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KENAI PENINSULA BOROUGH

COMMUNITY WILDFIRE PROTECTION PLAN

Working together to build fire adapted communities, resilient to wildfire

SWCA®
ENVIRONMENTAL CONSULTANTS

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The entities listed below participated in the development of and/or reviewed and are in support of the Kenai Peninsula Borough Community Wildfire Protection Plan:

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EXECUTIVE SUMMARY

WHAT IS THE PURPOSE OF THE KENAI PENINSULA BOROUGH COMMUNITY WILDFIRE PROTECTION PLAN?

The purpose of the 2022 Kenai Peninsula Borough (KPB or Borough) Community Wildfire Protection Plan (CWPP) update is to

- provide a peninsula-wide scale of wildfire risk and protection needs,
- bring together all responsible wildfire management and suppression entities in the planning area to address identified needs, and
- provide a framework for future planning and implementation of necessary mitigation measures.

This CWPP aims to assist in protecting human life and reducing property loss due to wildfire throughout the KPB. This 2022 updated plan was compiled from reports, documents, data, and the original 17 community-level CWPPs produced between 2006 and 2009, as KPB's first peninsula-wide CWPP. All versions of the CWPP, including the 17 community-level CWPPs produced between 2006 and 2009, have been developed in response to the federal Healthy Forests Restoration Act of 2003 (HFRA).

The CWPP meets the requirements of the HFRA by addressing the following:

- Having been developed collaboratively by multiple agencies at the state and local levels in consultation with federal agencies and other interested parties
- Prioritizing and identifying fuel reduction treatments and recommending the types and methods of treatments to protect at-risk communities and pertinent infrastructure
- Suggesting multi-party mitigation, monitoring, and outreach
- Recommending measures and action items that residents and communities can take to reduce the ignitability of structures
- Soliciting input from the public on the draft KPB CWPP

WHAT ARE THE KEY ISSUES ADDRESSED?

Issues addressed in this CWPP include the following:

- Spruce bark beetle (SBB) outbreaks and associated tree mortality
- Increasing capacity to remove dead and downed trees on public and private land
- Fuel treatment recommendations for land management agencies and homeowners to mitigate hazard and risk
- Prioritizing hazardous fuels reduction in the wildland urban interface (WUI)
- Raising awareness about the natural role that fire plays in ecosystem and maintaining resilient landscapes

- Public education and outreach to homeowners to enable individuals to reduce the risk of fire to their properties, particularly with an emphasis on the importance of personal responsibility in rural areas as additional time is required for fire response to remote communities
- Constant and consistent messaging for residents and visitors
- Increasing public access to information through online materials, including the story map created for this project
- Investing and supporting fire response at all levels, including resources for local fire departments to increase capacity to serve rural communities
- Increasing public understanding of the fire response process
- Continuing to address wildfire issues at the landscape level, across multiple jurisdictions
- Managing fire to protect values and accomplish resource management goals, including protection and enhancement of wildfire habitat, water supply and quality, and mitigation against forest insect and disease outbreaks
- Recent climate patterns and associated changes to the wildland fire environment

HOW IS THE PLAN ORGANIZED?

The CWPP provides a risk assessment, action items, project recommendations, and background information about the KPB's wildland fire environment as well as land management plans and agencies. Most of the background information is housed in several appendices.

Chapter 1 provides a general overview of CWPPs, the Core Team, project area, land ownership, and public involvement.

Chapter 2 presents an overview of the WUI and fire environment, as well as specific information about vegetation, fire history, fire management, and response.

Chapter 3 describes the risk assessment, results of the risk assessment, and community values at risk.

Chapter 4 provides mitigation strategies in accordance with the National Cohesive Wildfire Strategy as well as post-fire protocols and rehabilitation strategies.

Chapter 5 presents monitoring strategies to assist in tracking project progress and in evaluating work accomplished.

Appendix A contains background information on the KPB, including fire policy, past planning efforts, challenges to forest health, public education programs, and federal, state, and tribal land management agencies.

Appendix B presents the Chugach All-Lands Wildfire Risk Assessment.

Appendix C lists the Core Team members and contacts.

Appendix D provides the community risk assessments for WUI communities and contains the community risk descriptions and hazard ratings.

Appendix E presents a sample form of the National Fire Protection Association Wildfire Fire Risk and Hazard Severity Form 1144.

Appendix F details funding opportunities.

Appendix G contains additional resources, including a guide to manage spruce beetles and a homeowners wildfire mitigation guide.

Appendix H presents information on public outreach and engagement with regard to this CWPP.

Appendix I describes strategic infrastructure recommendations.

WHAT IS THE GOAL OF A CWPP?

The goal of a CWPP is to enable local communities to improve their wildfire-mitigation capacity, while working with government agencies to identify high fire risk areas and prioritize areas for mitigation, fire suppression, and emergency preparedness. Another goal of a CWPP is to enhance public awareness by helping residents better understand the natural- and human-caused risks of wildland fires that threaten lives, safety, and the local economy. The minimum requirements for a CWPP, as stated in the HFRA, are the following (Society of American Foresters [SAF] 2004):

- **Collaboration:** Local and state government representatives, in consultation with federal agencies or other interested groups, must collaboratively develop a CWPP.
- **Prioritized Fuel Reduction:** A CWPP must identify and prioritize areas for hazardous fuels reduction and treatments and recommend the types and methods of treatment that will protect one or more communities at risk and their essential infrastructures.
- **Treatments of Structural Ignitability:** A CWPP must recommend measures that homeowners and communities can take to reduce the ignitability of structures throughout the area addressed by the plan.

HOW WAS THE KENAI PENINSULA BOROUGH CWPP UPDATE DEVELOPED?

The CWPP update is built on a body of work completed by the All Lands/All Hands (ALAH) interagency group beginning in 2004 and continuing through today. Based on guidance provided by the ALAH group in the 2018 ALAH Action Plan update, the KPB and the Division of Forestry led the initiative to update the original 17 CWPPs located throughout the KPB. The KPB successfully applied for and received funding from the U.S. Forest Service to support this planning effort. Rather than updating 17 unique plans, the KPB engaged in a substantially different approach to develop one landscape-level plan for the entire KPB.

In 2019, the Chugach National Forest contracted the development of a Chugach All Lands Quantitative Wildfire Risk Assessment (QWRA, known as ARRA) that includes the Chugach National Forest and surrounding federal and non-federal land totaling approximately 30 million acres in south-central Alaska (Pyrologix 2021). The ARRA provides a model of potential losses associated with fire, based on fire behavior throughout the KPB and the location and density of values at risk. To complement this risk assessment, on-the-ground community risk assessments were completed to identify hazards and risks locally and provide a summary for each WUI community in the KPB. Additionally, any recommendations made in the original 17 CWPPs that are still relevant have been incorporated in the 2022 CWPP.

WHY CREATE A STORY MAP FOR THE PROJECT?

The Borough opted to develop a story map (online web content) to disseminate information to the public and provide an opportunity for the public to provide input into the plan content. The story map presents the CWPP in a web layout with accompanying web maps and includes a project tracker. In addition to facilitating information sharing, the story map also provides the Borough with a platform that can be readily revised to keep the CWPP document current. The CWPP is shared on the KPB's webpage at kpb.us/cwpp.

WHO PARTICIPATED IN DEVELOPING THE PLAN?

A group of multijurisdictional agencies (federal, state, local, and tribal), organizations, and residents, joined together as a Core Team to develop this CWPP. Land managers across the KPB convened about 15 years ago to treat fire management as a landscape effort and created the ALAH interagency group. This group, along with some additional community and organization representatives, served as the Core Team for this CWPP update and drove the decision-making process. Several Core Team members have many years of experience working together in fire management for the Borough and have contributed their expertise to this CWPP.

WHERE IS THE PROJECT AREA?

The project area includes the entire KPB as delineated by its geographic and political boundaries. The project boundary encompasses all communities that were included in the original 17 CWPPs.

WHAT WAS THE PUBLIC INVOLVEMENT?

The Core Team engaged in public outreach using a multimedia approach, using the story map created for the project, social media posts, community surveys, radio interviews, and information distributed through mass emails. The Core Team hosted five public meetings from July 20 through July 24, 2021, throughout the Borough. By incorporating public and Core Team input into the recommendations, treatments are tailored specifically for the Borough.

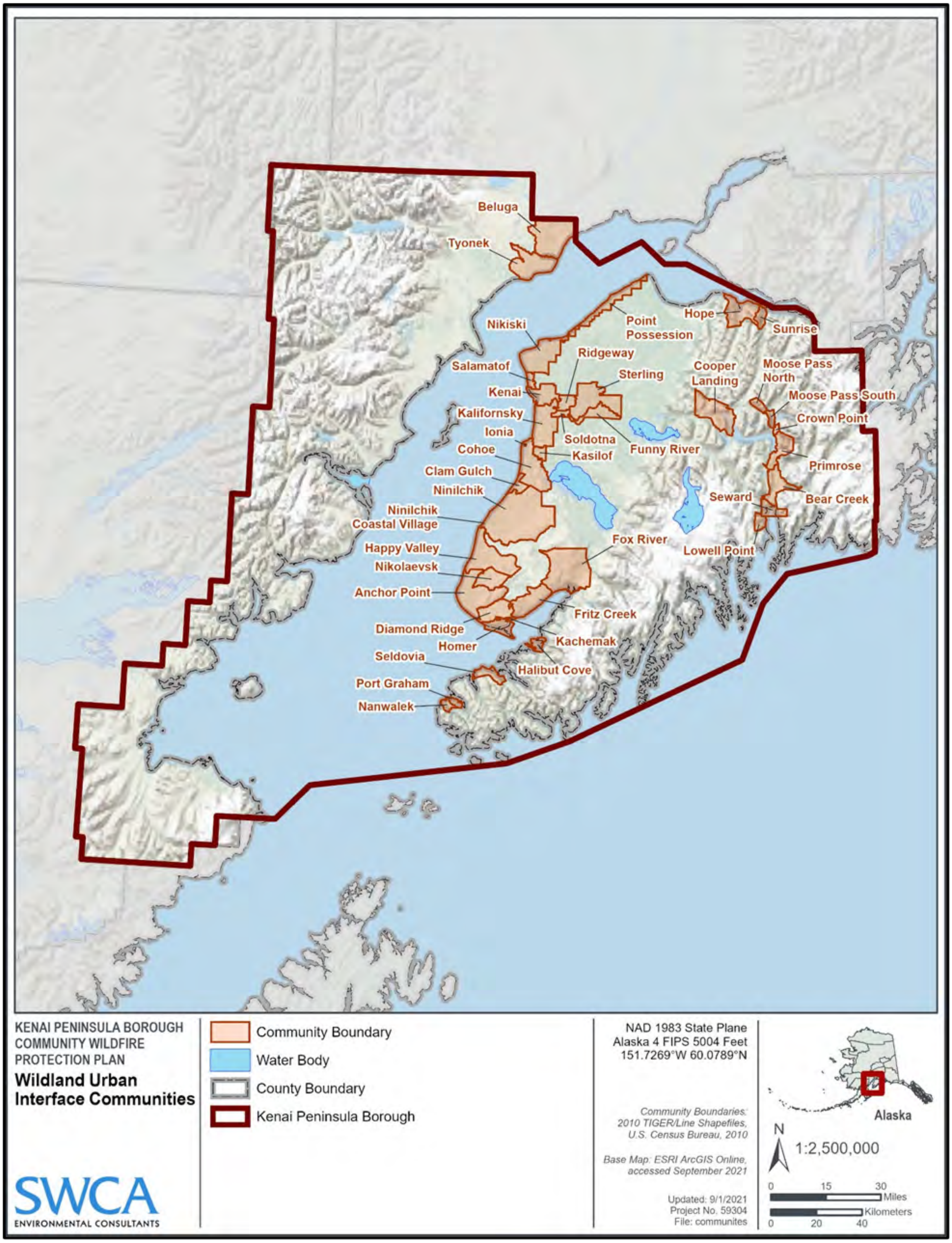

Figure E1.1. KPB CWPP project area.

WHAT IS THE CURRENT WILDFIRE SITUATION?

Abnormally warm temperatures have created conditions conducive to problematic insects as well as increased fire risk on the Kenai Peninsula. In the 1990s, there was an unusually dry and warm trend in Alaska, which was accompanied by a significant increase in SBB (KPB 2006a). Specifically, Alaska's Kenai Peninsula and Copper River Valley experienced an SBB outbreak that had infested about 2.3 million acres, killing most large-diameter spruce trees (National Park Service 2021a). In essence, unusually warm temperatures favor the pattern of SBB induced tree mortality, increased dead fuel, and the persistence and amplification of frequent and large fires. The warmer climate pattern has also triggered the onset of earlier-than-average snow-free events, which brings the premature arrival of the fire season. Under such circumstances, the drying of vegetation occurs more readily and for longer periods of time. Additionally, the shifting climate patterns create conditions that amplify the occurrence of lightning strikes. The combination of increased lightning strikes and ample fuels increases the risk of catastrophic wildfire on the Kenai Peninsula (KPB 2006a).

Recent findings suggest that SBB outbreaks are likely to persist. In 2016, another outbreak was recorded. A 2016 aerial detection study mapped 190,000 acres of SBB damage (National Park Service 2021a). Since the 2016 outbreak began, more than 1 million acres in south-central Alaska have been impacted, with 145,000 acres of SBB damage recorded in 2020 alone (U.S. Forest Service 2021d). Beetle-killed trees are a complex fuel type and pose an escalated risk for wildfire. The needles remain on the branches an entire season after the tree dies, leaving the tree relatively more flammable during this period. As the tree dries, branches and crowns are perfect fuel ladders for surface fires. Stem breakage in deceased trees usually starts around 5 years after mortality and when combined with forest surface debris (needles, grasses, and organic layers), result in a particularly dangerous fuel complex (KPB 2009a).

WHAT RECENT FIRES OCCURRED HERE?

The Borough and surrounding environment consist of diverse landscapes that produce a complex wildfire setting due to variable topography, high levels of SBB-induced tree mortality, an assortment of vegetation types, and development schemes. As such, the Borough is familiar with large fires. Many fires have occurred in and around the western region of the peninsula, including two of the Borough's largest recent wildfires—the 2014 Funny River Fire and the 2019 Swan Lake Fire.

WHAT IS THE PURPOSE OF THE RISK ASSESSMENT?

The purpose of the risk assessment is to provide information about wildfire hazard and risk to highly valued resources and assets (HVRAs) for the Chugach National Forest and surrounding areas in south-central Alaska (Pyrologix 2021).

The risk assessment considers:

- Likelihood of fire burning
- Intensity of a fire
- Exposure of assets and resources based on their locations
- Susceptibility of those assets and resources to wildfire

Some of the highest risk areas identified in the planning area are communities located within and near the Kenai National Wildlife Refuge, Chugach National Forest, Kachemak Bay, and the WUI.

HOW IS MY COMMUNITY RATED?

Community risk assessments, describing risk and hazard rankings for communities located in the WUI, throughout the KPB, are provided in this plan. A team from SWCA Environmental Consultants conducted on-the-ground community risk assessment surveys throughout the KPB between July 20 and 27, 2021, using the National Fire Protection Association 1144 standard for assessing structure ignitability in the WUI. Using this standard provided a consistent process for assessing wildland fire hazards around existing structures to determine the potential for structure ignition from wildland fire ignitions.
The assessments provide a total score of risk and hazard based on various parameters observed during the surveys, and a corresponding descriptive rating of low, moderate, or high are available in Appendix D.

WHAT ARE THE STRATEGIES TO ADDRESS WILDFIRE CONCERNS?

Goal 1 of the Cohesive Strategy and the Western Regional Action Plan is **Restore and Maintain Landscapes**: Landscapes across all jurisdictions are resilient to fire and other disturbances in accordance with management objectives.

Recommendations for hazardous fuels treatments include**:**

- Removing standing dead trees on public and private property
- Increasing workforce capacity to respond to hazardous fuel treatment needs
- Addressing existing limitations of slash disposal facilities
- Enhancing road right-of-way clearance to facilitate safe ingress and egress in areas that have been impacted by SBB

Goal 2 of the Cohesive Strategy/Western Regional Action Plan is: **Fire-Adapted Communities:** Human populations and infrastructure can withstand a wildfire without loss of life and property.

Recommendations for public outreach and education include:

- Developing an education campaign for beetle-killed tree removal
- Promoting Firewise participation (there are currently no Firewise certified communities within the KPB)
- Increasing education and outreach about the range of wildfire response strategies, also known as Fire Management Options, which are used by the Alaska Interagency Wildland Fire Coordinating Group
- Identifying vulnerable populations who may require assistance during fire prevention, fire response, and post-fire phases

Recommendations for reducing structural ignitability include:

- Increasing structure hardening of public buildings and structures
- Building self-planning tools to enable individuals to reduce the risk of fire to their properties

Goal 3 of the Cohesive Strategy/Western Regional Action Plan is **Wildfire Response:** All jurisdictions participate in making and implementing safe, effective, efficient risk-based wildfire management decisions.

Recommendations for improving fire response capabilities include:

- Supporting additional wildland crews with peninsula-wide capacity.
- Improving fire notifications and coordination between Alaskan Native villages and Incident Command Teams.
- Developing and coordinating a peninsula-wide comprehensive online emergency preparedness, response, and recovery plan.
- Facilitating greater preparedness for evacuations.

WHAT DOES POST-FIRE RESPONSE AND RECOVERY INVOLVE?

There are many aspects to post-fire response recovery, including but not limited to:

- Returning home and checking for hazards
- Coordinating and mobilizing a group of teams in the community to respond to emergencies
- Rebuilding communities and assessing economic needs—securing the financial resources necessary for communities to rebuild homes, business, and infrastructure
- Restoring the damaged landscape—restoration of watersheds, soil stabilization, and tree planting
- Prioritizing the needs of vulnerable and disadvantaged communities during response and disaster recovery efforts
- Evaluating and updating disaster recovery plans every 5 years to respond to changing needs and characteristics of the community
- Coordinating with planning, housing, health, and human services, and other local, regional, or state agencies to develop contingency plans for meeting the short-term, temporary housing needs of those displaced during a catastrophic wildfire event

HOW WILL THE PLAN BE IMPLEMENTED?

The CWPP does not require implementation of any of the recommendations, but the message throughout this document is that the greatest fire mitigation could be achieved through the joint actions of individual homeowners, tribes, and local, state, and federal governments.

The recommendations for fuels reduction projects are general in nature; site-specific planning that addresses location, access, land ownership, topography, soils, and fuels would need to be employed upon implementation. Also, it is important to note that the recommendations are specific to WUI areas and are expected to reduce the loss of life and property.

In addition, implementation of fuels reduction projects need to be tailored to the specific project and will be unique to the location depending on available resources and regulations. In an effort to streamline project implementation, this CWPP has identified the pertinent land management/ownership agencies associated with each recommendation. On-the-ground implementation of the recommendations in the CWPP planning area will require development of an action plan and assessment strategy for completing each project.

WHEN DOES THE CWPP NEED TO BE UPDATED?

The CWPP should be treated as a live document to be updated annually or immediately following a significant fire event. The plan should continue to be revised to reflect changes, modification, or new information. These elements are essential to the success of mitigating wildfire risk throughout the Borough and will be critical in maintaining the ideas and priorities of the plan and the communities in the future.

ACKNOWLEDGEMENTS

Thank you to the Core Team and all stakeholders who participated in the planning process, gave their time, and shared their expertise. These contributions lead to creating resilient landscapes, implementing public education, reducing structural ignitability, and ensuring safe and effective wildfire response.

This publication was funded in part by the Kenai Peninsula Borough and the Alaska Division of Forestry Department of Natural Resources pursuant to U.S. Forest Service Award No. 2018-G11100106-810.

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CHAPTER 1 – INTRODUCTION

PURPOSE

Wildfire is the leading disturbance in Alaskan boreal forests, and roughly 80% of Alaskans reside in areas potentially at risk from wildland fire (University of Alaska Fairbanks [UAF] 2018). Communities within the Kenai Peninsula Borough (KPB or Borough) planning area are familiar with community fire planning, having developed 17 community wildfire protection plans since the early 2000s, covering 33 communities (KPB 2019a). Because wildfire does not respect political boundaries, however, the KPB and other land management entities have been working together collaboratively for more than 15 years to treat fire management as a landscape effort, forming the All Lands/All Hands (ALAH) interagency organization, comprising a comprehensive body of land and resource managers across all jurisdictions, who collaborate on landscape-scale planning efforts to prepare the original ALAH Action Plan and supplemental updates (KPB Interagency 2018).

In support of this collaborative management approach, the purpose of the 2022 community wildfire protection plan (CWPP) update is to

- provide a peninsula-wide scale of wildfire risk and protection needs,
- bring together all the responsible wildfire management and suppression entities in the planning area to address the identified needs, and
- provide a framework for future planning and implementation of necessary mitigation measures.

This CWPP update process involves looking at past fires and treatment accomplishments using the knowledge and expertise of the land and resource managers who work for the various agencies and governing entities in the planning area. This update process incorporates a new assessment of wildfire risk and hazard and supplements local knowledge with relevant science and literature from the northwest region.

NAVIGATION

The CWPP provides a risk assessment, action items, project recommendations, and background information about the KPB's wildland fire environment as well as land management plans and agencies. Most of the background information is housed in several appendices. The CWPP is designed to be used by the residents of the Borough, as well as stakeholders tasked with forest, fire, and emergency management. Some information is therefore highly technical in order to provide sufficient detail to aid in project implementation.

Chapter 1 provides a general overview of CWPPs, the Core Team, project area, land ownership, and public involvement.

Chapter 2 presents an overview of the WUI and fire environment, as well as specific information about vegetation, fire history, fire management, and response.

Chapter 3 describes the risk assessment, results of the risk assessment, and community values at risk.

Chapter 4 provides mitigation strategies in accordance with the National Cohesive Wildfire Strategy as well as post-fire protocols and rehabilitation strategies.

Chapter 5 presents monitoring strategies to assist in tracking project progress and in evaluating work accomplished.

Appendix A contains background information on the KPB, including fire policy, past planning efforts, challenges to forest health, public education programs, and federal, state, and tribal land management agencies.

Appendix B presents the Chugach All-Lands Wildfire Risk Assessment.

Appendix C lists the Core Team members and contacts.

Appendix D provides the community risk assessments for WUI communities and contains the community risk descriptions and hazard ratings.

Appendix E presents a sample form of the National Fire Protection Association Wildfire Fire Risk and Hazard Severity Form 1144.

Appendix F details funding opportunities.

Appendix G contains additional resources, including a guide to manage spruce beetles and a homeowners wildfire mitigation guide.

Appendix H presents information on public outreach and engagement with regard to this CWPP.

Appendix I describes strategic infrastructure recommendations.

The CWPP does not require implementation of any of the recommendations; however, these recommendations may be used as guidelines for the implementation process if funding opportunities become available. The recommendations for fuels reduction projects are general in nature; site-specific planning that addresses location, access, land ownership, topography, soils, and fuels would need to be employed upon implementation. Also, it is important to note that the recommendations are specific to wildland urban interface (WUI) areas and are expected to reduce the loss of life and property.
All recommendation tables are provided within Chapter 4.

In developing the CWPP, a large amount of background information on the Borough is compiled and analyzed, including the CWPP planning process, fire policy, past planning efforts, location and land use data, population, and demographics, climate and weather data, and other supporting background information. This information is presented in Appendix A, Community and CWPP Background Information.

OVERVIEW OF COMMUNITY WILDFIRE PROTECTION PLANS

BACKGROUND

In response to a landmark fire season in 2000, the National Fire Plan (NFP) was established to develop a collaborative approach among various governmental agencies to actively respond to severe wildland fires and ensure sufficient firefighting capacity for the future fuels (U.S. Department of the Interior [USDI] and U.S. Department of Agriculture [USDA] 2000). The NFP was followed by a report in 2001 entitled *A Collaborative Approach for Reducing Wildland Fire Risks to Communities and the Environment: A 10-year Comprehensive Strategy*, which was updated in 2002 to include an implementation plan. This plan was updated once more in 2006, with a similar focus on using a collaborative framework for restoring fire-adapted ecosystems, reducing hazardous fuels, mitigating risks to communities, providing economic benefits, and improving fire prevention and suppression strategies. The 2006 implementation plan also emphasizes information sharing and monitoring of accomplishments and forest conditions, a long-term commitment to maintaining the essential resources for implementation, a landscape-level vision for restoration of fire-adapted ecosystems, the importance of using fire as a management tool, and continued improvements to collaboration efforts (Forests and Rangelands 2006). Progress reports and lessons learned reports for community fire prevention are provided annually.

In 2003, the U.S. Congress recognized widespread declining forest health by passing the Healthy Forests Restoration Act (HFRA), and President Bush signed the act into law (Public Law 108–148, 2003). The HFRA was revised in 2009 to address changes to funding and provide a renewed focus on wildfire mitigation (H.R. 4233 - Healthy Forest Restoration Amendments Act of 2009). The HFRA expedites the development and implementation of hazardous fuels reduction projects on federal land and emphasizes the need for federal agencies to work collaboratively with communities. A key component of the HFRA is the development of CWPPs to facilitate collaboration between federal agencies and communities in order to develop hazardous fuels reduction projects and place priority on treatment areas identified by communities. A CWPP also allows communities to establish their own definition of the WUI, which is used to delineate priority areas for treatment. In addition, priority is placed on municipal watersheds, critical wildlife habitat, and areas impacted by wind throw, insects, and disease. Communities with an established CWPP are given priority for funding of hazardous fuels reduction projects carried out in accordance with the HFRA.

ALIGNMENT WITH THE NATIONAL COHESIVE STRATEGY

In 2014, the final stage of the development of a national cohesive strategy for wildfire was developed: *The National Strategy: The Final Phase in the Development of the National Cohesive Wildland Fire Management Strategy* (Forests and Rangelands 2014). The national strategy takes a holistic approach to the future of wildfire management:

To safely and effectively extinguish fire, when needed; use fire where allowable; manage our natural resources; and as a Nation, live with wildland fire.

In order to achieve this vision, the national strategy goals are:

Restore and maintain landscapes: Landscapes across all jurisdictions are resilient to fire-related disturbances in accordance with management objectives.

Fire-adapted communities: Human populations and infrastructure can withstand a wildfire without loss of life and property.

Wildfire response: All jurisdictions participate in making and implementing safe, effective, efficient risk-based wildfire management decisions. (Forests and Rangelands 2014:3)

Like the 2014 national strategy, the NFP, state fire plans, 10-year comprehensive strategy, and Federal Emergency Management Agency (FEMA) Disaster Mitigation Act of 2000, all mandate community-based planning efforts with full stakeholder participation, coordination, project identification, prioritization, funding review, and multiagency cooperation. This collaboration aligns with the mission and goals of the ALAH Plan (KPB Interagency 2018). In compliance with Title 1 of the HFRA, a CWPP must be mutually agreed upon by the local government, local fire departments, and the state agency responsible for forest management (Alaska Department of Natural Resources [ADNR], Division of Forestry [DOF]). As outlined in the HFRA, this CWPP is developed in consultation with interested parties and the federal agencies managing land surrounding the at-risk communities.

As part of the 2022 update to the CWPP, the plan has been aligned with the Cohesive Strategy and its Phase III Western Regional Action Plan by adhering to the nationwide goal "*to safely and effectively extinguish fire, when needed; use fire where allowable; manage our natural resources; and as a Nation, live with wildland fire*" (Forests and Rangelands 2014:3).

For more information on the Cohesive Strategy, please visit: https://www.forestsandrangelands.gov/strategy/documents/strategy/CSPhaseIIINationalStrategyApr2014.pdf

Alignment with these Cohesive Strategy goals is described in more detail in Chapter 4, Mitigation Strategies.

GOAL OF A COMMUNITY WILDFIRE PROTECTION PLAN

The goal of a CWPP is to enable local communities to improve their wildfire-mitigation capacity, while working with government agencies to identify high fire risk areas and prioritize areas for mitigation, fire suppression, and emergency preparedness. Another goal of the CWPP is to enhance public awareness by helping residents better understand the natural- and human-caused risks of wildland fires that threaten lives, safety, and the local economy. The minimum requirements for a CWPP, as stated in the HFRA, are

Collaboration: Local and state government representatives, in consultation with federal agencies or other interested groups, must collaboratively develop a CWPP (Society of American Foresters [SAF] 2004).

Prioritized Fuel Reduction: A CWPP must identify and prioritize areas for hazardous fuels reduction and treatments and recommend the types and methods of treatment that will protect one or more communities at risk (CARs) and their essential infrastructures (SAF 2004).

Treatments of Structural Ignitability: A CWPP must recommend measures that homeowners and communities can take to reduce the ignitability of structures throughout the area addressed by the plan (SAF 2004).

CWPP PLANNING PROCESS

The SAF, in collaboration with the National Association of Counties and the National Association of State Foresters, developed a guide entitled *Preparing a Community Wildfire Protection Plan: A Handbook for Wildland-Urban Interface Communities* (SAF 2004) to provide communities with a clear process in developing a CWPP. The guide outlines eight steps for developing a CWPP, which have been followed in preparing the KPB CWPP:

Step One: Convene Decision-makers. Form a Core Team made up of representatives from the appropriate local governments, local fire authorities, and state agencies responsible for forest management.

Step Two: Involve Federal Agencies. Identify and engage local federal representatives and contact and involve other land management agencies as appropriate.

Step Three: Engage Interested Parties. Contact and encourage active involvement in plan development from a broad range of interested organizations and stakeholders.

Step Four: Establish a Community Base Map. Work with partners to establish a base map(s) defining the community's WUI and showing inhabited areas at risk, wildland areas that contain critical human infrastructure, and wildland areas at risk for large-scale fire disturbance.

Step Five: Develop a Community Risk Assessment. Work with partners to develop a community risk assessment that considers fuel hazards; risk of wildfire occurrence; homes, businesses, and essential infrastructure at risk; other community values that may be at risk from wildfire and local preparedness capability. Rate the level of risk for each factor and incorporate this information into the base map as appropriate.

Step Six: Establish Community Priorities and Recommendations. Use the base map and community risk assessment to facilitate a collaborative community discussion that leads to the identification of local priorities for treating fuels and reducing structural ignitability, as well as other issues of interest, such as improving fire response capability. Clearly indicate whether priority projects are directly related to the protection of communities and essential infrastructure or to reducing wildfire risks to other community values.

Step Seven: Develop an Action Plan and Assessment Strategy. Consider developing a detailed implementation strategy to accompany the CWPP as well as a monitoring plan that will ensure its long-term success.

Step Eight: Finalize Community Wildfire Protection Plan. Finalize the CWPP and communicate the results to the community and key partners.

Background and Process for Developing the Kenai CWPP Update

In 2003, the enactment of the HFRA provided an incentive to communities to engage in comprehensive forest planning across the United States. This community-based forest planning and prioritization led to the formation of the Kenai Forest, Wildfire Protection, and Fuels Management Coordinating Committee, comprised of federal, state, local and tribal governments. The committee's goal was to increase collaboration and coordination for strategic and project-level planning to address the impacts of spruce bark beetle (SBB), that had been ravaging the KPB for years. In November 2003, the committee met to develop an ALAH 5-Year Action Plan, which is frequently updated to serve as a guiding document for forest and wildfire management within the KPB.

The CWPP update is built on a body of work completed by the ALAH interagency group beginning in 2004 and continuing through today. Recognizing the need to plan for and mitigate the elevated wildfire risk associated with the spruce bark beetle (SBB) outbreaks in spruce forests throughout the peninsula beginning in the 1990s, the ALAH interagency group, formerly called the Kenai Forest, Wildfire Protection and Fuels Management Coordinating Committee, led the charge to proactively develop plans to address wildfire risk in the KPB.

In 2004, the first ALAH 5-Year Action Plan was developed. The purpose of the plan was to introduce a collaborative interagency approach to mitigating wildfire risk through a "from the back porch out" philosophy that emphasizes the need to implement fuel reduction, defensible space, and other mitigation efforts from the back porch outward (KPB Interagency 2018). Since 2004, the ALAH Action Plan has been updated in 2012 and 2018, with both updates reflecting lessons learned, new land management approaches, and project implementation guidance. The framework for all ALAH plans was shaped by the NFP and associated HFRA. The 2018 ALAH Action Plan update considers past KPB CWPPs, the FEMA-approved KPB Hazard Mitigation Plan (2019 update), the 2018 Comprehensive Plan, and the 2009 FLAME2 Act, and was developed in alignment with the 2014 National Cohesive Wildland Fire Management Strategy and associated goals (KPB Interagency 2018).

Guidance from the 2003 HFRA combined with KPB's high-risk status resulted in the 2004 ALAH Action Plan designating a need for communities within the KPB to develop CWPPs (KPB Interagency 2018). This need triggered the development of the original 17 CWPPs.

Based on guidance provided by the ALAH group in the 2018 ALAH Action Plan update, the KPB and the DOF led the initiative to update the original 17 CWPPs located throughout the KPB. The KPB successfully applied for and received funding from the U.S. Forest Service (USFS) to support this planning effort. Rather than updating 17 unique plans, the KPB engaged in a substantially different approach to develop one landscape-level plan for the entire KPB.

Both high-level and small-scale assessment of hazard and risk, as well as recommendations, are provided within this plan. In 2019, the Chugach National Forest contracted the development of a Chugach All Lands Quantitative Wildfire Risk Assessment (QWRA, known as ARRA) that includes the Chugach National Forest and surrounding federal and non-federal land totaling approximately 30 million acres in south-central Alaska (Pyrologix 2021). This comprehensive assessment encompassed the entire peninsula, and therefore, the KPB chose to integrate the assessment into the development of the CWPP. The ARRA provides a landscape-level model of potential losses associated with fire, based on fire behavior throughout the KPB and the location and density of values at risk. To complement this broad risk assessment, an on-the-ground community assessment was completed to identify hazards and risks locally and to provide a summary for each WUI community in the KPB. Additionally, any recommendations made in the original CWPPs that prove still relevant have been incorporated in the 2022 CWPP.

Why a CWPP is Needed

The United States is facing urgent forest and watershed health concerns. Reducing human vulnerability to the impacts of uncharacteristically severe wildfires depends not only on our ability to understand the science, but also upon our ability to integrate that knowledge to residents, fire and emergency managers, and local, state, and federal agencies. While fires are a natural phenomenon across much of the western United States, the presence of humans living, working, and recreating within the WUI means that every year people face the impacts of wildfire within their communities, and as fires are becoming more severe, those impacts are harder to recover from. While the number of annual wildfires has been slightly decreasing (67,700 fires in 2016 vs. 59,000 fires in 2020), the number of acres burned has been on the rise (Congressional Research Service [CRS] 2021). An average of 7 million acres burn every year due to wildfire, more than doubling the annual average of acres burned in the 1990s (CRS 2021). Communities are experiencing the most destructive wildfire seasons in history. The 2015 fire season had the most acreage impacted in a single year since 1960 at 10.13 million acres. 2020 came in second with 10.12 million acres, and 2017 was not far behind at 10.03 million acres (CRS 2021). Furthermore, with increased fires comes increased suppression costs; 2018 beat all previous records, with federal firefighting costs hitting $3,143,256,000 (National Interagency Fire Center 2021).

Alaska is no stranger to wildfire, but the state is facing an intensified pattern of wildfire due to rapidly escalating temperatures, extended growing seasons, and SBB outbreaks. Regardless of season-to-season variability, evidence suggests that wildfire is burning more acres and expanding into new regions of the state (International Arctic Research Center [IARC] 2021). This has statewide consequences, including increased wildfire risk for people, property, and natural resources. Residents of Alaska are especially vulnerable, with an estimated 80% of the population living in areas at risk of wildfire (IARC 2021). The KPB alone has over 10.25 million acres of forested lands with 65% of communities located in areas of extreme wildfire risk (KPB 2019a). Population growth and continued expansion in conjunction with dispersed settlement patterns on the Borough create a large WUI (USFS 2017). The total value of structures (e.g., homes, businesses) on private land is expected to increase by 66% during the next five decades—increasing the wildfire vulnerability of the Borough (USFS 2017). Moreover, population dynamics and distribution combined with insect and disease impacts on vegetation are further escalating wildfire risk. Therefore, planning and management regarding climate change, the WUI, and vegetation is a significant need within the Borough (KPB Interagency 2018).

The average annual number of large wildfires has nearly doubled in recent years, from approximately 23 (1950s–1980s) to 40 (1990s–2010s) (IARC 2021). In addition to this increase in the quantity of wildfires, the annual average number of acres burned doubled from 1 million during 1990–2000 to 2 million during 2001–2010. Furthermore, 2001–2010 set a new record for acres burned at 20 million acres (IARC 2021). With increased fire events comes increased suppression costs. 2019 was Alaska's costliest fire season, with costs exceeding $300 million. The 2019 Swan Lake Fire alone cost $46 million (IARC 2021). However, this figure does not include the cost to Alaskans who had their land scorched and homes burned. In addition to economic impacts, wildfires cause loss of life and injury, health problems related to smoke, and ecosystem changes (IARC 2021).

As wildfire severity increases, communities need a plan to help prepare for, reduce the risk of, and adapt to wildland fire events. CWPPs help accomplish these goals. A CWPP provides recommendations that are intended to reduce, but not eliminate, the extreme severity or risk of wildland fire, and seek to build natural and social resilience to wildfire impacts.

Wildfire is considered to be 'bad' or in most cases catastrophic, whenever homes and other structures are involved; timber values are lost; critical wildlife habitat is degraded; or other values are lost depending on the location, extent, and intensity of the wildfire. Wildfire can also be 'good' and have positive effects, mainly environmental, such as creating an environment for fire-dependent or fire-tolerant plant species to flourish, enhancing wildlife habitat by diversifying vegetation species and age classes, or removing surface fuels and other downed woody debris to limit the intensity of future wildfires (KPB Interagency 2018:9).

Story Map

The KPB and DOF decided to develop an interactive website called a story map (online web content) to disseminate information to the public and provide an opportunity for the public to provide input into the plan content. In addition to facilitating information sharing, the story map also provides the Borough with a platform that can be readily revised to keep the CWPP document current. The story map is hosted on the KPB website and acts as a 1-stop shop source of information for all Borough residents.

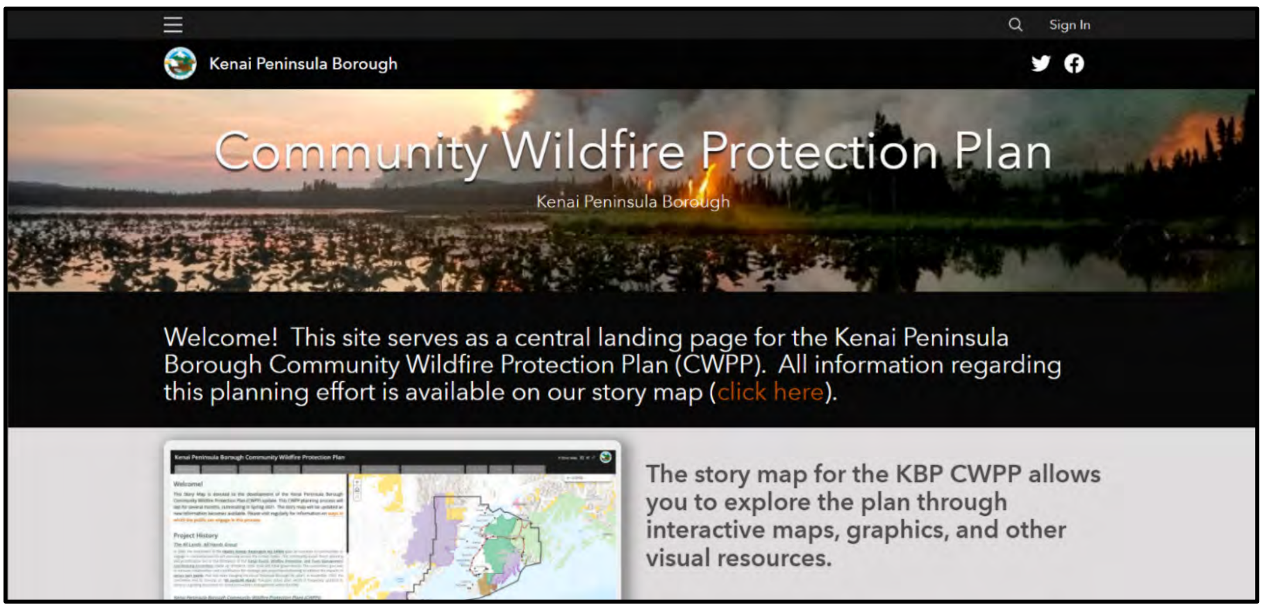


Figure 1.1. KPB story map hub.

CORE TEAM

The ALAH group, along with some others representing additional communities or entities, served as the Core Team for the CWPP update. The Core Team list is provided in Appendix C.

Building on the existing ALAH group membership, the Core Team continued to evolve and expand. The Core Team consists of the following:

- Kenai Peninsula Borough (KPB)
- Alaska Division of Forestry - Kenai/Kodiak

- KPB Office of Emergency Management
- KPB Bear Creek Fire
- KPB Central Emergency Services
- KPB Nikiski Fire
- KPB Kachemak Emergency Services
- KPB Western Emergency Services
- KPB Land Management
- U.S. Fish and Wildlife Service (USFWS), Kenai National Wildlife Refuge
- U.S. Forest Service (USFS), Chugach National Forest
- Alaska Department of Fish and Game (ADFG)
- Cities of Homer, Kachemak, Kenai, Seldovia, Seward, Soldotna
- Chugachmiut
- Seldovia Village Tribe
- Volunteer Fire Departments
- Cooper Landing Emergency Services
- Homer Electric Association
- SWCA Environmental Consultants
- Jim Butler, Incident Response Group
- Residents

The Core Team drives the planning process in its decision making, data sharing, experience, and communication with community members who are not on the Core Team. SWCA and the KPB had a project kickoff meeting in February 2020. SWCA facilitated the first Core Team meeting in person on March 12, 2020, and the second Core Team meeting virtually via Zoom on May 14, 2020. Due to the COVID-19 pandemic in 2020, the KPB decided to tactically pause the project from May 2020 through May 2021. In May 2021, the KPB and SWCA re-started the project. SWCA facilitated the third Core Team meeting in person on July 26, 2021, and the fourth Core Team meeting virtually in October 25. All other Core Team communications were limited to email and conference calls. SWCA and the KPB contacted the 10 entities representing Native Alaskan interests to inquire about their community values at risk, project recommendations, and fire response capabilities (see the Community Assessments sections for more information).

PROJECT AREA

The project area includes the entire KPB as delineated by its geographic and political boundaries. The project boundary encompasses all communities that were included in the original round of CWPPs (Figure 1.2). The most populated municipality is the census-designated area of Kalifornsky.

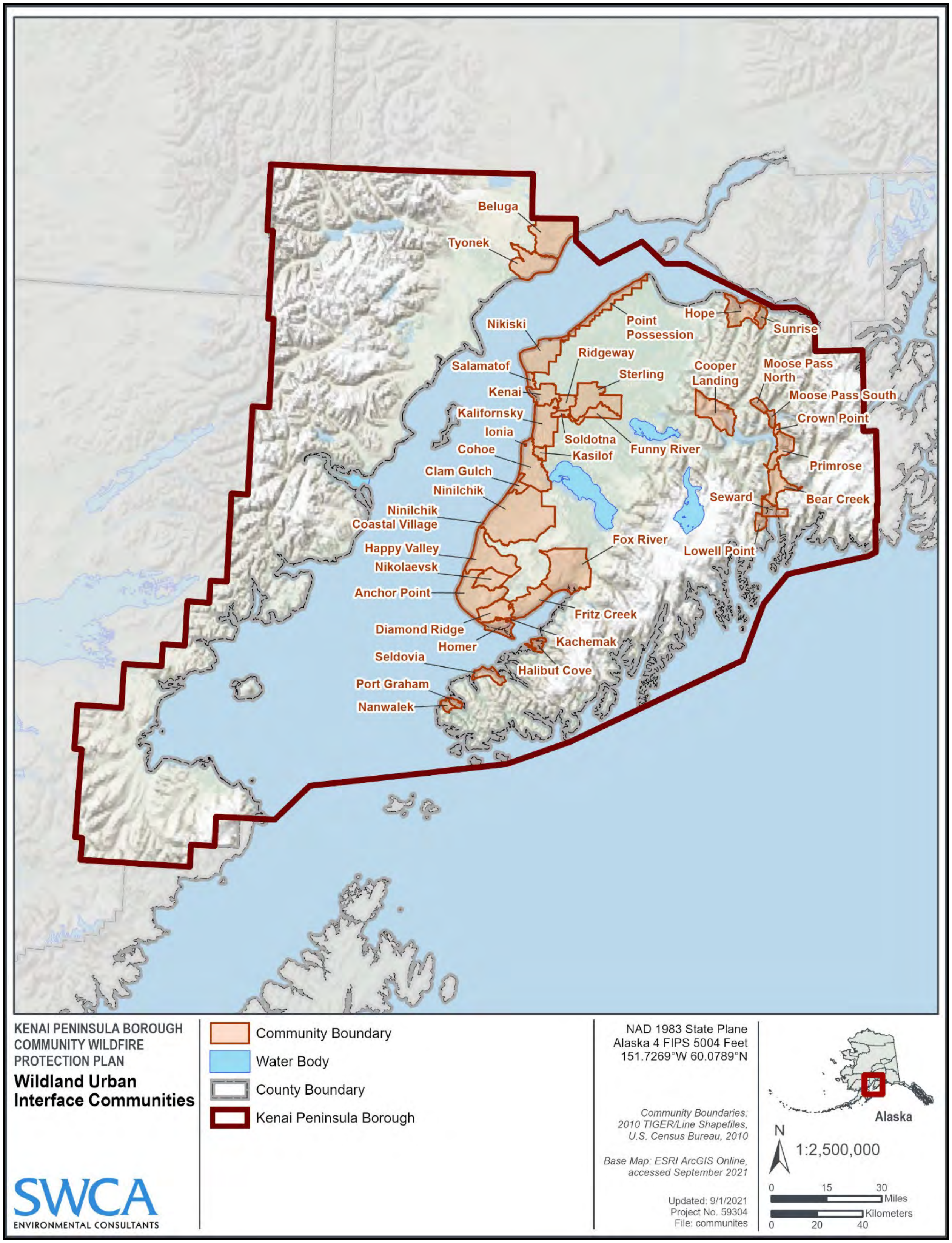


Figure 1.2. KPB CWPP project area and WUI communities.

LAND OWNERSHIP

The KPB has varied land ownership, including large areas of USFS, National Park Service (NPS), USFWS, Bureau of Land Management (BLM), tribal, state, and municipal land (Figure 1.3). Alaska Natives have a unique structure of ownership and management in Alaska, which is different from the system used in the lower 48 states. There are 12 geographic regions in Alaska identified by the Alaska Native Claims Settlement Act of 1971 (ANCSA) as both ethnic and geographic Native regions. Native entities that were created were first in the form of Tribes, next regional Native corporations, and finally Native village corporations. Each region created a non-profit organization to assume the federal responsibilities for the health and welfare of the Alaska Native peoples by use of a compact agreement with the federal government. The Alaska Native Corporations (both regional and village) hold title to a majority of Native land. Additional information regarding land ownership is provided in Appendix A.

PUBLIC INVOLVEMENT

The Core Team offered multiple public engagement opportunities throughout the planning process. Detailed information regarding public involvement is provided in Appendix H.

Engaging interested parties is critical in the CWPP process; substantive input from the public will ensure that the final document reflects the highest priorities of the local community. A key element in the CWPP process is the meaningful discussions it generates among community members regarding their priorities for local fire protection and forest management (SAF 2004).

The Core Team engaged in outreach using a multimedia approach, using the story map created for the project, social media posts, community surveys, radio interviews, and information distributed through mass emails. The Core Team hosted five public meetings from July 20 through July 24, 2021, throughout the Borough (see Table H.1 in Appendix H for dates and locations). The public meetings were designed using an open house format to encourage interactive communication with stakeholders. In some communities that had not received significant previous wildfire mitigation outreach, a public presentation about the project was held prior to the open house. This two-way communication was intended to increase understanding and build trust, rather than simply provide information. The goal of the public engagement was to inform the public about the KPB CWPP update and to gather feedback about specific topics related to this project, as well as general wildfire concerns. In addition to the open house style of public meetings, the Core Team also hosted an informational booth at a community festival.

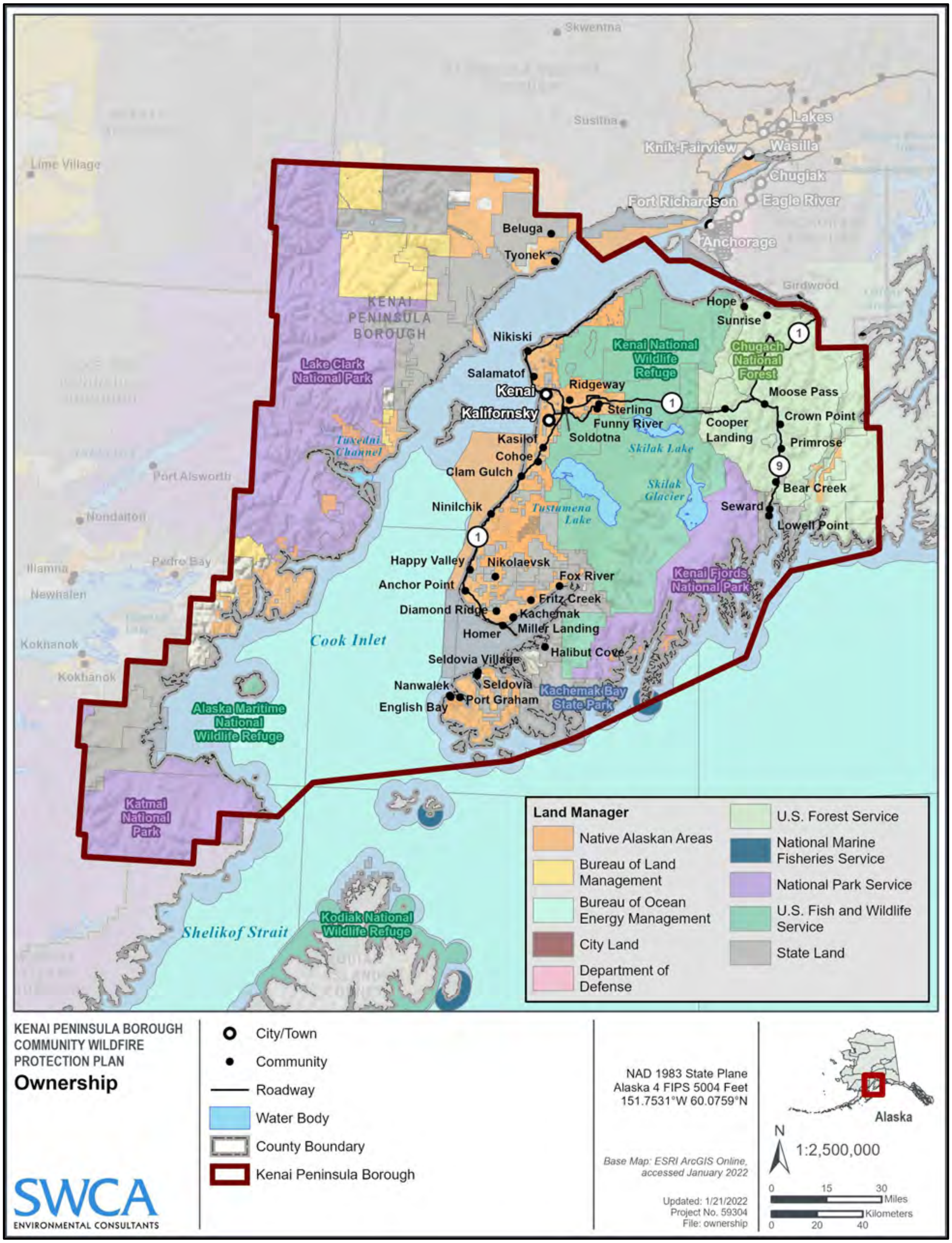
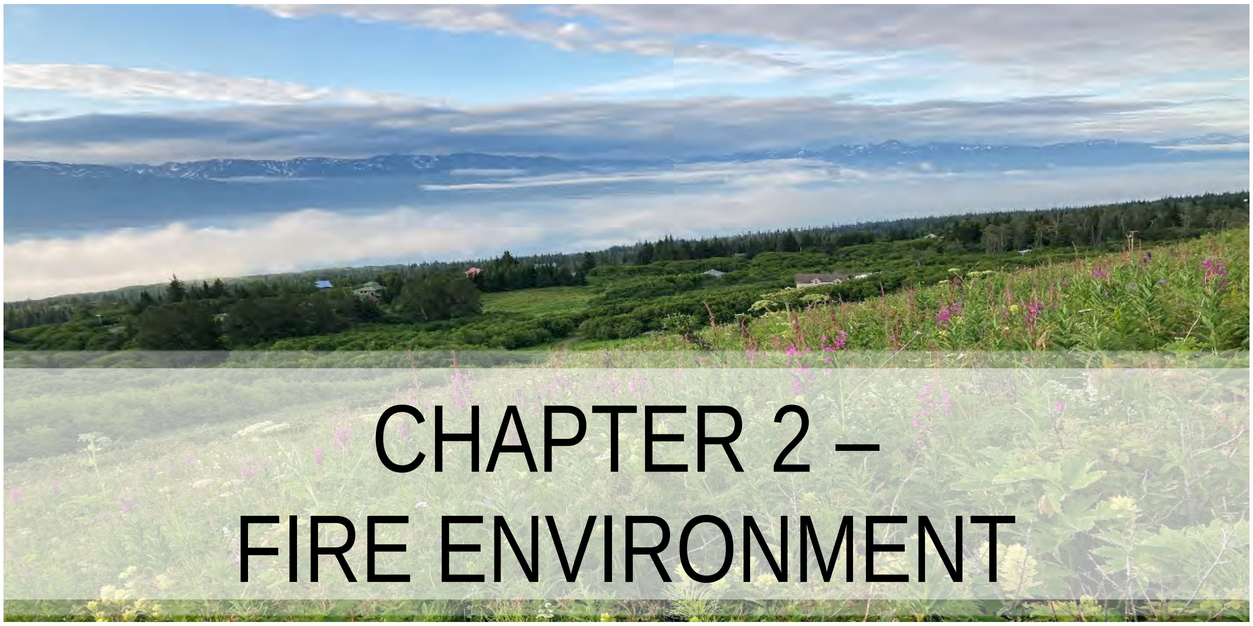


Figure 1.3. KPB land ownership.



CHAPTER 2 – FIRE ENVIRONMENT

WILDLAND URBAN INTERFACE

A WUI is composed of both interface and intermix communities and is generally defined as areas where human habitation and development meet or intermix with wildland fuels (USDI and USDA 2001:752–753). Interface areas include housing developments that meet or are in the vicinity of continuous vegetation. Intermix areas are those areas where structures are scattered throughout a wildland area where the cover of continuous vegetation and fuels is often greater than cover by human habitation.

The WUI creates an environment in which fire can move readily between structural and vegetative fuels, increasing the potential for wildland fire ignitions and the corresponding potential loss of life and property. Human encroachment upon wildland ecosystems within recent decades is increasing the extent of the WUI throughout the country as a whole, which is having a significant influence on wildland fire management practices. Combined with the collective effects of fire management policies, resource management practices, land use patterns, warming trends, and insect and disease infestations, the expansion of the WUI into areas with high fire risk has created a need to modify fire management practices and policies and to understand and manage fire risk effectively in the WUI (Pyne 2001; Stephens and Ruth 2005). Mitigation techniques for fuels and fire management can be strategically planned and implemented in WUI areas; for example, with the development of defensible space around homes and structures (Figures 2.1 and 2.2).

A CWPP offers the opportunity for collaboration of land managers to establish a definition and a boundary for the local WUI; to better understand the unique resources, fuels, topography, and climatic and structural characteristics of the area; and to prioritize and plan fuels treatments to mitigate fire risks. At least 50% of all funds appropriated for projects under the HFRA must be used within the WUI area.

Figure 2.1. Example of a coastal WUI in the Borough.

Figure 2.2. Example of forested WUI in the Borough.

This CWPP update aligns the WUI definition and delineation with those previously defined in the existing 17 community CWPPs (Figure 2.3). Those community plans align their WUI delineation with the HFRA as comprising "areas within or adjacent to at-risk communities." The WUI delineations around the at-risk communities were created through a collaborative process with the initial core teams for each community plan and were based on fuel composition, locations of values at risk, alignment with roads that may be used for emergency ingress and egress, and presence of wildfire risk and hazard.

Under HFRA Section 101(1), an at-risk community is one that:

- Comprises a group of homes and other structures with basic infrastructure and services
- Has conditions conducive to a large-scale wildland fire
- Faces a significant threat to human life or property as a result of a wildland fire

WUI fires challenge suppression agencies in Alaska just as they do in other parts of the country. The most acute increase in population and subsequent increased housing density at the interface, on the road system, is occurring on the Kenai Peninsula, in the Matanuska-Susitna Borough, and near Anchorage and Fairbanks. These areas have the classic WUI problems associated with rapid population growth without adequate zoning or fire planning (KPB 2009a).

The HFRA definition of WUI recognizes the WUI as a buffer extending 0.5 mile from the boundary of an at-risk community.

The WUI delineation should be reviewed and revised as needed during updates to the CWPP and by communities looking to develop and implement CWPPs at a smaller community scale.

FIRE HISTORY

HISTORIC FOREST USE

Since the last Ice Age, Alaska Native peoples and Alaskan forests have played an integral part in each other's lives. As the original forest stewards, Alaska Natives place significant cultural and spiritual value, in addition to subsistence value, on the forest land. The most noticeable forest management tool used by Alaska Natives was fire. Fire was used in boreal forests to control insects, preserve wildlife habitat, and maintain crops (DOF 2020a). Historical records note that Native people set fires along the Copper River across Alaska in the late nineteenth century and early twentieth century (Fryer 2014).

The Kenai Peninsula has been the home of the Kenaitze Indian Tribe for centuries and was developed by non-Natives for its plentiful resources, including oil, timber, fish, coal, gold, and wildlife (USFWS 2014). Early settlement brought increased population and infrastructure development; this increased human activity and development resulted in fire regime changes, with many fires occurring along roadways and towns. Throughout the nineteenth and twentieth centuries, the population of the Kenai Peninsula continued to grow. The population increased dramatically following World War II, giving rise to intensive development and other land use changes such as oil and gas development, increased recreational use, vegetation control, and infrastructure expansion (USFWS 2014).

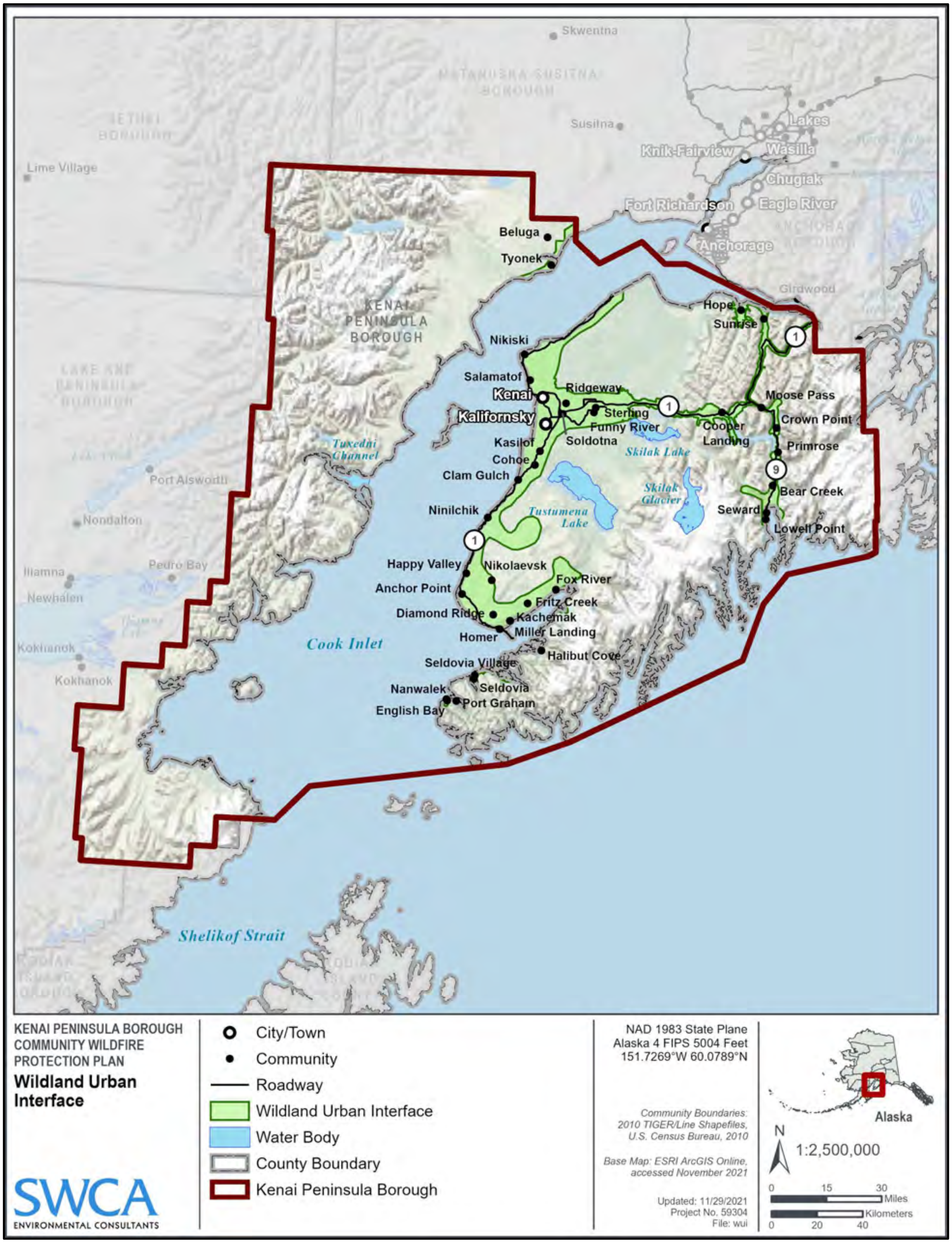


Figure 2.3. WUI delineation for the KPB.

HISTORIC FREQUENCY

Fire frequency is influenced by an interplay between numerous factors, including season, temperature, precipitation, lightning occurrence, forest health, topography, elevation, wind, aspect, and forest species composition and distribution. Therefore, how repeatedly a particular forest burns is determined by location-specific conditions (Fryer 2014).

Forest fires have been prevalent throughout the history of development of Alaska's boreal forests. Studies of the paradigms of big, historic fires in Alaska's taiga indicated that wildfire frequency was episodic, with most fires taking place during brief periods of high fire years (KPB 2006a). In Alaskan taiga, mean fire-return intervals (MFRIs) since the eighteenth century vary from 40 to 200 years. Fire frequency data from 1708 through 2004 indicate that historic fire frequency for black spruce forests on the Kenai Peninsula ranged from 25 to 185 years, with an average of 89 years (Fryer 2014). Some sections of the local forests on the Kenai Peninsula have evolved with fire, including large and severe fires. As such, these forests are typically adapted to large and severe fires (Wahrenbrock 2022).

Anthropogenic activity is another important factor in determining how often a forest will burn. Studies conducted in Alaska's taiga, including the Kenai Peninsula, indicate that before the European settlement of Alaska, the fire regime was distinguished by small fires (≤50,000 acres) and infrequent larger fires. Post European settlement, the Kenai Peninsula underwent an increase in the occurrence and acreage of fires linked to the increased presence of people (Ecology and Environment 2006).

FIRE SEASON

The majority of wildfires in the Alaskan boreal forests occur in summer; however, variation in fire season is significant. The fire season in the Kenai Peninsula usually extends from the beginning of April to the end of September, with May through late August being the most active fire months. This is because the period from May through late August has the highest average temperatures and lowest average humidity and precipitation (Fryer 2014). Fire season for the state of Alaska is defined as April 1 through August 31 by state law (Alaska Wildland Fire Coordinating Group Group[AWFCG] 2021). However, it should be noted that climatic shifts have been implicated in the earlier arrival and extension of the fire season.

A multitude of studies have reached the conclusion that the Earth's climate is getting warmer. This warming trend has been especially profound in recent decades. In the early 2000s, in Alaskan boreal forests, increases in mean annual air temperatures were accompanied by a trend toward larger, more frequent fires (Fryer 2014). In addition to increased fire frequency and severity, climatic warming has also been responsible for retreating glaciers, shrinking icefields, and decreasing lake levels and ponds (KPB 2006a).

Abnormally warm temperatures have created conditions conducive to problematic insects, as well as increased fire risk on the Kenai Peninsula. SBB thrive in warmer temperatures, and spruce trees weakened by drought stress are more susceptible to infestations and fire. In the 1990s, there was an unusually dry and warm trend in Alaska, which was accompanied by an exponential increase in SBB (KPB 2006a). Specifically, Alaska's Kenai Peninsula and Copper River Valley experienced an SBB outbreak that infested approximately 2.3 million acres, killing most large-diameter spruce trees (NPS 2021a). In essence, unusually warm temperatures favor the pattern of SBB-induced tree mortality, increased dead fuel, and the persistence and amplification of frequent and large fires. The warmer climate pattern has also triggered the onset of earlier-than-average snow-free events, which brings a premature arrival of the fire season. Under such circumstances, the desiccation of vegetation occurs more readily and for longer periods of time. Additionally, the shifting climate patterns create conditions that amplify the occurrence of lightning strikes. The combination of increased lightning strikes and ample fuels increases the risk of catastrophic wildfire on the Kenai Peninsula (KPB 2006a).

RECENT FIRE OCCURRENCE

While wildfires are typically rare within coastal Alaska (USFS 2011c), recent wildfire history for the Kenai Peninsula suggests that the risk of uncharacteristically large and severe wildfires remains elevated. Recent fires include the 2004 Glacier Creek Fire (8,600 acres), 2005 Fox Creek Fire (25,500 acres), 2005 Tracy Avenue Fire (5,400 acres), 2005 King County Creek Fire (10,000 acres), 2007 Caribou Hills Fire (55,000 acres), 2009 Shanta Creek Fire (13,000 acres), 2014 Funny River Fire (196,000 acres), 2015 Card Street Fire (8,900 acres), and the 2017 East Fork Fire (1,000 acres) (KPB 2006a).

More recently, in 2019, south-central Alaska had an extraordinarily hot, dry spring and summer season. June (2019) was the second-warmest month in the state's history, which, combined with higher-than-average lightning strikes, created ideal conditions for extreme wildfires (National Oceanic and Atmospheric Administration [NOAA] 2021a). Consequently, the 2019 wildfire fire season was the second-most destructive in Alaska (ADNR 2019). One of the largest fires of the 2019 fire season was the Swan Lake Fire (Figure 2.4), a lightning-caused wildfire that burned approximately 170,000 acres between Sterling and Cooper Landing on the Kenai Peninsula (Figure 2.4).

Figure 2.4. Swan Lake burned area, showing extensive landscape-scale damage.

Historic data indicate that most wildfires in Alaskan black spruce communities, including those on the Kenai Peninsula, are ignited by summer lightning. Yet humans are increasingly the culprit of ignitions in black spruce communities. Human-caused fires from 1956 through 2000 averaged 131 fires per year; in comparison, lightning strikes caused an average of 136 fires per year (Fryer 2014). More recent fire management records also demonstrate an increasing trend of human-caused fires. The records from 1990 through 2005 for the Kenai Peninsula show a total of 1,079 fires; of those, 1,052 (97.5%) were determined to be human caused (Ecology and Environment 2006).

The Borough's recent wildland fire history (1990–2020) shows that fire occurrence follows a cyclical pattern, with brief periods of elevated fire events and longer periods with fewer fire events (Figure 2.5). For the period of 1990 through 2020, the top two causes of fire events were lightning and human activity (Figure 2.6). Human-caused fires represent 95% of the fire causes; however, it should be noted that human-caused fires are generally smaller than lightning-caused fires (Fryer 2014). In addition, there has been an increasing trend toward fires larger than 5 acres; the period of 1990 through 2020 is anomalous compared with the historic pattern, which shows fire events less than 5 acres in size (Figure 2.7).

While most fires on the Kenai Peninsula are human caused, lightning-caused fires typically consume more acreage (Fryer 2014). Dense forest stands resulting from decades of fire suppression policies create a conducive environment to large fires. Therefore, fuels treatments such as prescribed burns that thin and reduce forest stands may minimize the impact and extent of large, lightning-caused fires (ADFG 2003).

Moreover, for a period of 80 years (1940–2020), a total of 946,052 acres have burned in areas throughout the Borough (Figures 2.8 and 2.9). The decadal graph also shows a recent trend toward increasing acreage burned in the 2010 through 2020 period (see Figure 2.8).

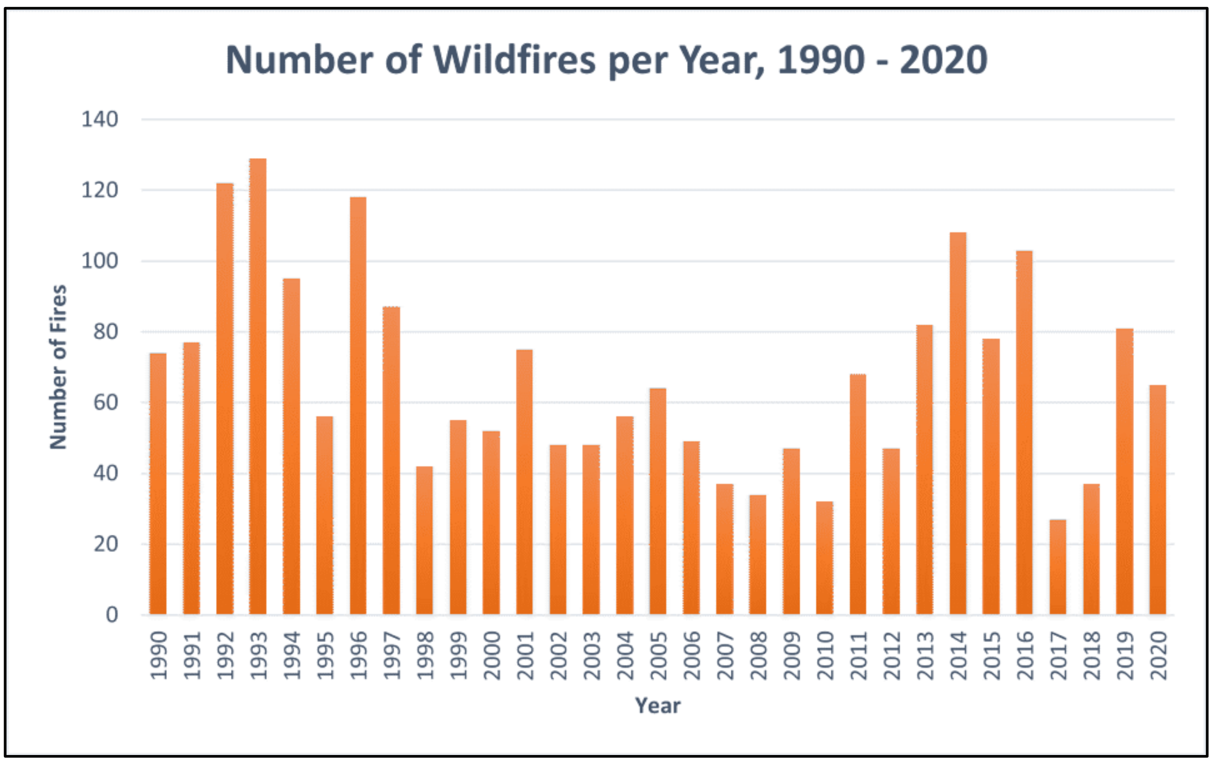


Figure 2.5. Annual wildfire frequency in the Borough from 1990 through 2020.

Source: BLM Alaska Fire Service

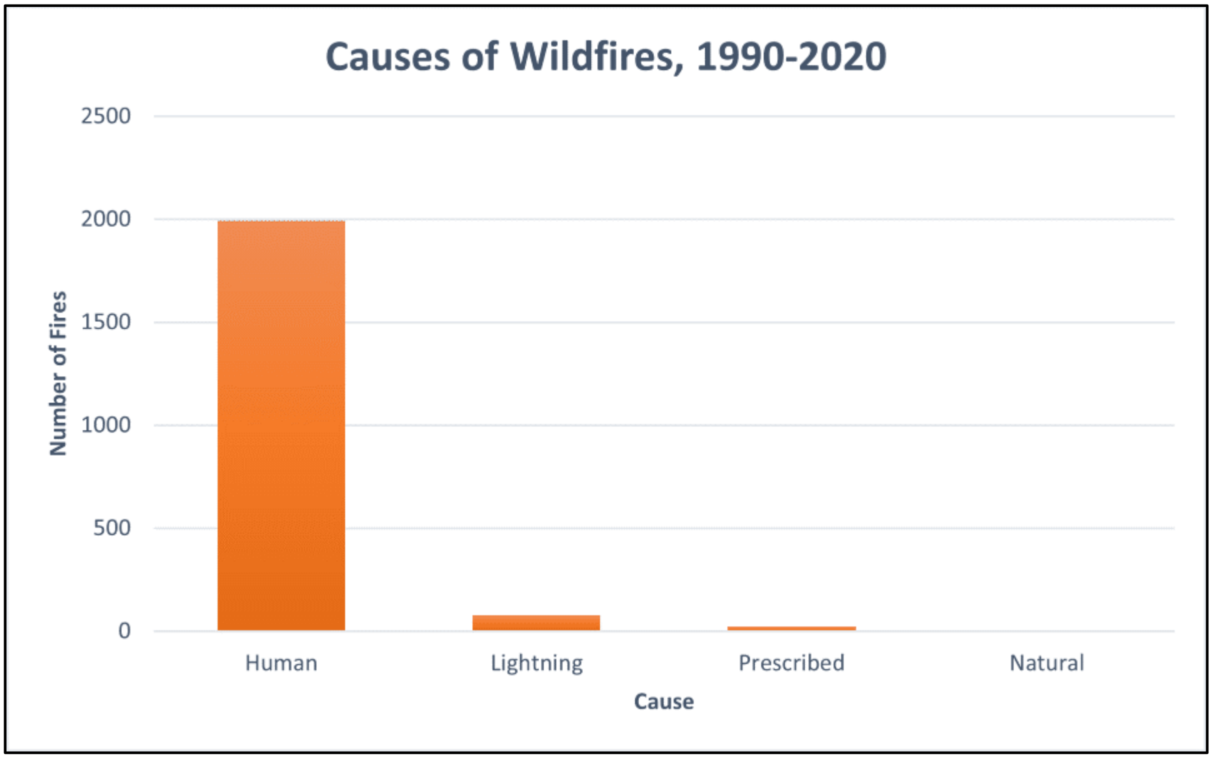


Figure 2.6. Wildfire causes for the Borough from 1990 through 2020.

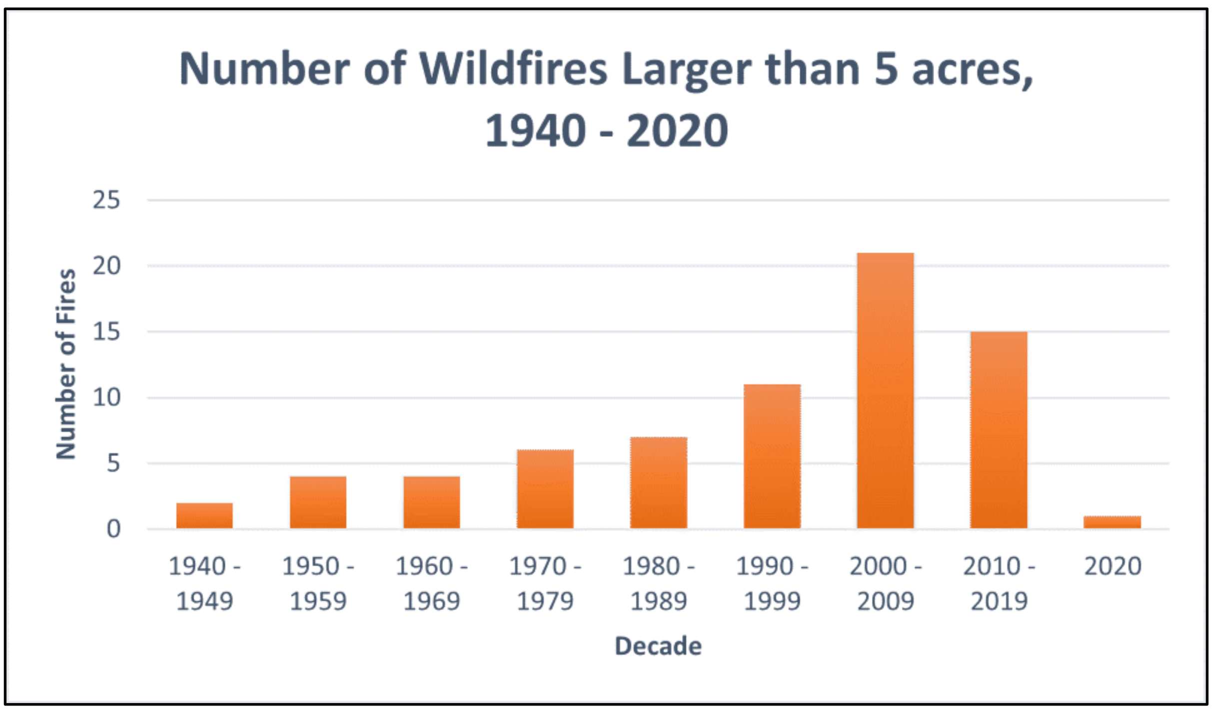


Figure 2.7. Number of wildfires larger than 5 acres in the Borough based on data from 1940 through 2020.

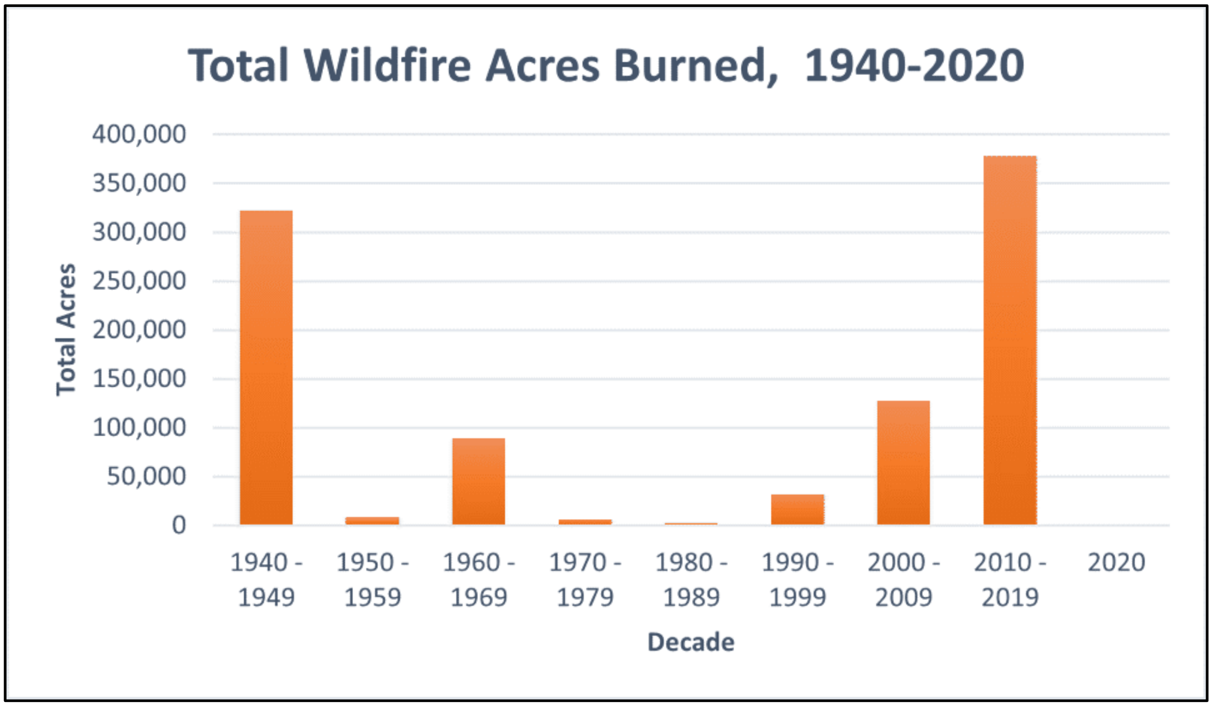


Figure 2.8. Wildfire size statistics for the Borough based on historical data from 1940 through 2020.

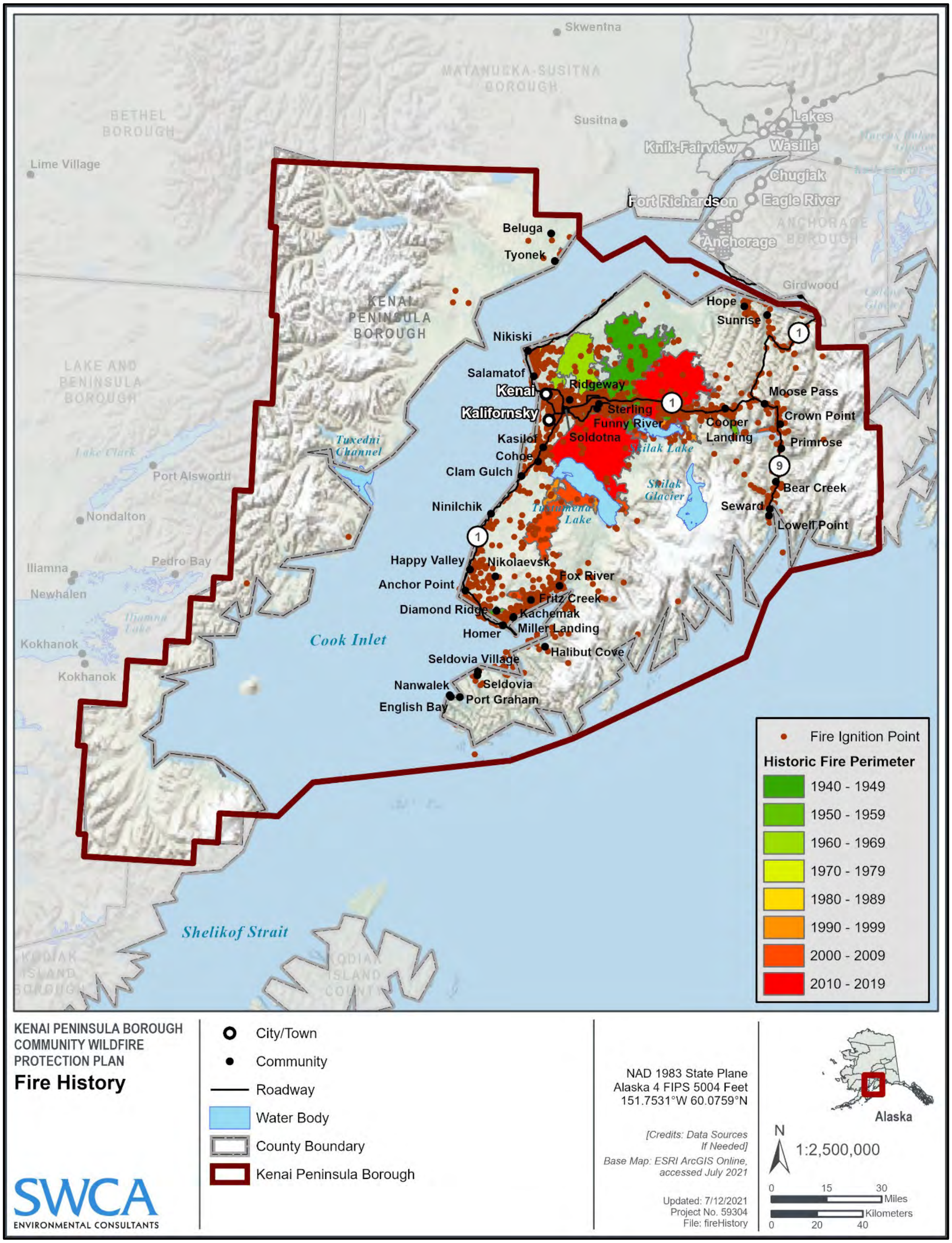


Figure 2.9. Fire history for the KPB from 1940 through 2019.

VEGETATION AND FIRE ECOLOGY

Vegetation zones within the KPB are primarily a function of elevation, slope, aspect, substrate, and associated climatic regimes. Because a broad range in elevation and topography exists across the Borough, characteristics in vegetative communities are quite variable from site to site (Figure 2.10).

The KPB is predominantly composed of spruce (needleleaf) and hardwood (broadleaf) forests (Table 2.1). Black, white, Sitka, and hybrid Lutz spruce present volatile fuels due to high needle resin content and branch configuration. Hardwood species include paper birch, balsam poplar, quaking aspen, and green alder (tall shrub), which are less flammable than spruce species. Forests on the KPB can be composed of individual species as well as mixed-species communities (mixed forest).

Fire plays an important role in in the ecology of spruce forests in Alaska and is the main catalyst of change in the boreal forest system. Fires clear the ground from organic layers and expose fertile ground that promotes seed germination. However, it should be noted that fire intensity is directly related to reforestation success. Generally, fires that burn after a long period of dry weather or drought conditions have greater organic duff consumption and, in turn, create microsites favorable for tree seed germination. Early season burns and fires that occur on grasslands have less surface fuel consumption and usually produce spotty or poor post-fire reforestation (Wahrenbrock 2022). Black spruce are dependent on fire for optimal regeneration. White spruce and Sitka may benefit significantly from fire but will positively respond to most forms of site clearance, such as windstorms, with respect to regeneration (Wahrenbrock 2022).

Although black spruce are easily damaged by fire, black spruce seedlings prosper in post-fire conditions. Fire assists in opening cones, and the open seedbed prepared by the fire provides conditions for optimal growth (KPB 2006a). In addition, some sections of the local forests on the Kenai Peninsula have evolved with fire, including large and severe fires. As such, these forests are typically adapted to large and severe fires (Wahrenbrock 2022).

The USFS, in collaboration with other land management organizations, including federal, state, borough, tribal, and non-profit partners, prepared an existing vegetation map for the Kenai Peninsula (USFS 2020a). The map covers the entire Kenai Peninsula; however, it omits a small part of the Borough—the Tyonek and Beluga communities across the Cook Inlet (see Figure 2.10). Vegetation data for the omitted areas can be accessed through the National Land Cover Database (U.S. Geological Survey 2019). Vegetation in and surrounding Tyonek and Beluga is composed primarily of mixed and deciduous forest, sedge/herbaceous communities, and wetlands. Minor vegetation types in the area include dispersed patches of evergreen forest and shrub/scrub communities.

For more details on vegetation, visit the vegetation map developed by the USFS: https://www.arcgis.com/apps/MapSeries/index.html?appid=4e21c25d5eac421babaef3222004cccf

For additional information on fuels, visit the Fuel Models Guide to Alaska Vegetation by the AWFCG: https://www.frames.gov/documents/alaska/docs/awfcg_2018_FuelModelGuideAlaskaVegetation_withCitationV2.pdf

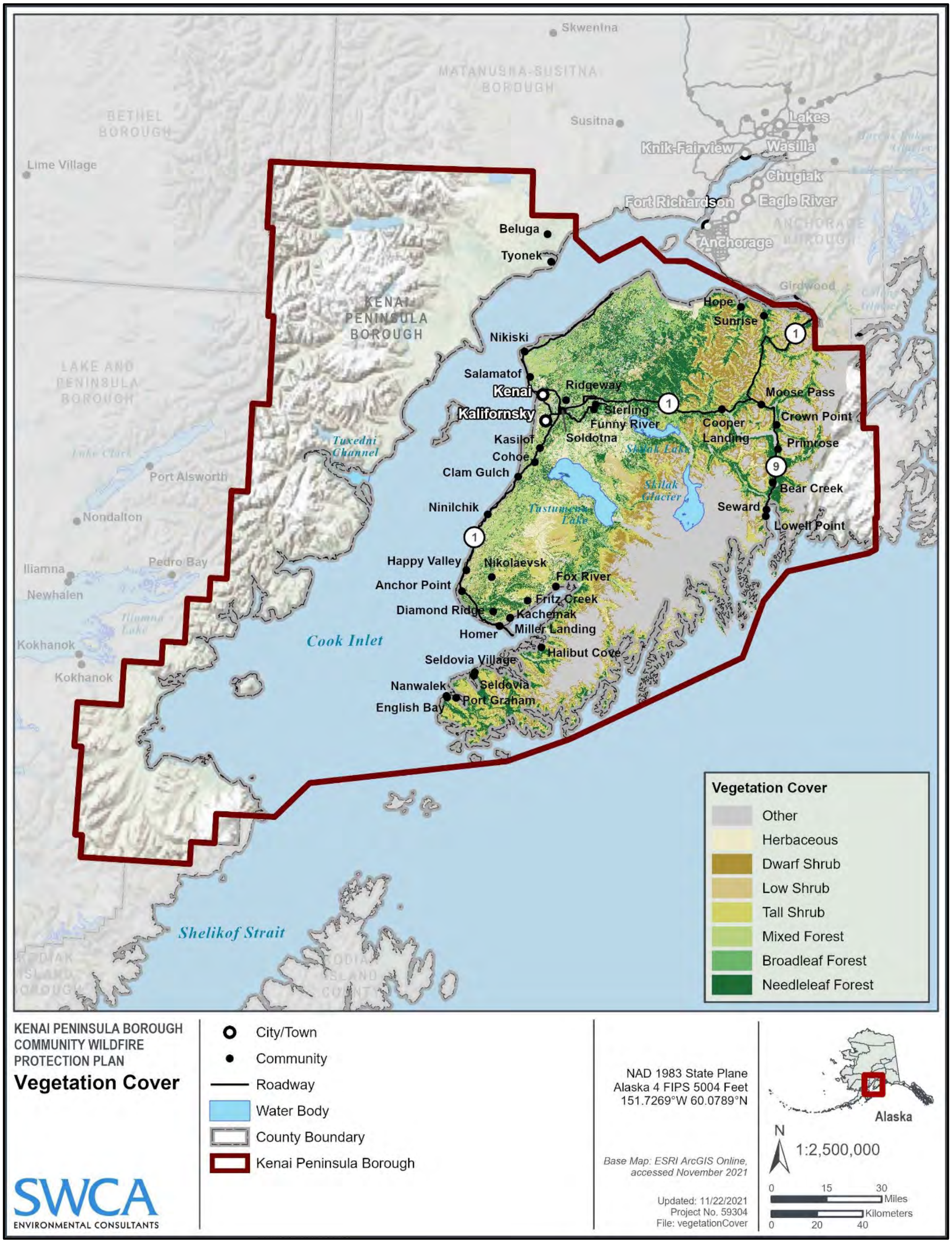


Figure 2.10. Existing vegetation cover within the KPB.

Table 2.1. Major Vegetation Types within the Borough

Existing Vegetation Type*	Acres	Percent
Other	1,956,370	36%
Needleleaf Forest	1,052,638	19%
Tall Shrub	580,651	11%
Mixed Forest	506,055	9%
Dwarf Shrub	483,065	9%
Herbaceous	469,115	8%
Low Shrub	247,041	5%
Broadleaf Forest	153,351	3%

*Based on data from the USFS story map (USFS 2020a)

Spruce Forests

Black spruce is the most common type of forest in the Kenai Peninsula. However, other species of spruce trees are also present, including white spruce, Sitka spruce, and the hybrid Lutz spruce. The multilayered structure—branches covering the trunk from top to bottom, with twigs angled downward—and chemical composition of black spruce make them highly flammable (NPS 2015a). Additionally, recurring infestations of SBB have altered the forest composition; downed trees open the canopy and allow for light, flammable fuels, e.g., Canada bluejoint reedgrass, to colonize the forest floor. Light and flammable fuels, such as grasses, combined with weakened or beetle-killed trees create the perfect conditions for intensified fire risk (KPB 2006a).

Black Spruce Forests

Black spruce is the most common forest type in Alaska, yet it covers only roughly 10% of the KPB. However, black spruce is found in many WUI settings and is intermingled around residential sites, thus creating a challenge with regard to protecting life and property during wildland fire events (Wahrenbrock 2022). When compared with other Alaskan vegetation types, black spruce forests have short to medium MFRIs. MFRIs since the 1700s in black spruce range from 40 to 200 years. How often black spruce stands burn is determined by the site’s stand composition, solar insulation, altitude, slope, drainage, presence and thickness of permafrost, and fire history. Fire return intervals of less than 30 years can result in black spruce recruitment failure. On the Kenai Peninsula, studies have demonstrated at least 35 years between fires in black spruce forests. Small fires are more common in black spruce stands, although large fires occasionally do occur. All fires are typically crown fires with associated surface and ground fire. Live black spruce trees are very flammable because the needles contain low moisture levels and are dense. Furthermore, a thick forest floor of detritus and resinous shrubs in the understory typically are associated with black spruce stands. Fine fuels on the black spruce forest floor react quickly to dry conditions and increase extreme fire behavior. Black spruce is partially dependent on stand-replacing fires because cones are opened by canopy fire, exposing the seeds (Fryer 2014).

Human-caused fires are more common recently in the WUI on the Kenai Peninsula. In the early 2000s, there was a shift toward larger, more frequent fires compared with the last half of the twentieth century. These increases have been attributed to increased temperature, resulting in drought stress in black spruce.

White/Lutz Spruce Forests

White spruce is widespread in Alaska, particularly in the interior regions. The distribution of white spruce stands is influenced by elevation, soil drainage, fire history, topography, presence of permafrost, and climate. Upland white spruce communities occur on warm, well-drained, south-facing slopes. White spruce typically displays less intense fire behavior than black spruce. Historically, MFRIs in white spruce communities range from 40 to over 250 years. Fire return intervals of 40 years or less can result in white spruce recruitment failure. Floodplain, stringer (thin strip of trees), and treeline white spruce may have longer MFRIs. Ground, surface, and crown fires can all occur in white spruce stands, but crown fires are less typical in white spruce than in black spruce. On Kenai lowlands, fires burning in black spruce often stop upon reaching white spruce forests. When white spruce does burn, canopy mortality is high. White spruce stands experience less frequent crown fire than black spruce due to an absence of ladder fuels and lower needle resin content. Most fires in white spruce are stand-replacing (Abrahamson 2014).

On the Kenai Peninsula, only two fires over 10,000 hectares have been recorded in white spruce as of 2014, one fire occurring in the late 1800s and the other in 2014. Lightning is a historical source of ignition in the Alaskan boreal forest and is still a common ignition source on the Kenai Peninsula. Temperature changes and extended dry periods may increase the size and severity of fires as a result of longer fire seasons, drought, and higher ignition rates.

Sitka Spruce Forests

On the Kenai Peninsula, Sitka spruce dominates valley bottoms and lower side slopes. Along the eastern coast of the Kenai Peninsula, Sitka spruce forests occur at all elevations. However, Sitka spruce stands are more abundant at low elevations and in areas with periodic disturbances such as water movement, wind, soil mass movement, and salt spray. Sitka spruce is often favored post-fire, as it is well adapted to large openings, and when mineral soil is exposed. Generalized studies of fire in costal Sitka spruce forests describe large, stand-replacing fires. However, these fires in Sitka spruce stands are rare on the Kenai Peninsula (Zouhar 2017).

Mixed-Wood Forests

White/black spruce with paper birch and/or aspen communities primarily occur in Alaska's interior and in south-central Alaska, with minimal occurrence in northwest and southwest Alaska. These communities can have open or closed stands and consist of paper birch and/or aspen with white/Lutz or black spruce or a combination of those species. Spruce trees are typically more prominent in older stands. Typical herbaceous plants in these communities include bluejoint reedgrass, horsetail, twinflower, and bunchberry dogwood. Lichen may occur in open stands. The primary carrier of fire is usually leaf litter, and the number of spruce trees in the stand increases the rate of spread (AWFCG 2018). Paper birch found in mixed-wood forest and boreal spruce types has an MFRI of 50 to 150 years (Uchytil 1991).

Hardwood Forests

Hardwood species common on the Kenai Peninsula include paper birch, cottonwood, quaking aspen, and Sitka alder. These species are less flammable than spruce species. Hardwood species do not burn with high intensity but, when they do burn, can be difficult to extinguish due to deep leaf litter and longer intervals between fires. Quaking aspen is a minor but widespread forest type in Alaska. Aspen generally occupy warm slopes lacking permafrost. Quaking aspen generally succeed to spruce forests in the absence of stand-replacing fire. Quaking aspen MFRIs range from 40 to over 200 years in Alaska. Fires are low severity and typically stay on the surface, but stand-replacing fires can occur infrequently. Climate warming may favor quaking aspen at the expense of spruce forests due to decreasing fire return intervals. Another common hardwood species, cottonwood, is confined to floodplains and is succeeded by white spruce in the absence of stand-replacing fire. Balsam poplar forests have infrequent, low-severity surface and infrequent stand-replacing fires (Fryer 2014).

Grasslands and Shrublands

Grasslands on the Kenai Peninsula, particularly where there have been disturbances, consist primarily of bluejoint reedgrass and perennial bunch grasses. Bluejoint reedgrass species occurs particularly where stands of white spruce were attacked by SBB. Additionally, repeated, severe fires may result in replacement by shrub or herb communities such as bluejoint reedgrass sedge meadows. This species shift raises concerns regarding increased fuel loads and altered fuel characteristics that increase the risk of severe fire. Bluejoint reedgrass is the primary carrier of wildland fire in south-central Alaska due to dangerous fire behavior. High winds can quickly spread a small grass fire over a large area, often spreading hundreds of acres before first responders can arrive. Alaska sub-boreal mesic subalpine alder shrublands can be intermixed with bluejoint reedgrass and other fireweed communities (Zouhar 2017).

FUTURE CHALLENGES FOR FIRE REGIMES

Impact of Spruce Bark Beetle

The SBB is a category of bark beetle. Bark beetles bore through a tree's bark to feed on its carbohydrate-rich phloem tissue and to nest in the galleries created by boring. Significant disruption in the trees vascular tissue (phloem), such as a large number of beetles feeding, starves the tree and typically results in tree mortality. SBB also carry a blue-stain fungus that blocks the water-transporting tissue (xylem), accelerating tree mortality (NPS 2021a).

As a natural component of Alaska's forest habitats, the native SBB has a history of initiating large spruce die-off occurrences in many areas of the state. The species primarily infests white, Sitka, and Lutz spruce, and rarely black spruce. In the 1990s, the Kenai Peninsula and Copper River Valley experienced a SBB outbreak that affected close to 2.3 million acres by 1996, killing nearly all large-diameter spruce trees. In 2016, another outbreak was recorded. A 2016 aerial detection study mapped 190,000 acres of SBB damage (NPS 2021a). Since the 2016 outbreak began, more than 1 million acres in south-central Alaska have been impacted, with 145,000 acres of SBB damage recorded in 2020 alone (USFS 2021d). Beetle-killed trees are a complex fuel type and pose an escalated risk for wildfire (Figure 2.11). The needles remain on the branches an entire season after the tree dies and make the tree relatively more flammable during this period. After needle loss, numerous species of lichen often use tree branches as a growth platform and can become abundant in volume. This lichen acts as a fine fuel that is dry during low air humidity conditions and is quite flammable. This material is easily ignited by fire embers, causing spot fires in advance of wildland fires (Wahrenbrock 2022).)As trees dry, branches and crowns are perfect fuel ladders for surface fires. Stem breakage in deceased trees usually starts around 5 years after mortality and, when combined with forest surface debris (needles, grasses, and organic layers), results in a particularly dangerous fuel complex (KPB 2009a).

In its Alaska Forest Health Conditions report, the USFS's aerial surveys detected about 115,000 acres of SBB activity, of which 108,00 acres were recent mortality (USFS 2021d); 96% of the damage mapped is within south-central Alaska. On the Kenai Peninsula, 18,330 acres of SBB activity were detected. Specifically, SBB activity increased substantially in the Cooper Landing area in 2020, with patches of damage observed along Sterling Highway and the Kenai River from around Quartz Creek campground to

Skilak Lake Road. SBB-caused mortality was also dispersed along the Russian River several miles upstream from its confluence with the Kenai River. Moreover, SBB activity continued to expand in the Kenai and Soldotna areas, with activity continuing in the Kenai National Wildlife Refuge and in the vicinity of the Kenai Spur Highway from Soldotna to Kenai. Equally extensive damage was noted in the Soldotna vicinity, particularly along the south side of the Kenai River and continuing to Kasilof. Additional areas with SBB activity include Tustumena Lake in Caribou Hills, Port Dick Creek, the Rocky River, Seldovia Lake, and the Perl and Elizabeth Islands (USFS 2021d).

SBB outbreaks tend to affect forest composition and soil properties. Forest canopy reductions via diseased or killed trees cause the canopy to open, which can allow for an entirely different community of plants to emerge. For example, Canada bluejoint reedgrass is a plant that thrives with the increased light penetration allowed by reduced or absent canopies. The grass grows thick and tall in areas of the Kenai Peninsula where there are many dead trees. The cover of dense grass decreases soil temperatures, altering the growing environment for understory plants. Some plants, such as shrubs, prosper in these new environments (ADFG 2021a). Shrubs and grasses are light and flashy fuels that colonize affected areas. For instance, one survey found that grass coverage in the understory had increased from approximately 5% to above 55% 5 years following SBB infestation. Mixed grass, shrubs, and beetle-killed trees provide abundant fuels for wildfires (KPB 2006a).

Temperature is one of the major controls on SBB population numbers. For example, during abnormally warm springs, SBB may become active sooner in the season. Contrarily, an extreme winter may kill SBB wintering above the snowline (NPS 2021a). As a result, SBB outbreaks are associated with warmer temperatures. Berg et al. (2006) determined that SBB outbreaks on the Kenai Peninsula are attributed to relatively long periods of elevated summer temperatures that enhance both rapid growth of SBB and extensive drought stress of host trees. With the warming trend persisting, SBB outbreaks will likely continue to increase in frequency and severity and expand their geographical and host ranges (Berg et al. 2006).

Figure 2.11. SBB-killed trees visible along the roadside.

Impact of Climate Change

In Alaska, global warming trends have been especially dramatic; the rate at which Alaska's temperature has been increasing is two times as fast as the global average since the middle of the twentieth century (U.S. Global Change Research Program [USGCRP] 2018). Average temperatures throughout the state for 2014, 2015, and 2016 were exceptionally warmer relative to previous decades, with 2016 being the warmest on record (Figure 2.12). In 2019, the record was set again when an average temperature of 58.1 degrees Fahrenheit (°F) was recorded for the month of July (NOAA 2019). The trend toward hotter temperatures is projected to increase; climate models indicate that by mid-century (2046–2065) the highest daily maximum temperature is expected to increase 4°F to 8°F relative to the average for 1981 through 2000 (USGCRP 2018). However, climate shifts are not evenly distributed throughout the state. Interior regions, along with the Arctic, are expected to warm faster than the southern and coastal regions of Alaska. Additionally, maximum 1-day precipitation is also projected to increase by 5% to 10% in southeastern Alaska and by more than 15% in the rest of Alaska, yet the longest dry and wet spells are not expected to change over much of the state. Therefore, long periods of dry weather are expected to persist (USGCRP 2018).

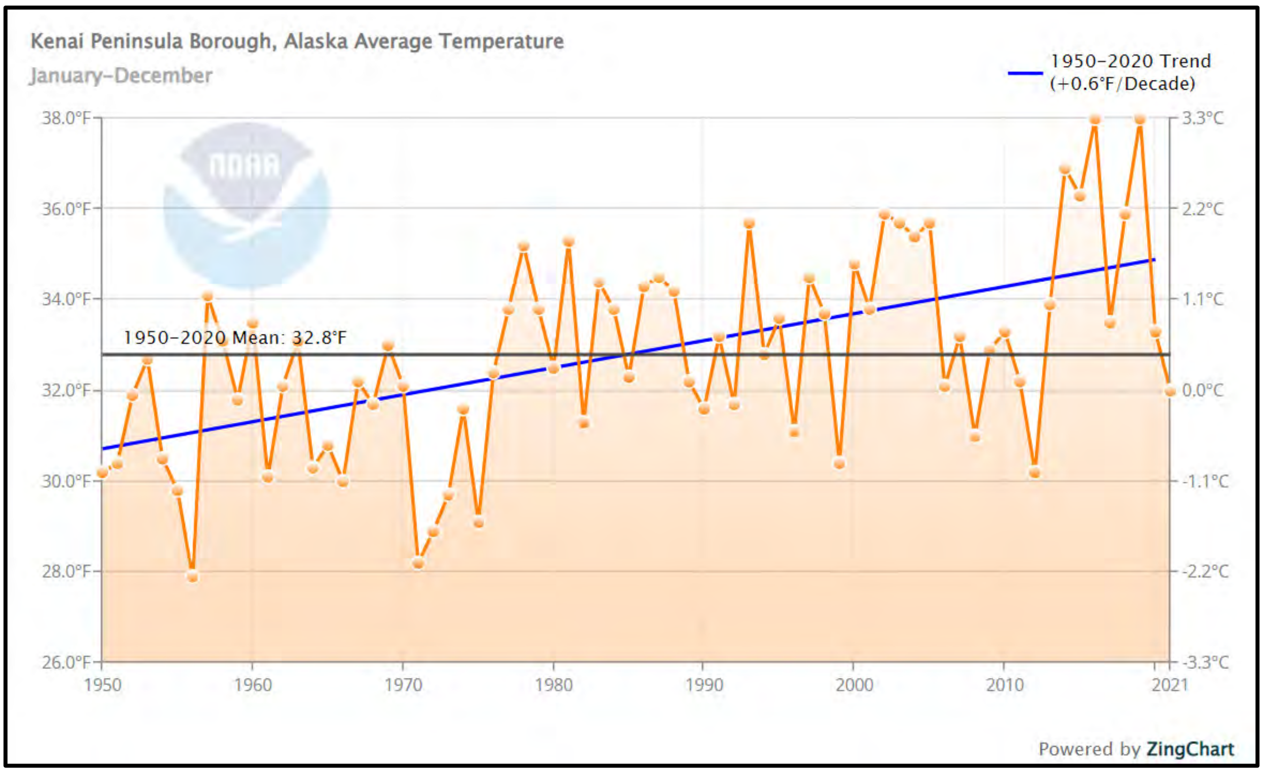


Figure 2.12. Average KPB temperature from 1950 through 2020.

Source: NOAA (2021c)

The shifting climate patterns have broad implications for wildfire occurrence and susceptibility. Hotter temperatures drive the early disappearance of snow, reduced fuel moisture content, higher surface heating, longer fire seasons, and shifts in forest composition. The longest fire season on record was recorded in 2016, which began with a wildfire in April and ended with a WUI fire in October (UAF 2018). In addition, the changing weather also creates conditions conducive to the occurrence of lightning strikes (KPB 2006a). In June 2015, a cascade of lightning in Alaska ignited 295 fires over a period of 7 days, which eventually consumed 5.1 million acres and 80 homes. State and federal fire expenditures in Alaska in 2015 alone were $188 million (UAF 2018).

Climate warming is impacting fire potential on the Kenai Peninsula and in Alaska overall. The annual area burned by wildfires varies significantly on an annual basis, but the frequency of big fire years (>2 million acres) has been increasing—since the year 2000, three of the top four fire years (in terms of acres burned) have occurred (USGCRP 2018). Models suggest that this trend will persist and amplify; predictions gauging the area burned for 2006 through 2100 are estimated at 120 million acres under a high scenario and 98 million acres under a low scenario (USGCRP 2018).

Although black spruce trees are fire adapted, dramatic changes in fire regimes undermine resilience and often result in recruitment failure (Baltzer et al. 2020). Consequently, forest composition in many regions of Alaska have changed, with a general shift toward shrubs and less acreage of older spruce forest. Additionally, 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).

A recent study, *Climate Change Vulnerability Assessment for the Chugach National Forest and the Kenai Peninsula*, by the USFS evaluates the impacts of future climate change on a set of ecosystems in the Kenai Peninsula and Chugach National Forest regions (USFS 2017). The study highlights the potential effects of climate change on the fire environment. With respect to assessing future vulnerability to wildfire the USFS found that 1) most of the area in the southwestern Kenai Peninsula could potentially change from forest to grassland as a result of environmental factors, including insects, insect disease, and a warming and drying climate (although field observations indicate that most of the SBB-impacted areas are currently transitioning to healthy stands of young spruce trees [Wahrenbrock 2022]) and 2) the distribution of land cover types dominated by black spruce is projected to remain similar to the current distribution. Therefore, vegetation types currently classified as high hazard will likely remain high over the next 50 years. Furthermore, the total value of structures (e.g., homes, businesses) on private land is expected to increase by 66% over the next 50 years. Population growth and expansion in conjunction with dispersed settlement patterns on the peninsula create a large WUI. As such, the wildfire vulnerability of the Kenai Peninsula is expected to increase (USFS 2017).

FIRE RESPONSE

Alaska fire management planning, preparedness, suppression operations, prescribed fire, and related activities are coordinated on an interagency basis with the full involvement of state, federal, and local government cooperators. The Alaska Interagency Wildland Fire Management Plan, 2021 (AIWFMP) details operational guidance under the Alaska Master Cooperative Wildland Fire Management and Stafford Act Response Agreement (Alaska Master Agreement) and the Alaska Statewide Operating Plan (AWFCG 2021). Its purpose is to "*promote a cooperative, consistent, cost-effective, interagency approach to wildland fire management; and it is the interagency reference for wildland fire operational information*" (AWFCG 2021:1).

The AIWFMP does not supersede any individual agency fire policies and requirements and, therefore, must be applied in conjunction with individual land and resource management plans and fire management plans when they exist (AWFCG 2021).

The collaborative nature of the interagency wildland fire organization allows fire response agencies to coordinate response for enhanced public safety and coordinate other fire management activities for the purpose of enhancing ecosystem health. It also enables fire response agencies to serve communities that do not have their own fire departments or have very limited fire response capabilities, such as Nanwalek, