects. If projects come in under or over the proposed cost, the funds maybe reallocated to other projects. In the case of fuel treatment projects, the amount of acres treated will depend on the bids received. Bids will vary depending on fuel size and density, slope, distance to access, fuel costs, competition, etc. Higher bids will reduce the number of acres treated.

Community Wildfire Protection Plan to DOF	$ 66,550
Hazardous Fuels Mapping for the FNSB to DOF	$135,200
High-resolution imagery and house mapping to FNSB GIS	$ 75,000
Community Wide callout for evacuations to FNSB Emergency Op.	$ 35,000
Sub-total	$311,750

Fuel Reduction Projects

Hazardous fuel reduction treatments around FNSB Dumpster sites to contractor	$ 20,000
Hazardous fuel reduction treatments across the borough includes layout, pile and burn, permits to DOF & contractor-750 acres*	$558,750
Sub-total	$578,750
Grand Total	$890,500

*Allocation of Funds- allocation of funds to Fuel mitigation projects will be subject to future Cooperative Agreements to be signed between DOF and the FNSB.

Action Plan

The following action plan was developed from the goals and objectives.

Objective	Tasks	Timeline	Agency Responsible
#1 Establish an Exposure Model for the Borough that Rates Risk and Complete a CWPP	1.A Map hazardous fuels in the borough.	Phase I Spring 2006 and Phase II Spring 2007	DOF-Fairbanks Area
	1.B Complete a Community Wildfire Protection Plan and Exposure Model.	Phase I Spring 2006 and Phase II Spring 2007	DOF-Fairbanks Area
#2 Reduce Risk of Hazardous Fuels through Fuels Reduction Silvicultural Treatments	2.A Treat, pile and burn fuels on approximately 1300 acres in strategic locations on public land.	Winter 2007 and 2008	DOF-Fairbanks Area
	2.B Treat hazardous fuels surrounding FNSB dumpster sites.	Winter 2006	FNSB
	2.C Support and encourage the treatment of hazardous fuels around resident's homes.	Ongoing	DOF, FNSB, Interior Fire Chiefs Association
#3 Reduce the Risk from Wildfire to Life and Property by Education and Community Outreach	3.A Support and encourage the use of Firewise program by borough residents. Provide site inspections and cost share treatments when funding is available.	Ongoing	DOF
	3.B Support and encourage the use of Firewise program by insurance companies. State Farm to assess customer homes. DOF provide additional assessment support and exposure maps to prioritize high risk areas. FNSB GIS to assist in parcel locations with FNSB GIS.	Summer 2006 and Ongoing	DOF, FNSB
	3.C Provide current fire information to the public. DOF to build a mapping website to display fires, activated burn permits, evacuation maps, etc. DOF provide PIO during high fire activity.	Spring 2006	DOF
	3.D Provide timely evacuation information to the affected public. Institute community wide automated call out system.	Summer 2006	FNSB
#4 Reduce Risk of Escaped Fire By Improving the Effectiveness of Fire Suppression Resources	4.A Improve the accuracy of FNSB parcel database.	Summer 2006	FNSB
	4.B Provide fire departments, DOF dispatch and fire managers, FNSB emergency managers with improved GIS data and map products.	Summer 2006	FNSB
	4.C Acquire high-resolution imagery of the settled areas of the borough and map structure locations.	Fall 2006	FNSB
#5 Community Planning	5.A Require Future State and FNSB subdivisions to be fire safe.	Ongoing	State FNSB

Appendices

Appendix A
Definitions List

i. **Alaska Interagency Wildland Fire Protection Plan**
   1. **Critical** the highest priority for suppression action on wildland fires that threaten human life, inhabited property, designated physical developments and to structural resources designated as National Historic Landmarks.
   2. **Full** established for the protection of cultural and historical sites, uninhabited private property, natural resource high-value areas, and other high-value areas that do not involve the protection of human life and inhabited property. Fires within full protection will receive aggressive initial attack dependent upon the availability of suppression resources.
   3. **Limited**-recognizes areas where the cost of suppression many exceed the value of the resources to be protected, the environmental impacts of fire suppression activities may have more negative impacts on the resources than the effects of the fire or exclusion of fire may be detrimental to the fire dependent ecosystems.
   4. **Modified** designation was intended to be the most flexible option available to land managers/ owners. The intent is to provide a higher level of protection when fire danger is high, probability of significant fire growth is high and probability of containment is low.

ii. **Climax plant community**: The plant community on a given site that will be established if present environment conditions continue to prevail and the site is properly managed (North Star Soil Survey)

iii. **Needle leaf forest**: Vegetation with at least 25 percent crown cover of trees and in which 75 percent or more of the trees cover is needle leaf trees (i.e. white spruce, black spruce and or tamarack).

