APPENDIX A:

Community and CWPP Background Information

FIRE MANAGEMENT POLICY

The primary responsibility for WUI fire prevention and protection lies with property owners and state and local governments. Property owners must comply with existing state statutes and local regulations. These primary responsibilities should be carried out in partnership with the federal government and private sector areas. The current Federal Fire Policy states that protection priorities are 1) life, 2) property, and 3) natural resources. These priorities often limit flexibility in the decision-making process, especially when a wildland fire occurs within the WUI.

LAWS, ORDINANCES, STANDARDS, AND CODES FOR WILDFIRE PREVENTION

Municipal Direction

There are currently no WUI or Fire codes within the Kenai Peninsula Borough.

State Direction

Department of Natural Resources (DOF)

"Alaska Statutes sections 41.15.010 - 41.15.240 mandate the Department of Natural Resources to manage the wildland fire program for the State of Alaska. Statute 41.15.010 addresses "protection from wildland fire and other destructive agents, commensurate with the values at risk, on land that is owned privately, by the state, or by a municipality." Alaska State House Bill 395 signed on May 4, 2005 defines the official Alaska Fire Season as April 1 to August 31; this was incorporated into state law under statute 41.15.050. In 2018, the Alaska State Legislature updated and approved House Bill 355 which brought additional changes, revisions and updates to the existing Alaska wildland fire protection laws. Links to the updated statutes and regulations can be found on the Alaska Division of Forestry webpage-(http://forestry.alaska.gov/)." (AICC 2021a)

The State of Alaska is not constrained by federal fire management policies on lands under state jurisdiction, i.e. state, private and municipal lands. However, the DOF *is* bound by the Alaska statutes and administrative code sections, the *Alaska Forest Resources and Practices Act*, and *Alaska Forest Resources and Practices Regulations* that directly regulate forest management endeavors on state forest lands (AICC 2021a). Information regarding the state fire management and forest health programs, including burn permits, available grants, Community Wildfire Protection Plans, and Firewise, is available on the Alaska Division of Forestry webpage (http://forestry.alaska.gov/) (AICC 2021a).

Alaska Department of Game and Fish (ADF&G)

"Pursuant to Alaska Statute 16.20, ADF&G shares jurisdictional authority with the Department of Natural Resources for 32 state game refuges, critical habitat areas, and wildlife sanctuaries across the state, totaling 3 million acres. ADF&G manages the wildlife and habitat within these legislatively designated areas. Alaska Statute 16.05.871(a) requires ADF&G to specify the various rivers, lakes, and streams, or parts of them, that are important for spawning, rearing, or migration of anadromous fishes. Protection of these specified water bodies is addressed by other sections of AS 16.05.871, which requires persons or governmental agencies to submit plans and specifications to ADF&G and receive written approval in the

form of a Fish Habitat Permit or concurrence prior to beginning the proposed use, construction or activity that would take place in specified water bodies." (AICC 2021a)

In order to uphold their mission to protect, maintain and improve fish, game and aquatic plant resources, the ADF&G 2009 fire management policy incorporates an aim to encourage wildland and prescribed fire management policies, practices, and decisions that are beneficial to the fish and wildlife resource (ADFG 2009).

Alaska Department of Environmental Conservation (ADEC)

"ADEC has primacy for implementing the federal Clean Air Act (CAA) and maintaining and enforcing the National Ambient Air Quality Standards (NAAQS) within the State (AS 46.03.020(a)). ADEC's policy is to minimize air pollution that is injurious to human health or welfare, animal or plant life, or property, or that would unreasonably interfere with the enjoyment of life or property. All prescribed burning in the state, whether requiring written approval from ADEC or not, must be done in a way that maintains maximum combustion efficiency throughout the burning period." (AICC 2021a).

Tribal Direction

More detailed information is available in the Alaska Native Organizations and Lands of the Alaska Statewide Operating Plan.

Policy affecting fire management responsibilities relating to Alaska Native organizations and lands can be found in the following documents (AICC 2021a:7):

- 1891 Townsite Act
- 1906 Alaska Native Allotment Act (amended 1956)
- 1971 Alaska Native Claims Settlement Act (ANCSA)
- 1980 Alaska National Interest Lands Conservation Act (ANILCA)
- 1998 Alaska Native Veteran Allotment Act
- Department of the Interior Manual 620 Chapter 5.3

ANCSA Native Corporations

"Alaska Regional and Village Native Corporations (ANCSA Corporations) were established in 1971 by the Alaska Native Claims Settlement Act (ANCSA). Individual ANCSA Corporations are considered the Jurisdictional Agency for their lands, and are annually given the opportunity to validate or change the AIWFMP Fire Management Options for those lands. As specified in DOI manual 620 Chapter 5.3, BLM-Alaska Fire Service (AFS) is responsible for fire protection on ANCSA Corporation lands. BLM-AFS provides fire management liaisons to the ANCSA Corporations to ensure they are informed about fires occurring on or threatening their lands and interests are represented in fire management decisions." (AICC 2021a)

Tribal Governments

"There are 229 federally recognized tribes in Alaska. Most have tribal councils as their governing bodies. Tribal governments in Alaska are distinct from ANCSA Regional and Village Corporations and have the same governmental status as other federally recognized Indian tribes by virtue of their status as Indian

tribes. They have a government-to-government relationship with the United States, and are entitled to the same protections, immunities, and privileges as other federally recognized tribes. Some tribes receive funding from BIA to provide certain fire management services such as advising protection agencies of their needs during active wildfires and fuels management work. Even though ANCSA places its land entitlement with the ANCSA Corporations, most tribes in Alaska own some land. Tribally owned land is in fee simple status and in Alaska is not considered held in Trust for jurisdictional purposes. Although tribally owned lands are in fee simple status, and fire management responsibilities are not identified in ANCSA, ANILCA, or 620 DM 5.3, tribal lands are currently treated similarly to ANCSA Corporation lands for fire management purposes." (AICC 2021a)

FEDERALLY ADMINISTERED INDIAN TRUST LANDS (INCLUDING NATIVE ALLOTMENTS)

"Federally administered Indian trust lands in Alaska include the Annette Island Indian Reservation and some Town Site lots created under the 1891 Townsite Act. Lands placed into trust under the fee-into trust regulation that was broadened to include Alaska tribes in 2013 are also included. A Native Allotment is a parcel or parcels of land, totaling up to 160 acres, conveyed by restricted title to an Alaska Native under the terms and conditions of the Alaska Native Allotment Act of 1906 and 1956 amendment; and the Alaska Native Veteran Allotment Act of 1998. 43 U.S.C. §§ 357, 357a, 357b. The restricted title exempts the land from taxes and specifies that the federal government will maintain the land and associated trust assets in perpetuity. Restricted-title Alaska Native Allotments are treated as trust lands for the purpose of fire protection. The Native Allotment itself is a value that needs to be protected from fire. Other trust assets (values) such as timber, cultural sites, houses, fish camps, exist on the allotments. Allotments are placed in Full protection regardless of the fire management option selected on surrounding lands by other agencies. The Department of the Interior, Bureau of Indian Affairs (BIA) has been tasked with the protection of Alaska native trust lands and serves as the Jurisdictional Agency for fire management purposes. Some of Alaska's federally recognized tribes, as well as several tribal consortiums, have compacted with the BIA through their Tribal Governments to become a service provider for some allotment owners. These providers serve as additional points of contact for fire managers. The BIA is still ultimately responsible for ensuring that the federal government's trust responsibilities are met. Where an additional provider exists, both BIA and the provider need to be notified of wildfires and included in the decision-making process. BIA will assist with this. Per DOI Manual 620, Chapter 5.3, the BLM-AFS provides fire protection for the BIA, in some parts of the state DNR or USFS have agreed to carry out AFS' responsibility and protect BIA land through the Statewide Master Agreement. Thus, both BIA and AFS will be involved in fire management decisions in order to ensure the federal responsibilities are met." (AICC 2021a)

Federal Direction

"Federal wildland fire policy forms the basis for Department of the Interior (Bureau of Indian Affairs, Bureau of Land Management, National Park Service, and U.S. Fish and Wildlife Service) and Department of Agriculture (U.S. Forest Service) fire management programs in Alaska. Additional guidance for the lands withdrawn for military use can be found in memorandum of agreements and annual operating plans between BLM-AFS and the Department of Defense agencies. Federal policies and programs are implemented through Congressional appropriations and funding levels vary annually." (AICC 2021a)

Guidance for Implementation of Federal Wildland Fire Management Policy

"The Federal Wildland Fire Management Policy and Program Review Final Report (December 18, 1995) was the first joint comprehensive fire policy for the Departments of the Interior and Agriculture. The Final Report contained guiding principles that directed federal agencies to achieve a balance between suppression to protect life, property and resources, and fire use to regulate fuels and maintain healthy ecosystems. It promoted the use of wildland fire to accomplish resource management objectives and supported implementation of policies and recommendations in conjunction with states, tribes, and local governments. The review and update of the 1995 Federal Wildland Fire Management Policy (January 2001) contained specific actions to enhance wildland fire management and seeks to build on the strengths of the original policy. Firefighter and public safety is listed as the first priority and the 2001 policy directs all fire management plans and activities to reflect this commitment. The 2001 guiding principle and policy statements guide the philosophy, direction, and implementation of fire planning, activities and projects on federal lands. All the principles and policy statements are incorporated by reference into this Plan and, where appropriate, the statements are included within this Plan. The first Interagency Strategy for the Implementation of Federal Wildland Fire Management Policy was issued in 2003; it was replaced by the Guidance for Implementation of Federal Wildland Fire Management Policy (February 13, 2009). The 2009 Guidance affirmed the soundness of the 2001 review and update, and clarifies implementation direction to achieve the intent of the 2001 policy." (AICC 2021a)

National Fire Plan

"The National Fire Plan (NFP) was developed in August 2000, following a landmark wildland fire season in the Lower 48, with the intent of actively responding to severe wildfires and their impacts to communities while ensuring sufficient firefighting capacity for the future. The NFP addresses five key points: firefighting, rehabilitation, hazardous fuels reduction, community assistance, and accountability." (AICC 2021a)

Healthy Forests Initiative and Restoration Act

"Fuels management was addressed further in the Healthy Forests Initiative (August 2002) which sought to reduce the risks severe wildfires pose to people, communities, and the environment. The Initiative was followed by the Healthy Forests Restoration Act of 2003 which contains a variety of provisions to speed up hazardous-fuel reduction and forest-restoration projects on specific types of federal land that are at risk of wildfire and/or of insect and disease epidemics." (AICC 2021a)

Good Neighbor Authority

"The Good Neighbor Authority authorizes the Forest Service and BLM to partner with states, local governments, and tribes in order to implement watershed and forest management activities on federal lands. The authority was permanently authorized in the 2014 Farm Bill. It is intended to expand limited federal capacity to implement and plan projects, and addresses shared, cross boundary priorities like fire risk, invasive species, and water quality and wood products supply. The authority is broad, allowing for a wide range of restoration services that will improve 'forest, rangeland, or watershed health.'" (AICC 2021a)

Federal Aid in Wildlife Restoration (Pittman-Robertson Act)

"The Pittman-Robertson Act, passed in 1937, now known as Federal Aid in Wildlife Restoration, imposes an excise tax on the sale of firearms and ammunition to help fund wildlife conservation in the United

State. Revenues generated from these excise taxes are apportioned to state wildlife agencies for their conservation efforts, hunter education programs, and operation of archery and shooting ranges. ADF&G has been able to leverage funds generated through this act for habitat restoration projects." (AICC 2021a)

Reserved Treaty Right Lands (RTRL)

"Beginning in FY 2015, Fuels Management Funding has been appropriated for the purpose of treating and restoring tribal landscapes within and adjacent to reserved treaty right lands. The Department's Reserved Treaty Right Lands (RTRL) program enables Tribes to participate in collaborative projects with non-Tribal landowners to enhance the health and resiliency of priority tribal natural resources at high risk to wildland fire. The RTRL allocation is provided to the BIA through the DOI's Wildland Fire Management appropriation and is made available through the fuels management program." (AICC 2021a)

Cohesive Wildland Fire Management Strategy

"The National Strategy is the result of a collaborative effort by Federal, state, local, and tribal governments and non- governmental partners and public stakeholders, in conjunction with scientific data analysis. It recognizes and accepts fire as a natural process necessary for the maintenance of many ecosystems, and strives to reduce conflicts between fire-prone landscapes and people. By simultaneously considering the role of fire in the landscape, the ability of humans to plan for and adapt to living with fire, and the need to be prepared to respond to fire when it occurs, the Cohesive Strategy takes a holistic approach to the future of wildland fire management." (AICC 2021a)

Dingell Act

"Public Law 116-9, the John D. Dingell, Jr. Conservation, Management, and Recreation Act of March 12, 2019 (Dingell Act) is a combined package of more than 100 individual bills introduced by over 50 members of Congress. It lays out provisions for various programs and activities affecting the management and conservation of natural resources on federal lands, to include wildland fire operations. Section 1114 of the Dingell Act, titled Wildfire Technology Modernization, mandates interagency collaboration to expand the use of unmanned aircraft systems, location trackers, and decision management systems. It also calls for the enhancement of smoke projections, erosion data, and predictive services." (AICC 2021a)

Executive Order 13855

"In response to the deadly wildfires of 2017 and 2018, the President signed Executive Order 13855 - Promoting Active Management of America's Forests, Rangelands, and Other Federal Lands To Improve Conditions and Reduce Wildfire Risk on December 21, 2018 calling for federal land managers to improve conditions and reduce wildfire risk through active management of their lands. Executive Order 13855 emphasizes that federal agencies must collaborate with state and local institutions and incorporate active management principles into all land management planning efforts in order to address the challenges of wildland fire. Quoting from Section 1: "With the same vigor and commitment that characterizes our efforts to fight wildfires, we must actively manage our forests, rangelands, and other Federal lands to improve conditions and reduce wildfire risk." Section 5 of the executive order directs the Secretaries of Interior and Agriculture to jointly develop a Wildfire Strategy in collaboration with Federal, State, tribal, and local partners that supports local Federal land managers in project decision-making and informs local fire management decisions related to forests, rangelands, and other Federal lands, thereby protecting habitats and communities, and reducing risks to physical infrastructure." (AICC 2021a)

EMERGENCY MANAGEMENT PLANNING

The Kenai Peninsula Borough updated its Hazard Mitigation Plan (HMP) in 2019. This CWPP dovetails with the wildfire section of the HMP by incorporating wildfire hazard mitigations identified in that plan. In the future, the Borough should consider revising both plans in unison.

PUBLIC LAND MANAGEMENT

Past Land Management Strategies

Beginning in the early 1900s, the policy for handling wildland fire leaned heavily toward suppression. Over the years, other agencies, such as the BLM, the Bureau of Indian Affairs, and the NPS, followed the lead of the USFS and adopted fire suppression as the primary means for protecting the nation from wildfire. As a result, many areas now have excessive fuel buildups, dense and continuous vegetative cover, and tree and shrub encroachment into open grasslands.

Over the past few decades, several elements have compounded to alter forest composition, understory and overstory composition, fuel dynamics, and historical fire regimes. Insect outbreaks, changes in land use practices, the shifting climate, and increased human presence and activity have all been implicated as contributing elements (Fryer 2014). Although black spruce trees are fire adapted, significant changes in fire regimes undermine resilience and often result in recruitment failure (Baltzer et al. 2020). As a result, forest composition in many regions of Alaska has changed; there has been a general shift toward shrubs and less acreage of older spruce forest. The shifts in forest composition are likely to increase forest flammability and shorten fire-return intervals (Fryer 2014). Moreover, shrubs and other light fuels have been expanding their range with the warming temperatures—increasing the spatial extent of areas susceptible to severe wildfires (USGCRP 2018).

Current Land Management Strategies

The KPB has a long history of SBB outbreaks. In 1999, SBB damage reached a high point with over 1.2 million acres impacted (KPB Interagency 2018). Southcentral Alaska is currently undergoing another SBB outbreak. More than 1.2 million acres have been impacted since the outbreak began in 2016. In 2020 alone, 145,000 acres of SBB activity was recorded, with 18,330 acres located on the KPB (USFS 2021d).

The 2018 ALAH plan focuses on managing wildfire risk and the hazards linked with trees damaged by SBB. Accordingly, the aim of the ALAH plan is to address fire hazards and forest health. Strategic actions include (KPB Interagency 2018):

- The promotion of prescribed fire training and certification, landscape scale fuels treatments, and active forest management
- The development of methods to assist and inform private landowners with fuels management
- The integration of fuels reduction and fire risk management methods into existing and future land management plans

For SBB management, implementation tasks include the prioritization of hazard tree removal linked with SBB in areas with high human activity to reduce public safety hazard and protect critical infrastructure (KPB Interagency 2018).

Alaska Division of Forestry

The mission of the DOF is to develop, conserve, and enhance Alaska's forests to provide a sustainable supply of forest resources for Alaskans (AICC 2021a). Within the DOF is the Wildland Fire and Aviation Program. This program operates with the mission of providing safe, cost-effective, and efficient fire protection services and related fire and aviation management activities on state, private, municipal lands, and lands negotiated through agreement, commensurate with the values at risk (AICC 2021a).

National and State Forest priorities, as defined in the State Forest Action Plan are to (DOF 2020a):

- Conserve and manage working forest landscapes for multiple values and uses
- Protect forests from threats
- Enhance public benefits from trees and forests

Further detail on the priorities listed above is provided in Figure A.1.

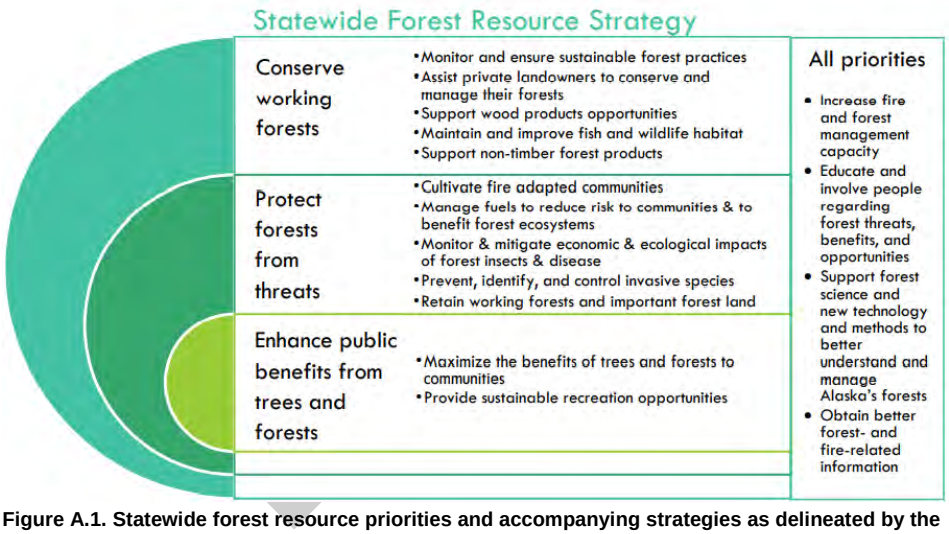

Figure A.1. Statewide forest resource priorities and accompanying strategies as delineated by the 2020 Alaska Forest Action Plan.

Source: Alaska DOF (2020)

Fuel Reduction Crew Management

Some new ideas on how to assemble and implement a fuels reduction crew on the Kenai Peninsula are included in a memo prepared by a Core Team member with vast experience in this arena.

Commented [VA1]: Core Team (especially John Winters) if you would prefer, we can include this letter with the project files for the CWPP instead of including here. Please advise.

THE STATE of ALASKA
GOVERNOR MIKE DUNLEAVY

Department of Natural Resources

Division of Forestry

Stewardship Program
2156 Kachemak Drive
Homer, Alaska 99603
907-235-7841
907-260-4245
john.winters@alaska.gov

August 30, 2021

Kenai Peninsula CWPP Core Team

Hello All.

The widespread beetle-kill and recent large fires on the Kenai Peninsula has heightened interest in fuel mitigation. Creating a hand crew for fuels mitigation and fire suppression was suggested at the July 26 Core Team meeting.

I expressed that crew management is a daunting effort, in which admin and logistical support be carefully included in funding. I do not wish to throw cold water on a fuels reduction crew idea. Crew management, however, can overwhelm an agency office. My points here will hopefully spark some new ideas on how to assemble and implement a fuels reduction crew on the Kenai Peninsula.

From 1998 to 2006 I managed crews from the Division of Forestry Kenai / Kodiak Area Office. Federal grants funded the seasonal crews to carry out fuel mitigation projects on the Kenai Peninsula. Most of the projects occurred on Kenai Peninsula Borough lands and entailed removing hazard trees from school grounds and other high-risk public sites.

The fuel reduction crews were organized as Type II crews that could assist with local, statewide and Lower 48 fire suppression. Crews were initially hired and administered as Emergency Firefighter crews, but were later required to be hired and administered as short-term nonperm employees. This allowed the crews to be hired and utilized without high fire danger, as is required for Emergency Firefighter crews. Although intended to be Type II crews, the Kenai fuels mitigation crews were usually 10 to 16 people and augmented with additional firefighters whenever the crew was assigned to a fire.

The necessary functions that needed to be carried out each season could are Crew Oversight, Administrative Support and Logistical Support.

Oversight

-Annual crew hire including documentation of hiring procedures and compliance with agency hiring/EEO/recruitment requirements.

-Training to State and Federal standards for chainsaw operations and firefighting.

-Qualified crew supervision.

Page 1 of 4

-Appropriate and competitive pay level for the Crew boss and squad leaders.

-Coordination of projects with local agencies.

-Budget management.

-Initializing and maintaining records of training and recertification and fire qualifications.

-Agency non-fire training requirements to satisfy agency health, safety and EEO requirements.

-COVID-19 mitigation protocols.

-Injury and property loss/damage accountability.

-Personnel files containing performance evaluations, and related administrative documents.

Administrative Support

-Payroll-timesheet processing.

-Seasonal "New-Hire" documentation: "Returning Seasonal" employment documents, health insurance enrollment, Worker's Comp., driving records, background checks.

-Arranging for procurement including credit cards and tax-exempt identification cards.

*An important point: I spoke with two Administrative Assistants stationed offices that employed 20-person fire crews. Despite those offices acquiring crews, the admin staffing was never augmented with additional positions. I would therefore recommend that any agency taking on a crew factor admin support into the personnel budget.

Logistical Support

-Personal protective equipment and fire clothes.

-Dedicated vehicles and their support including agency maintenance schedules. Vehicle compliment should be capable of transporting 20 firefighters and equipment to assemble at least 4 saw teams.

-Fuel for vehicles transporting the crew and chainsaws.

Profile of a Crew Boss

The crew boss would need to coordinate diligently with administrative offices, warehouses, fire dispatchers, HR Offices and Job Service. This will therefore require the commensurate communications, interpersonal, technical skills.

For these reasons, the crew Boss should be a dedicated position, and not assigned to a staff supervisor in charge of initial attack crews, in my opinion. Crews call for focused attention especially if their primary function is tree felling and chainsaw operations. The role of a fuels mitigation crew leader is complex enough to warrant pay equal to fire staff supervisors. Under the national wildland qualification system, a Type II Crew Boss is part of the Single Resource Boss group which includes engines, helitack, dozers, plows etc. All receive the same pay if hired as Emergency firefighters. I believe that the Crew Boss position is the most taxing of these Single Resource Boss positions, especially if hiring, procurement and the other administrative/support functions are added to their position description. The Division of Forestry's initial attack Engine Helitack crew leaders are employed as Wildland Fire & Resources Technician III's. I further believe that the supervisor for a 20-person Type II fuels reduction/fire crew should be paid at a level

commensurate with a Fire & Resources Technician IV, or similar federal counterpart pay level. Again, these points are my opinion based on experience with recruitment and retention of crews in the early 2000's.

In recent discussions with DOF offices on crew management, the general consensus is a crew adds considerably to their workload even with the benefits that a local fire crew offers.

Managing Chainsaw Operations
There is a huge liability managing a crew assigned to fell and remove dead trees near buildings, power lines and public facilities. It is reasonable to expect that the crew will have minimal chainsaw experience yet be faced with projects requiring advanced skills. An important role of the crew supervisor is to ensure that the crew is not lassoed into tree removal projects beyond their capabilities. Annual turnover will likely be high, as quality crew members [rightfully] advance to higher paying jobs. The crew proficiency cycle restarts continually; and needs to be proactively addressed through an effective training program.

Firefighter Development Opportunities
Going to fires has historically been a key incentive for crew members to stick around. Cutting trees and stacking slash all day strains young attention spans and enthusiasm. Fire assignments—and associated overtime pay—will boost morale. Fire assignments will also boost work seasons and budgets. Past crews provided training opportunities for agency firefighters to gain leadership experience and fulfill their Crew Boss / Squad Boss qualification requirements.

A crew offers a strong source of strong recruits for the DOF, Forest Service and Refuge seasonal fire staff. From my experience, strong crew members also became strong agency technicians.

Proposed Solutions to Crew Management Challenges
Mitigate risks of tree felling. A crew of first-year firefighters felling large dead trees poses unacceptable risks. However, the risks would be mitigated by advance fallers cutting trees ahead of time. This would provide an opportunity for Faller-Trainees to sharpen their skills while assisting with a project. More of the felling could be gradually carried out by a hazard fuels crew as they become more proficient using chainsaws. Slash disposal alone is a large enough undertaking to fully occupy a crew. Advanced fallers and a crew focused on slash disposal could result in more efficient fuels mitigation.

Tree removal services could also provide tree mechanical tree felling leaving slash disposal to the crew.

Start with smaller crews. A crew is as effective as it can be managed and supported. If a 20-person crew is overwhelming, then a smaller crew could carry out daily operations and respond to fires as Initial Attack squads. Since Type II crews are incident-driven, the smaller fuels reduction crew could be augmented with sufficient firefighters/supervisors from cooperating fire agencies to form a Type II crew for a specific incident. A smaller crew would better enable funding for added admin and / or logistical support.

I hope that this information is helpful.

Sincerely,
John Winters
Stewardship Forester—Kenai Peninsula

Page 3 of 4

Alaska Department of Fish and Game

The State of Alaska, Department of Fish and Game (ADFG) follows a mission to protect, maintain, and improve the fish, game, and aquatic plant resources of the state, and manage their use and development in the best interest of the economy and the well-being of the people of the state, consistent with the sustained yield principle (AICC 2021a).

The 2009 ADFG fire management policy aims to implement strategic practices and decisions which benefit Alaskan resources, including wildland fire and prescribed fire management policies (AICC 2021a).

All Lands, All Hands Action Group

According to the ALAH Action Plan, continued expansion of the WUI, the effects of a changing climate on wildfire extent and seasonality, and vegetation that has been unfavorably affected by insect infestations are main concerns within the KPB that require planning and management. To address these forest health concerns and increasing wildfire risk, the ALAH Action Plan has aligned all goals, and corresponding desired outcomes, strategic actions, implementation tasks, and performance measures for the years 2018-2022 with the three main goals of the Cohesive Strategy (KPB Interagency 2018).

FIRE PLANNING – PAST EFFORTS

There is a number of existing documents relating to fire management in the Borough, the main fire management document being the Alaska Interagency Wildland Fire Management Plan (FMP), which provides more detailed information regarding operational procedures relating to wildfire on state and federal lands. This CWPP is meant to supplement and not replace the FMP or any other existing plans.

Regional Plans

2018 All Lands All Hands Action Plan:

In 2018, the KPB Interagency prepared the All Lands All Hands Action Plan Update for the Borough. The plan was created to be a working document that also considers the FEMA-approved Hazard Mitigation Plan and 2018 Comprehensive Plan, 2009 Federal Land Assistance, Management, and Enhancement Act (FLAME), and integrates the 2014 Cohesive Strategy (KPB Interagency 2018). The plan focuses on the use of science-based data analysis to support planning, decision making, and implementation as a mechanism to produce substantial reductions in wildfire risk both in the short and long-term. The plan also integrates monitoring and evaluation of these efforts to evaluate progress towards the desired outcomes. Specifically, the plan identifies actions and tasks with respect to restoring and maintaining landscapes, fire adapted communities, and wildfire response (KPB Interagency 2018).

2019 Kenai Peninsula Borough Hazard Mitigation Plan:

In 2019 the KPB updated its 2019 Hazard Mitigation Plan. The update modifies the previous plan to integrate information regarding hazard risk assessment, climate, geography, and population demographics, among others. The objective of the plan is to minimize or eliminate injuries or fatalities, damages and losses from natural and human-caused hazards (KPB 2019a). This plan was developed to review past disasters, predict the potential of future disasters, and determine mitigation priorities. The document provides an overview of the Borough and its communities, a description of the planning

process, updates to mitigation goals, a risk assessment, capabilities assessment, goals and strategies, and implementation measures.

State Plans

2018 Alaska Disaster Response Plan

In 2018, the Alaska Department of Environmental Conservation (DEC) developed the Disaster Response Plan (DEC 2018). This plan was designed to act as a guideline or reference for organizing and coordinating disaster response at the agency level. The plan establishes a framework to improve coordinated emergency response efforts between communities, local and tribal organizations, state and federal agencies, and first responders. The plan prioritizes 5 objectives in responding to disaster emergencies: safety, health, environment, cleanup, and recovery. In addition, the plan outlines the DEC's responsibilities in assisting emergency response agencies during disaster emergencies (DEC 2018).

In 2011, the DHSEM developed the **Alaska Emergency Response Guide for Small Communities** (DHSEM 2011). The guide was created to assist local governments in emergency response and preparation planning in their communities. The guide provides several recommended actions during the first 72 hours of a disaster and details efforts to begin the recovery phase (DHSEM 2011).

2020 Annual Report

In 2020, the DOF published the 2020 Annual Report. The report reviews many aspects of and relating to Alaska state forests, including forest practices, forest management, fire programs, fire management, forest health status, resource development, and cooperative forestry programs. The report details past and current forest projects such as fuels reduction, timber harvesting, and forest health monitoring. The report also includes a fire section describing 2020's fire season, which covers fire causes, fire statistics, fire impacts, and weather patterns (DOF 2020b).

2020 Alaska Forest Action Plan:

In 2020 the DOF developed the 2020 Alaska Forest Action Plan. The plan aims to identify threats facing Alaska's forests and the opportunities to improve the benefits of Alaska's Forests, and to present a guide of methods that can be utilized by landowners across Alaska. The overall purpose of the Forest Action Plan is to guide the use of federal, state, local, and private funding to conserve Alaska's forest resources and maximize the public benefits of Alaska's forests. The plan is guided by three national priorities: to conserve and manage working forest landscapes for multiple uses and values, to protect forests from threats, and to enhance public benefits from forests (DOF 2020a).

2021 Alaska Interagency Wildland Fire Management Plan:

In 2021, the Alaska Interagency, an organization composed of various state, federal, and native organizations, developed the Wildland Fire Management Plan for Alaska (AICC 2021a). The plan was developed to promote a consistent, cooperative, and cost-effective interagency approach to wildland fire management. The plan emphasizes firefighter and public safety as the overriding priority in all fire management activities for all agencies. Strategies outlined within the plan include vegetation management, prevention of human starts, wildfire investigation, adjustment of fire management options to changing environmental and regulatory conditions, and the integration of a wide range of economically and ecologically sound fire management options (AICC 2021a).

Federal Plans

2013 Kenai National Wildlife Refuge Fire Management Plan:

In 2013, the USFWS updated the Kenai National Wildlife Refuge 2001 Fire Management Plan. The plan provides the framework and management direction necessary to ensure refuge objectives are met, while providing for the protection and/or enhancement of cultural and natural resources and life and personal property (USFWS 2013). To meet its objectives, the plan emphasizes public engagement, prescribed fire, hazardous fuel reductions, and coordination with cooperating agencies. These plans are typically evaluated after 15 years but may be updated earlier as needed. Future updates of the Kenai National Wildlife refuge FMP will follow the 15-year Comprehensive Conservation Plan revision cycle to provide uniformity in objectives and management strategy development (USFWS 2013).

2020 Forest Health Conditions in Alaska:

In 2020, the USFS published the Forest Health Conditions in Alaska report. The report summarizes monitoring data collected annually by the Forest Health Protection team and integrates information from many sources to inform land managers, resource professionals, decision-makers, and other interested parties on forest health conditions. In addition, the report fulfills the congressional mandate (The Cooperative Forestry Assistance Act of 1978) that requires surveying, monitoring, and annual reports of the health of the forests (USFS 2021d).

2020 Chugach National Forest Land Management Plan:

In 2020, the USFS published the Chugach National Forest Land Management Plan (Forest Plan). The purpose of the Forest Plan is to sustain the health, diversity, and productivity of the Nation's forests and grasslands to meet the needs of present and future generations. The Forest Plan provides management direction for the National Forest System lands within the boundary of the Chugach National Forest. It emphasizes coordination and communication with communities, tribes, and federal, state, borough, and local governments for hazard fuel management, community wildfire protection planning, preparedness actions, and wildfire response (USFS 2020b).

LOCATION AND GEOGRAPHY

The KPB is roughly 10 million acres and is bordered by the Gulf of Alaska to the southeast, the Cook Inlet to the southwest, and Anchorage to the north. The KPB is at the southern terminus of Alaska. The main transportation corridors include the Sterling and Seward Highways. The Sterling Highway connects the Borough to Anchorage and the mainland. The Seward Highway originates at Tern Lake in Moose Pass and provides access to Seward City. Land ownership information is provided in Table A.1.

Land ownership in the Borough is spread across different agencies, organizations, and tribes. Major federal landowners include the NPS, USFWS, USFS, and BLM. The state and local governments also own a considerable amount of land (23%). Native lands and allotments constitute about 11% of land ownership in the Borough. Lastly, private landowners represent a little over 2% of the entire area (Table A.1; Figure A.2).

Table A.1. Breakdown of Land Ownership in Borough

Land Ownership	Acres	Percentage of the County
National Park Service	3,003,770	29%
State	2,333,304	22%
U.S. Fish and Wildlife Service	1,822,810	17%
U.S. Forest Service	1,250,793	12%
Alaska Native Lands Patented or Interim Conveyed	1,004,335	10%
Bureau of Land Management	475,230	5%
Undetermined	255,286	2%
Private	251,932	2%
Local Government	89,072	<1%
Alaska Native Allotment	16,533	<1%
Coast Guard	1,696	<1%
Federal Aviation Administration	179	<1%
Other Federal	125	<1%
Army	32	<1%
Air Force	11	<1%
Department of Defense	10	<1%
United States Postal Service	10	<1%

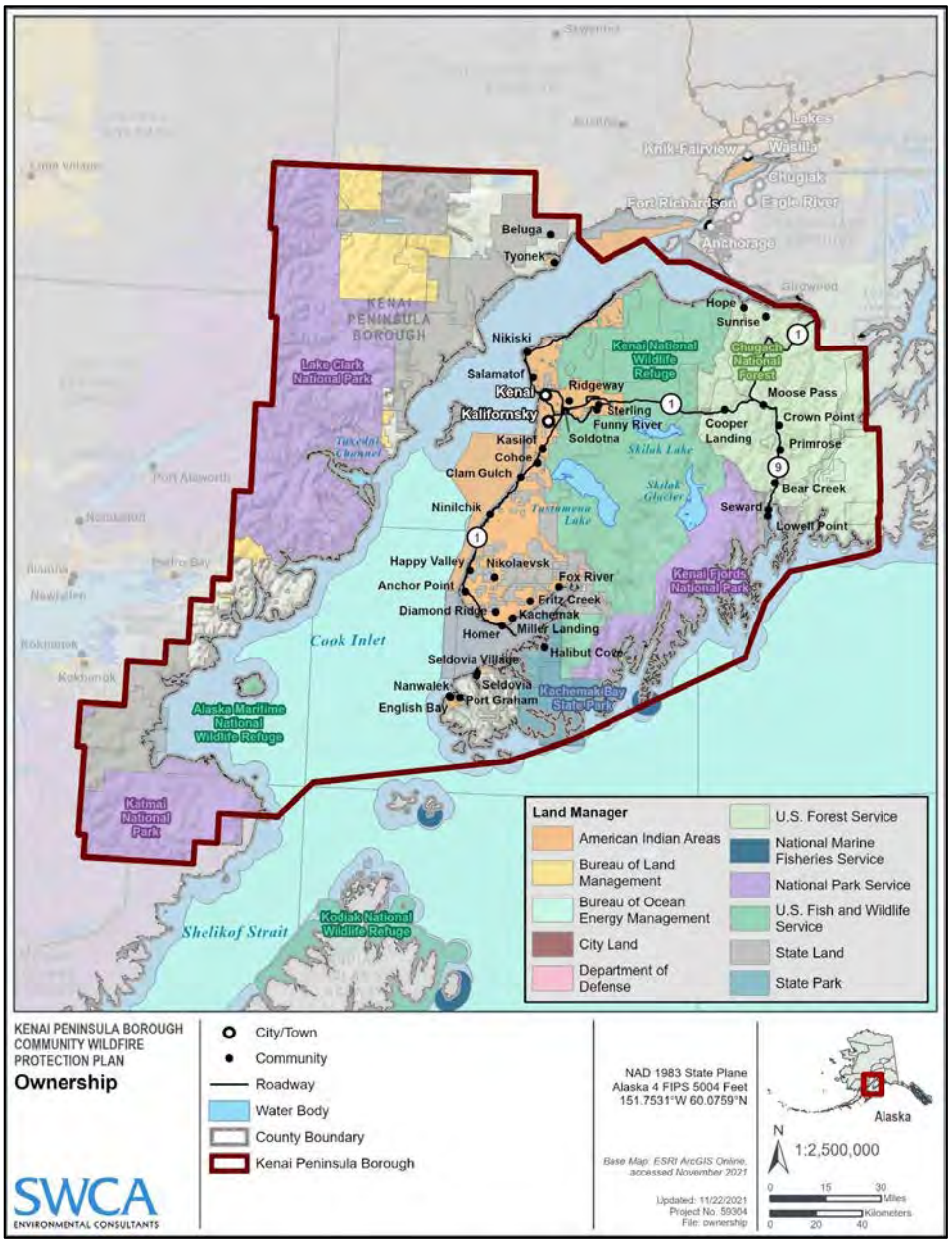

Figure A.2. Land ownership within the KPB.

FEDERAL, STATE, AND TRIBAL LANDS

Federal Lands

Kenai National Wildlife Refuge

The Kenai Wildlife Refuge is in the western portion Kenai Peninsula and comprises approximately 2 million acres. The Refuge stretches across the western slopes of the Kenai Mountains, forested lowlands along Cook Inlet, wetlands, rivers, and series of lakes. A variety of habitats are present in the Refuge, including ice fields and glaciers, mountain tundra, lakes and wetlands, rivers, and boreal forests. The diverse ecosystems support a diversity of wildlife, including brown and black bears, mountain goats, caribou, moose, eagles, wolves, lynx, and trumpeter swans. The Refuge is part of the National Wildlife Refuge System, a diverse network of lands and waters dedicated to conserve America's fish and wildlife heritage and is managed by the U.S. Fish and Wildlife Service (USFWS) (2021).

The Refuge is managed by the USFWS, and the leading fire management document is the Kenai National Wildlife Refuge 2013 Fire Management Plan. The plan was created to guide all fire management activities on and for the Refuge. The Refuge is divided into four Fire Management Units (FMUs): Wilderness, Minimal, Moderate, and Intensive. The four FMUs are described below (USFWS 2013):

- The Wilderness FMU manages areas designated as units of the National Wilderness Preservations System, which represent the largest area of the Refuge. Management within the Wilderness FMU aims to preserve all values and resources of the area.
- The Minimal FMU manages the second largest area of the Refuge (26%). Management within the Minimal FMU operates under the goal of maintaining the natural environment, therefore allowing natural ecosystem fluctuations to occur, and keeping public use disturbances to a minimum.
- The Moderate FMU manages about 50,000 acres on the northern end of the Refuge. Management guidelines for the Moderate FMU permits activities that may result in small-scale temporary or permanent changes, but do not disrupt natural processes. While human disturbance may be evident, the goal of this FMU is to restore, maintain, or enhance habitat.
- The Intensive FMU manages approximately 50,000 acres with the management objective of allowing compatible actions. This means activities are permitted to cause alteration to the natural environment, obvious human disturbance is acceptable, and habitat conditions may be altered or controlled for habitat improvement.

Kenai Fjords National Park

The Kenai Fjords National Park (KFNP) encompasses an area of 600,000 acres of icefields, glaciers, water bodies, valleys, mountains, and fjords (NPS 2020a). The KFNP spans from the southern edge of the city of Seward to the northern end of the Kachemak Bay State Park. The KFNP supports a diversity of wildlife such as lynx, mountain goats, moose, wolverines, orcas, humpback whales, sea otters, and harbor seals. The Park also provides important habitat for many migratory and resident birds, including cormorants, pigeon guillemots, kittiwakes, eagles, and puffins (NPS 2021b).

KFNP lands are managed by the NPS (NPS 1984). There is no existing fire management plan for the KFNP; this is because the NPS is required to have fire management plans only for parks with burnable vegetation (NPS 2021c). The KFNP is generally not vulnerable to severe fires; the glaciers, streams, and fjords serve as natural fire barriers (NPS 1984). However, the NPS develops State of the Park reports to

assess the overall conditions and trends of park resources. The latest State of the Park report for the Kenai Fjords National Park was completed in 2017 (NPS 2021d).

Lake Clark National Park and Preserve

Lake Clark National Park and Preserve (LCNPP) is located on the western edge of Cook Inlet and comprises about 4 million acres. The LCNPP ranges in elevation from sea level to over 10,000 feet and stretches across the Aleutian Range, wetlands, rivers, lakes, volcanoes, tundra, and boreal forest. The diverse ecosystems provide habitat for a diversity of wildlife, including Dall sheep, brown and black bears, porcupine, caribou, moose, subarctic fish, wolves, lynx, and numerous species of birds. In addition, Lake Clark maintains the ancestral homelands of the Dena'ina people, an intact ecosystem with the largest sockeye salmon fishery in the world (NPS 2020c).

The LCNPP is managed by the NPS. There is no current fire management plan for the LCNPP. However, the NPS implements fire management activities such as clearing flammable vegetation around structures and monitoring the impacts of fires. In addition, the NPS shares responsibilities with the DOF to protect life, property, and natural and cultural resources. They also collaborate with communities, local, state, federal, and native organizations to keep people and ecosystems healthy (NPS 2020b).

Chugach National Forest

The Chugach National Forest is located in south-central Alaska and encompasses an area of 5.4 million acres. It is the nation's second-largest forest and spans from the waters and peaks of Prince William Sound to the streams of the Kenai Peninsula. The Forest is composed of three discrete landscapes: the Copper River Delta, Eastern Kenai Peninsula and Prince Willian Sound. The various landscapes contain rain forests, coastal inlets, wetlands, boreal woods, glaciers, and rivers. The Forest is also home to several of Alaska's Native peoples, including Chugach, Eyak, Dena'ina, and Ahtna.

The Forest is managed by the U.S. Forest Service (USFS 2021a), and the main fire management document is the Chugach National Forest Land Management Plan (USFS 2020b). The Forest is divided into eight Management Areas (MAs), and each of these areas determines suitable uses and activities. However, only five of the eight MAs are located on the KPB (USFS 2020b):

- The Wilderness Study Area MA covers 1,944 acres on the KPB. Management objectives in these areas are to protect ecological properties of all the wilderness areas and to preserve their existing state.
- The Wild, Scenic, and Recreational Rivers MA covers 28,345 acres on the KPB. Management objectives in this MA are to preserve and safeguard the free-flowing properties of specific river sections that display significant natural and recreational values.
- The Research Natural Areas MA covers 5,951 acres on the KPB. Management objectives in this MA are to preserve the unique properties of natural environments. Ecosystems in these areas are representative of undisturbed environments, which serve as controls to gauge ecosystem effects relative to disturbed areas. These areas present perfect opportunities for monitoring, observation, and research activities.
- The Backcountry Areas MA covers 1,013,205 acres on the KPB. Management objectives in these areas are to enhance backcountry environments to promote varied recreational activities. Ecosystems in these areas are preserved and natural processes are mostly unaltered by human activity.

- The Front Country MA covers 104,566 acres on the KPB. Areas under this MA have high levels of human activities and associated construction, including utilities, trails, and roads. Management objectives in these areas are to restore fish and wildlife habitat and to manage forest vegetation to mitigate wildfire risk.

Figure A.3. Forest management on the Chugach National Forest.

Commented [VA2]: @Mark Cahur- do you have any good fire or fuels treatment photos on the NF that we could add here?

State Lands

Kachemak Bay State Park and Kachemak Bay State Wilderness Park

The Kachemak Bay State Park and Kachemak Bay State Wilderness Park (Park) span an area of 400,000 acres of forests, mountains, glaciers, and ocean. It extends from the southern boundary of the Kenai Mountains to the Gulf of Alaska. The Park is managed by the ADNR; however, there are two critical habitat areas on the Park which are managed by the ADFG. Kachemak Bay is one of the critical habitat areas, which supports many species of marine life such as fish, shellfish, sea otters, porpoise, waterfowl, shorebirds, seabirds, and whales (ADNR 2021b). The other critical habitat area is the Fox River Flats. The Flats are located at the head of Kachemak Bay and cover expansive intertidal mud flats and a complex of low-lying marshlands in the lower Fox River Valley. The Flats serve as a staging area for more than a million shorebirds and thousands of waterfowl that pause to feed and rest during migration. The area also serves as important habitat for moose, black and brown bear, coyote, wolves, red fox, mink, and muskrat. In addition, many of the streams in the area support anadromous fish (ADFG 2021f).

The DOF has primary responsibility for wildland fire response in the Park. The Management Plan for Kachemak Bay State Park and Kachemak Bay State Wilderness Park (1995) is the guiding policy document for forest and fire management on the forest (ADNR 1995). However, the plan does not include a fire management component. An updated plan that will integrate fire management is in progress (ADNR 2020).

Tribal Lands - Alaska Native Regional Corporations and Non-profits on the Kenai Peninsula

Regional corporations were created by the Alaska Native Claims Settlement Act of 1971 (ANCSA) assume the federal responsibilities for the health and welfare of the Alaska Native peoples by use of a compact agreement with the federal government. Native owned corporations provide stewardship of ancestral lands, resources and finances for Alaska's native people. In addition to these regional corporations, some villages formed their own village corporations who take responsibility for leadership roles in native communities and villages in Alaska.

Cook Inlet Region, Inc (CIRI)

Cook Inlet Region, Inc (CIRI) is one of 12 Alaska Native regional corporations created by the ANCSA and is located on the Kenai Peninsula Borough. ANCSA addressed the aboriginal claim to land by Alaska Native people by mandating the formation of for-profit corporations representing various regions, and by providing land and seed capital to those corporations (CIRI 2021).

ANCSA created 12 distinct regional and over 200 village corporations representing over 79,000 Alaska Native people. The Act provided for the conveyance of 44 million acres of land, allocating land to each of the regional and village corporations (CIRI 2021).

Ninilchik, Salamatof, Seldovia and Tyonek are native villages located in the Kenai Peninsula. They are CIRI shareholders and each has its own village corporation.

Chugachmiut

Chugachmiut is a native consortium and regional non-profit. The tribes in the Chugach Region developed a cooperative agreement among the 7 tribes in the region to develop a health and social services regional non-profit, which has become Chugachmiut. (As a non-profit, Chugachmiut does not use a business nomenclature such as “Inc”, “Company”, or “LLC” or other such construction for a business name.) Chugachmiut represents the two tribal communities of Nanwalek and Port Graham on the Kenai Peninsula providing health and social services to the members of these communities. Chugachmiut works as an agent for the Native landowners both Native allotment owners and Trust townsite lot owners associated with Nanwalek and Port Graham. Chugachmiut also represents Qutekcak Native Tribe out of Seward, Alaska. They have no formally recognized Native corporation.

Commented [EG3]: Charlie and Nathan – please review and revise as needed

Commented [EG4]: Charlie Sink - Do Nanwalek or Port Graham have Native Corporations?

TOPOGRAPHY

The KPB is in southern Alaska and is topographically varied. The KPB has distinct topographical zones: mountain, valley, and foothill regions. The landscapes present on the KPB include ice fields, forests, fjords, and coastal areas. The western half of the KPB is lower in elevation relative to the eastern half. The eastern portion of the KPB contains the Kenai mountains, which reach up to 7,000 feet in elevation. Additionally, the KPB encompasses 14 major watershed and contains over 20,000 miles of stream habitat as well as more than 350,000 acres of wetland habitat (KPB 2019b).

ROAD SYSTEMS

Some of the KPB is accessible via surfaced roads and highways; however, some communities are accessed only via unsurfaced roads (Figure A.4), which in more remote areas are often narrow and windy with many dead-end roads (Figure A.5). These routes may prove hazardous during emergency evacuation, especially where they are adjacent to forested land with vegetation close to or overhanging the road. Fuel treatment may be needed along some roads where vegetation is overhanging and could prevent safe evacuation of residents or safe access by emergency responders.

Figure A.4. Example of an unsurfaced road that has not been well maintained or frequently traveled.

Figure A.5. Example of narrow roads within the KPB.

TRANSPORTATION CORRIDORS

The two main transportation corridors serving the KPB are the Sterling and Seward corridors. The Sterling Highway connects the KPB to Anchorage, running from south Anchorage to Homer. The Sterling Highway intersects many communities on the western border, including Soldotna, Sterling, Kasilof, Clam Gulch, Ninilchik, Anchor Point, and Happy Valley. The Seward highway starts in Moose Pass and terminates in the city of Seward and intersects many communities on the eastern border such as Moose Pass, Crown Point, Primrose, Bear Creek, and Seward.

In addition to the surfaced highways, numerous smaller roads, and forest roads traverse the KPB, with variable road conditions. Some steep grades and gravel road surfaces may impede travel in the event of a wildfire evacuation or emergency response (Figures A.6 and A.7).

Figure A.6. Photograph showing typical road surface on side roads in the Borough.

Figure A.7. One of many dead-end roads on the Borough that may impede ingress and egress.

POPULATION

The following information is drawn primarily from U.S. census data (U.S. Census Bureau 2020). In 2020, the population estimate of the KPB was 58,799 persons, an increase of 6% over the 2010 census numbers of 55,400. In 2019, there were 31,439 housing units on the KPB. The KPB has a population density of 3.4 people per square mile.

RECREATION

Outdoor recreation is extremely popular on the KPB, with the Kachemak Bay State Park, Kenai Fjords National Park, Chugach National Forest, and Kenai Wildlife Refuge attracting thousands of visitors. Hunting, fishing, and camping are popular on public land (Figure A.8).

Tourism has been one of fastest growing sectors in the KPB. Each summer, around 500,000 people visit the Borough, with outdoor recreation and sport fishing representing the major visiting activities (Kenai Chamber of Commerce 2021). During these peak seasons and large events, a significant number of people can congregate in a relatively small space, which constitutes a large population to evacuate.

Figure A.8. Peak of salmon fishing on the Kenai River.

PUBLIC EDUCATION AND OUTREACH PROGRAMS

Public education and outreach programs are a common factor in virtually every agency and organization involved with the wildfire issue.

LOCAL AND STATE PROGRAMS

Alaska Department of Natural Resources, Division of Forestry

Firewise Alaska

The DOF encourages Alaskan communities to form Firewise communities. Firewise is a collaborative effort between local, state, federal, and private agencies and organizations to encourage fire safety in the WUI. Firewise Alaska is a reference guide for homeowners designed by the Alaska Wildland Fire Coordinating Group (AWFCG 2009). The guide details the steps an Alaskan homeowner can take to reduce the probability that their home and property will be consumed by a wildfire. The guide focuses on preparation and is well suited for small communities, developments, and residential home associations of all types (ADFG 2021g). The guide can be accessed here: http://forestry.alaska.gov/Assets/pdfs/home/firewise09.pdf

Forest Stewardship Program

The DOF's Forest Stewardship Program is a collaborative state and federal service that aids private landowners with forest concerns. Usual concerns include insect and disease pests, wildfire protection for homes, firewood assessment, tree planting, and wildlife habitat. The aim is to help the active management of forest resources to maintain land productivity for present and future owners and increase the ecological and economic benefits. Upon request for assistance, a site assessment is conducted, and a plan is subsequently developed based on the findings. Financial assistance is available for some

activities recommended in the plan. The following examples constitute eligible projects: dead tree and spruce removal around homes, soil preparation for tree seedling establishment, and tree seedling purchase and planting. Alaskan landowners with 7 or more acres of land capable of growing trees are eligible; some homeowners with wildfire hazard and 2 or more acres may also qualify. Alaska Native corporations are also eligible (DOF 2021b).

NATIONAL PROGRAMS

Ready, Set, Go!

The Ready, Set, Go! Program, which is managed by the International Association of Fire Chiefs, was launched in 2011 at the WUI conference. The program seeks to develop and improve the dialogue between fire departments and residents, providing teaching for residents who live in high-risk wildfire areas—and the WUI—on how to best prepare themselves and their properties against fire threats. The program works in collaborative and synergistic fashion with Firewise USA and other existing wildland fire education efforts (International Association of Fire Chiefs 2021).

The tenets of Ready, Set, Go! as included on the website (http://www.wildlandfirersg.org) are:

Ready – Take personal responsibility and prepare long before the threat of a wildland fire so your home is ready in case of a fire. Create defensible space by clearing brush away from your home. Use fire-resistant landscaping and harden your home with fire-safe construction measures. Assemble emergency supplies and belongings in a safe place. Plan escape routes and ensure all those residing within the home know the plan of action.

Set – Pack your emergency items. Stay aware of the latest news and information on the fire from local media, your local fire department, and public safety.

Go – Follow your personal wildland fire action plan. Doing so will not only support your safety but will allow firefighters to best maneuver resources to combat the fire.

National Fire Protection Association

The NFPA is a global non-profit organization devoted to eliminating death, injury, property, and economic loss due to fire, electrical, and related hazards. Its 300 codes and standards are designed to minimize the risk and effects of fire by establishing criteria for building, processing, design, service, and installation around the world.

The NFPA develops easy-to-use educational programs, tools, and resources for all ages and audiences, including Fire Prevention Week, an annual campaign that addresses a specific fire safety theme. The NFPA's Firewise Communities program (www.firewise.org) encourages local solutions for wildfire safety by involving homeowners, community leaders, planners, developers, firefighters, and others in the effort to protect people and property from wildfire risks.

The NFPA is a premier resource for fire data analysis, research, and analysis. The Fire Analysis and Research division conducts investigations of fire incidents and produces a wide range of annual reports and special studies on all aspects of the nation's fire problem.

Insurance Institute for Business and Home Safety

The Insurance Institute for Business and Home Safety (IBHS) is an independent, non-profit, scientific research and communications organization supported solely by property insurers and reinsurers.

The IBHS's building safety research leads to real-world solutions for home and business owners, helping to create more resilient communities. Its mission is to conduct objective, scientific research to identify and promote the most effective ways to strengthen homes, businesses, and communities against natural disasters and other causes of loss.

The IBHS conducts laboratory and field experiments in structural ignitability and has helped develop new guidelines for defensible space zones to emphasize ember resistance and a "home ignition zone" (Figure A.9).

Figure A.9. Defensible space standards from the IBHS.

CLIMATE AND WEATHER PATTERNS

There are two major forest climates within the planning area: coastal and boreal. The coastal forest is grouped under the maritime climate zone and is characterized by year-round precipitation, cloudy cool summers with temperatures (in °F) averaging upper 50s, and mild winters with temperatures ranging from low 20s to mid-30s (DOF 2020a). However, precipitation levels and precipitation type vary significantly by geographic location. Coastal forests located in the northern part of the state see cooler temperatures and less precipitation than coastal forests in the southern portion of the state. To compare extremes, the northern edge of coastal forested areas near Homer receives only 24 inches of precipitation a year while the southernmost coastal forests in Alaska receive 220 inches of precipitation per year. Furthermore, rain is the common precipitation form in areas with lower elevations, while areas with higher elevation levels see snow and ice. The snow encourages the development of ice fields and glaciers, driving glacial winds. Winter storms with Gale-force winds are common from October to February (DOF 2020a).

Boreal forests extend into both the transitional and continental climate zones and are characterized by temperature extremes. Summer months show temperatures in the upper 90s° F while winter months

experience temperatures as low as -40 F, with significant temperature inversions between ridgetops and valley bottoms (DOF 2020a). The mean annual temperature for Alaskan boreal forests sits between 20°F and 30°F with an annual precipitation level of 6 to 12 inches. Despite low precipitation levels, the low evaporation rates, and lack of drainage due to permafrost create wetland ecosystems within boreal forests. River flooding is relatively common due to snow and ice melt in the spring and heavy rain in the summer. In addition, valley entrances and coastal areas frequently experience strong winds (DOF 2020a).

Differences in topographical characteristics throughout the state of Alaska and the KPB contribute to the divergent climatic regimes within the planning area. Maritime, transitional, continental , and arctic are the four major climatic zones of the state (DOF 2020a). Despite having organized climatic zones, weather prediction is difficult as there is no "typical" weather pattern for the state of Alaska (KPB 2009a). Strong high-pressure systems may linger for days at a time, bringing in warm temperatures and low humidity levels. Those high-pressure systems may result in daily thunderstorm activity and atmospheric conditions, contributing to high-intensity, plume-dominated, blow-up fires. On the contrary, the high-pressure systems can break down with ease, bringing in cool, humid, arctic air which is rapidly followed by replaced high pressure and favorable burning conditions (KPB 2009a). In addition to the various weather systems, the state sees 24 hours of daylight in June and July. Under normal light conditions, fire activity dramatically decreases in the night hours as humidity levels rise. The constant sunlight experienced in June and July significantly limits the ability for humidity levels to "recover" (KPB 2009a), resulting in increased fire risk.

Table A.2. Mean Annual Temperature and Precipitation by Station within the KPB

Station	Period of Record	Mean Annual Precipitation (Inches)	Mean Annual Temperature (°F)		
			Max	Min	Mean Annual
Campbell Creek Science Center	1991-2020	17.81	43.9	24.3	34.1
Kenai Airport	1991-2020	18.27	43.5	27.7	35.6
Seldovia Airport	1991-2020	40.39	45.4	33.6	39.5
Seward Airport	1991-2020	69.71	46.3	34.5	40.4

Source: NOAA (2021b)

July is generally the warmest month of the year in the KPB, with average monthly maximum temperatures ranging from 61.8ºF in Seldovia (Seldovia Airport) to 68.6ºF in Anchorage (Campbell Creek Science Center). January is the coldest month, with average temperatures ranging from 19.1ºF in Anchorage to 31.3ºF in Seward. Mean annual temperatures do not vary significantly across the KPB, mean annual temperatures only range from approximately 34.1ºF in Anchorage to 40.2ºF in Seward. Within the KPB, maximum mean annual temperatures vary even less with a range from 43.5ºF in Kenai to 46.3ºF in Seward. Minimum annual temperatures range from 24.3ºF in Anchorage to 34.5ºF in Seward (Table A.2) (National Oceanic and Atmospheric Administration [NOAA] 2021b).

The mean annual precipitation within the KPB is light to abundant, ranging from 17.81 inches in Anchorage to 69.71 inches in Seward. The maximum annual rainfall within the planning area has been recorded as high as 71.81 inches in 2009 in Big River Lakes. Homer had the lowest minimum average annual precipitation at 12.95 inches in 1996 (Western Regional Climate Center 2021). The highest precipitation levels typically occur from late summer to early fall in the KPB. September and October are usually the wettest months of the year, with monthly averages ranging from 3.14 inches in September in

Anchorage to 9.9 inches in September in Seward. The lowest precipitation levels occur from spring to early summer in the KPB. March through June are typically the driest months of the year, with monthly precipitation averages ranging from 0.34 inch in April in Anchorage to 2.34 inches in June in Seward.

Monthly climate normals (30-year averages) for the KPB are graphed by weather station below (Figures A.10–A.13).

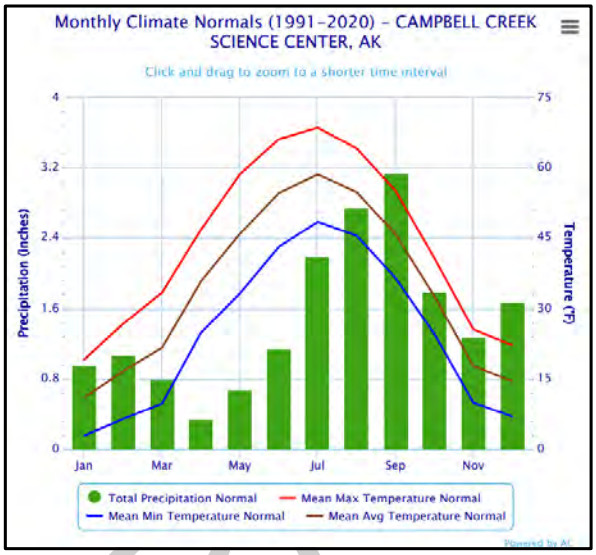

Figure A.10. Monthly climate normals for the Campbell Creek Science Center weather station for the period of record (1991–2021).

Source: NOAA (2021b)

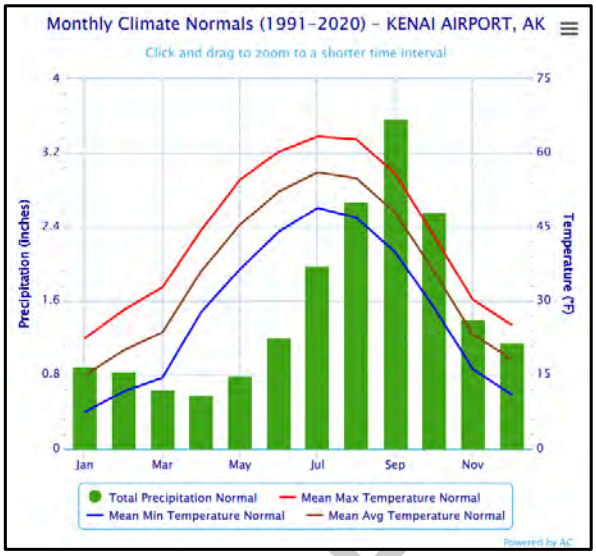

Figure A.11. Monthly climate normals for the Kenai Airport weather station for the period of record (1991–2021).

Source: NOAA (2021b)

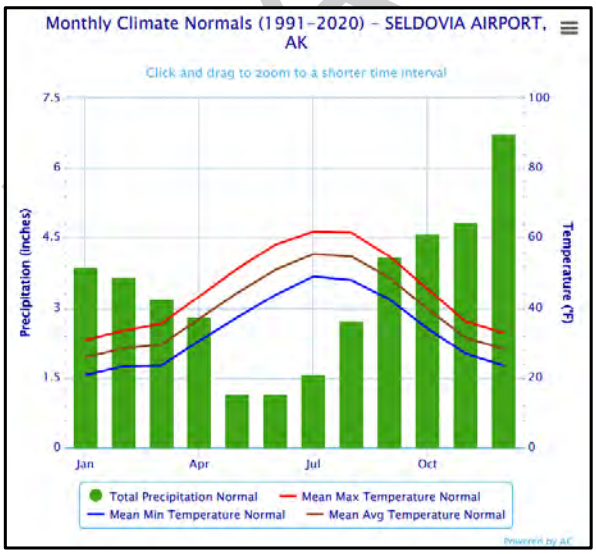

Figure A.12. Monthly climate normals for the Seldovia Airport weather station for the period of record (1991–2021).

Source: NOAA (2021b)

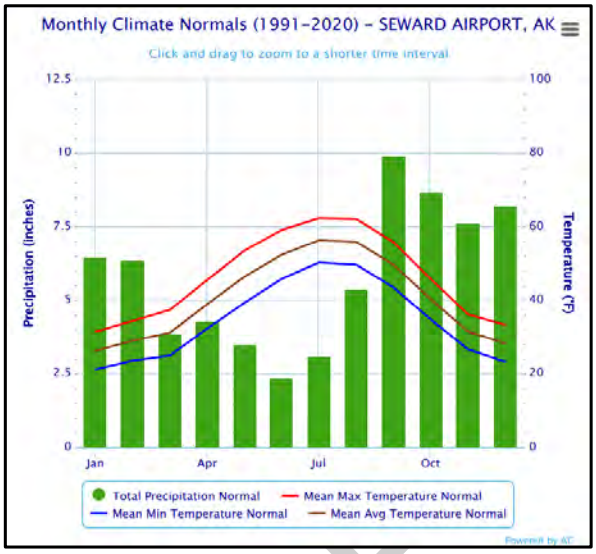

Figure A.13. Monthly climate normals for the Seward Airport weather station for the period of record (1991–2021).

Source: NOAA (2021b)

FOREST HEALTH CONSIDERATIONS

INVASIVE PLANT SPECIES

Invasive plant species are those that take over the habitat of other species (native), displacing the native species from their natural environment. Invasive species are highly adaptive, competitive, and successful at reproducing quickly in varied environments, including the KPB. The KPB has vast natural areas such as national forests, state parks, conservation areas, and scenic waterways. These resources are being threatened by invasive species. While trade and travel increase so does the risk of new invasion. Invasion can devastate industries such as fisheries, agriculture, recreation, tourism, and hydroelectric. Invasion and establishment of invasive plant species can also destabilize soil and alter the hydrology of rivers, lakes, streams, and wetlands (Alaska Department of Natural Resources, Division of Agriculture [DOA] 2021).

The following list includes some of the invasive plants that have been identified as high priority in the Chugach National Forest.

European bird cherry (*Prunus padus*) is a low-branched tree which disperses by seed and can reach up to 35 feet in height. European bird cherry (EBC) can create tall shrub layers, eliminating native willow layers underneath. The plant occurs along urban streams and rivers, displacing native trees and shrubs. EBC is known to reduce the quality of willow-dominated foraging sites for moose. Also, EBC can be toxic to deer, moose, sheep, goats, and cattle (University of Alaska Anchorage [UAA] 2011a).

Orange hawkweed (*Hieracium aurantiacum*) is a perennial herb that has shallow, fibrous roots. Stems can reach a height of around 31 centimeters. Orange hawkweeds establish dense monocultures that lower biodiversity and diminish the forage value of grasslands for grazing animals. The plant also reduces soil moisture and nutrient availability (UAA 2011b).

Reed canarygrass (*Phalaris arundinacea*) is a tall, reed-like perennial that invades wetlands. Reed canarygrass outcompetes all native vegetation, threatening waterfowl habitat. The grass also threatens salmon streams by increasing silt deposition and contracting water ways, modifying stream hydrology and degrading salmon habitat (Homer Soil and Water Conservation District 2021).

White sweet clover (*Melitotus albus*) is a biennial plant that grows from 61 to 152 centimeters tall. Each plant can produce up to 350,000 seeds, which can remain viable in the soil for up to 80 years. Natural and human-caused fires generate ideal growing conditions since they open seeds and promote germinations. White sweet clover degrades natural grassland communities by overtopping and shading native species. It is toxic to some animals and can alter sedimentation rates of river ecosystems (UAA 2011c).

In addition, over 70 invasive plant species were recorded in 2019 on the Kenai National Wildlife Refuge (USFWS 2020b). A considerable number of invasive plants have also been detected on the Kenai Fjords National Park (NPS 2015b).

INSECTS

Native insect epidemics within plant communities are usually part of a natural disturbance cycle similar to wildfire. They are often cyclic in nature and are usually followed by the natural succession of vegetation over time. Of primary interest are those that attack tree species because of the implications for fire management.

Present-day insect epidemics in Alaska's spruce forests are on the rise. Spruce beetle infestation is the top cause of death for mature spruce trees in Alaska and is currently responsible for about 900,000 acres of deceased and dying trees in the southcentral portion of the state (USFS 2021e).

SBB outbreaks are linked to drought-related stress and/or faster completion of life cycles due to warmer climate regimes (NPS 2021a). Stands of trees that have been killed by insects have varying degrees of associated fire danger depending on the time lapse following an insect attack and structure of the dead fuels that remain. However, forests with a large degree of mortality following an insect attack may have the potential to experience extremely high fire danger, especially if a large degree of needle cover remains in the canopy.

Southcentral Alaska is currently undergoing a SBB outbreak. More than 1.2 million acres have been impacted since the outbreak began in 2016. In 2020 alone, 145,000 acres of SBB activity was recorded, with 18,330 acres located on the Kenai Peninsula (USFS 2021d). SBB history, ecological impacts, and recent outbreak specifics are detailed in chapter 2. This section covers other problematic insects.

Insects that have infested or have the potential to infect the forests within and around the planning area are discussed below.

Battered Sallow Moth (Sunira verberata) is a generalist hardwood defoliator. The battered sallow moth (BSM) attacks aspen, birch, willows, soapberry, highbush cranberry, roses, and nearly any other broad-leaved plant. In 2020, outbreaks of BSM were observed on the Kenai Peninsula, particularly in the Kenai National Wildlife refuge and in the areas from Cooper Landing to Sterling to Kasilof (USFS 2021d). Even though deciduous trees and shrubs like alders and willows usually endure defoliation from BSM without

incurring lasting damage, severe outbreaks can lead to mortality. For instance, the largest recorded outbreak on the Peninsula (2003-2006) resulted in alder mortality on mountain slopes over vast areas (Friends of Alaska National Wildlife Refuge 2021).

Birch Aphid (*Euceraphis betulae*) is a non-native, sap-sucking, asexually reproducing insect. These insects typically pierce leaves to derive nutritional needs. Birch aphids primarily attack birch tree, specifically silver birch. Although aphid damage to Alaska birch forests is usually negligible, aphid feeding causes a decline in tree vigor and, in some instances, tree mortality (USFS 2011a). In 2020, the USFS recorded birch aphid activity in the Sterling area; however, the outbreaks were of moderate size (USFS 2021d).

Aspen Leafminer (*Phyllocnistis populiella*) adults are tiny, lance-shaped moths with white wings speckled with brown and black markings. Aspen leafminers are hardwood defoliators; their hosts include aspen, poplar, willow, and cottonwood. Damage due to feeding is generally described as cosmetic. However, severely mined leaves have been shown to lose their photosynthetic capacity, causing the leaves to dry and turn brown, which is suspected to result in branch dieback and top-kill (USFS 2011b). In 2020, around 50 acres of aspen leafminer damage was recorded in the Kenai and Soldotna areas (USFS 2021d).

DISEASES

Diseases of trees, such as parasitic plants, fungi, and bacteria, can also affect forests on the KPB. These diseases impact forest systems by degrading the productivity and health of the forest. Some of the more common forest diseases that are found on the KPB are described below. Trees that are killed by disease have the similar potential to increase fire hazards.

Spruce needle casts/blights are a disease complex of spruce in Alaska that is caused by different fungi: *Lirula macrospora, Lophodermium piceae,* and *Rhizosphaera pini.* Fungal spores are typically spread by splashing water or wind. Host trees consist of black, Sitka, and white spruce. Symptoms include needle discoloration and black fruiting bodies. Trees are not usually killed by needle cast. However, the disease results in large quantities of dry needles on the trees and the forest floor (USFS 2021f). In 2020, the 3 fungi were detected infecting black, Sitka, and white spruce on the Kenai Peninsula (USFS 2021d).

Spruce needle rust (*Chrysomyxa ledicola*) is a fungus infecting white, black, and Sitka spruce and Labrador tea. The fungus has 5 life stages and completes its life cycle between two different hosts: spruce trees and Labrador tea. Severely infected trees have pale orange to yellow spore masses projecting from infected needles (USFS 2001). Spruce trees are typically not killed by needle rust, but high infection levels may limit growth and increase stress. In 2020, USFS ground surveys detected multiple incidences of needle rust on the Kenai Peninsula affecting white, black, and Sitka spruce as well as Labrador tea (USFS 2021d).

Spruce bud blight is a disease caused by the fungal parasites *Camarosporium* sp*., Dichomera gemmicloa,* and *Gemmamyces piceae*. These parasites cause loss of buds, which strips the tree's ability to produce new needles. Fungi transmission is through, rain, wind, or insect vectors. Although *Gemmamyces piceae* is known to cause tree mortality in Colorado blue spruce, mortality has not been documented in Alaska. In 2020, spruce bud blight was detected throughout southcentral and interior Alaska (USFS 2021d).

Spruce broom rust is a disease caused by the fungus *Chrysomyxa arctostaphyli*. The fungus affects white, black, and Sitka spruce trees in Alaska, particularly in the interior and southcentral regions. However, the fungus needs bearberry and spruce to complete its life cycle. Therefore, rust infection

closely follows the distribution of bearberry. Infected trees have dense clusters of branches with a yellow-orange appearance. Depending on the severity of infection, the disease may cause reduced growth, top-kill, or tree mortality. In 2020, spruce broom rust was observed on the northeastern portion of the Peninsula (USFS 2021d).

Alder canker (V*alsa melanodiscus; Valsalnicola* spp.) is a disease caused by fungal pathogens. The primary hosts for these pathogens are alder trees. Symptoms include bumpy, fruiting outgrowths from the trunk of the tree. In 2020, alder dieback was extensive on the Kenai Peninsula, with 650 acres of dieback detected near Tustumena Lake (USFS 2021d).

Other diseases detected in 2020 on the Kenai Peninsula include Canker-rot of birch, brown crumbly rot, trunk rot of aspen, trunk rot of birch, red ring rot, and armillaria root disease (USFS 2021d).

APPENDIX B:

Chugach All-Lands Wildfire Risk Assessment (ARRA)

Commented [BP5]: Core Team, we will insert the risk assessment for the final PDF.

APPENDIX C:

Core Team List

Name	Organization
Miles Spathelf	Alaska Dept of Fish and Game
Sue Rodman	Alaska Dept of Fish and Game/ Division of Wildlife Conservation
Jon Marsh	Anchor Point Fire (Now Western Emergency Service Area)
Jim Butler	Baldwin and Butler
Charlie Sink	Chugachmiut
Nathan Lojewski	Chugachmiut
Mark Kirko	City of Homer
Rick Abboud	City of Homer
Jeremy Hamilton	City of Kenai
Tony Prior	City of Kenai
Ryan Foster	City of Kenai
Willie Anderson	City of Kenai
Rachel Friedlander	City of Seldovia
Courtney Bringhurst	City of Seward
Jason Bickling	City of Seward
Clinton Crites	City of Seward Fire
Jennifer Hester	City of Soldotna
John Czarnezki	City of Soldotna
John Czarnezki	City of Soldotna
Riley Shurtleff	Cooper Landing Emergency Services
Hans Rinke (NEW POSITION)	Division of Forestry
Diane Campbell	Division of Forestry Kenai/Kodiak
Howie Kent	Division of Forestry Kenai/Kodiak
John Winters	Division of Forestry Kenai/Kodiak
Cody Neuendorf	Homer Electric
Jeff Jaworski	Homer Electric
Steven Cannon	Homer Electric
Jack Thomas	Hope Volunteer Fire
Travis Peterson	Hope Volunteer Fire
Wendy Wayne	Kachemak City
Bobbi Lay	Kenai Peninsula Borough
Brenda Ahlberg	Kenai Peninsula Borough
Bryan Taylor	Kenai Peninsula Borough
Celina Robertson	Kenai Peninsula Borough
Marcus Mueller	Kenai Peninsula Borough
Richard Brackin	Kenai Peninsula Borough Bear Creek Fire Service Area

Commented [VA6]: Core Team- would you like us to include a column with position title?

Name	Organization
Roy Browning	Kenai Peninsula Borough Central Emergency Services
Bob Cicciarella	Kenai Peninsula Borough Kachemak Emergency Services
Bryan Crisp	Kenai Peninsula Borough Nikiski Fire Service Area
Trent Burnett	Kenai Peninsula Borough Nikiski Fire Service Area
Karl Van Buskirk	Lowell Point Volunteer Fire
Mike Van de Grift	Marathon Petroleum
Phillip Ingersoll	Moose Pass Volunteer Fire Co.
Mitch Michaud	Private Consultant
Wade Wahrenbrock	Resident
Mark Ball	Seldovia Village Tribe
Emily Geery	SWCA
Vicky Amato	SWCA
Jeff Bouschor	U.S. Fish and Wildlife Service, Kenai National Wildlife Refuge
Will Jenks	U.S. Fish and Wildlife Service, Kenai National Wildlife Refuge
Kristi Bulock	U.S. Fish and Wildlife Service (former), Citizen Advocate
Mark Cahur	U.S. Forest Service
Erick Stahlin	U.S. Forest Service, Chugach National Forest
Franscisco Sanchez	U.S. Forest Service, Chugach National Forest
Jonathan Tepley	U.S. Forest Service, Chugach National Forest
Tim Spencer	U.S. Forest Service, Chugach National Forest

Commented [VA6]: Core Team- would you like us to include a column with position title?