Abbreviations and Acronyms

A: Availability of Resources (Suppression Difficulty equation)

ADCED: Alaska Department of Community and Economic Development

ADFG: Alaska Department of Fish and Game

AFS: Alaska Fire Service, Bureau of Land Management

Ar: Access Risk (Suppression Difficulty equation)

ATV: All terrain vehicle i.e. four-wheeler

AWFCG: Alaska Wildland Fire Coordinating Group

BLM: Bureau of Land Management

BTU: British Thermal Unit

CERT: Community Emergency Response Team

CFFDRS: Canadian Forest Fire Danger Rating System

CWPP: Community Wildfire Protection Plan

DOF: State of Alaska Division of Forestry

DNR: Alaska Department of Natural Resources

EMS: Emergency Management System

FLI: Fire Line Intensity

Fr: Fuels Risk

FRAT: Fire Risk Assessment Team

FNSB: Fairbanks North Star Borough

H: Hazard Fuels

IA: Initial Attack The first response of fire fighters to the reported wildland fire location (via engine / helicopter/ ATV).

GIS: Geographical Information System

GVEA: Golden Valley Electrical Association

HFRA: Healthy Forest Restoration Act

I: Ignition Risk

In: Infrastructure (Values of Concern equation)

Lo: Land Ownership (Values of Concern equation)

Lr: Land-Use Risk (Ignition Risk equation)

Ltg: Lightning (Ignition Risk equation)

PSA: Public Service Announcement

NFP: National Fire Plan

Ra: Road Accessibility (Suppression Difficulty equation)

Rt: Response Time (Suppression Difficulty equation)

S: Suppression Difficulty

Se: Existing Structures (Values of Concern equation)

UAF: University of Alaska Fairbanks

USFWS: U.S. Fish and Wildlife Services

V: Values of Concern

W: Wildfire Exposure Risk (Cumulative fire risk)

Ws: Water Sources (Suppression Difficulty equation)

WUI: Wildland Urban Interface

Appendix B Wildfire Exposure Model (insert)

Appendix C Land Status Report (insert)

Appendix D Maps (insert)

Appendix F Preparing a Community Wildfire Protection Plan (insert)

Appendix G Healthy Forest Initiative (insert)

Appendix H References

References

Fairbanks North Star Borough (FNSB)

FNSB Code Chapter 2.28: Civil Defense and Emergency Preparedness

Disaster as defined in FNSB Code Chapter 2.28: includes but is not limited to actual or threatened enemy attack, sabotage, extraordinary fire, flood, storm, earthquake, epidemic or other impending or actual calamity endangering or threatening to endanger health, life, property or constituted government. The Mayor is responsible for meeting the dangers presented by disasters to the borough and its people. 2.28.071 Duties of division of emergency management: The emergency manager shall be responsible to the mayor with regard to all phases of the civil defense activity in the borough. Under the supervision of the mayor, he shall maintain liaison with the state and federal authorities and the authorities of other nearby political subdivision so as to insure the most effective operation of the emergency preparedness plan.

2.28.111 Disaster Prevention: in addition to the disaster prevention measures as included in the borough and local disaster plans, the mayor shall consider on a continuing basis steps that could be taken to prevent or reduce the harmful consequences of disasters.

Federal

The Bureau of Land Management (BLM) maintains and operates the Department of the Interior wildland fire suppression organization in Alaska per Department of Interior Manual 620

1. Assistance PL 81 920 Civil Defense Act of 1950 as amended
2. PL 93-288 Robert Stafford Disaster Relief and Emergency Assistance Act of 1974 as amended
3. CFR 44.205 Federal Disaster Act

State of Alaska –

The Alaska Department of Natural Resources fire protection program is established by Alaska Statutes 41.15.010-41.15.170. Authority is provided by statute through the Commissioner of Natural Resources and is delegated to the Division of Forestry in Department Order 113 to protect natural surface resources as determined by the values-at-risk on all lands under State, private, and municipality ownership, with the exception of private lands protected by the federal government enacted by law (i.e. native ownership under ANCSA).

The Reciprocal Fire Protection Agreement between BLM- Alaska Fire Service and the State of Alaska, Department of Natural Resources, Division

of Forestry (DOF) identifies that the Alaska Fire Service will be responsible for fire protection in northern third of the state, DOF will be responsible for fire protection in the middle third of the state, and the US Forest Service will be responsible for fire protection on Forest Service Lands in southern third of the state.

AS 26 Chapter 20: Civil Defense Act as amended
AS 26 Chapter 23: Alaska Disaster Act
AS 44.19.048 Disaster Relief Fund
State of Alaska Emergency Operation Plan, as amended May 19

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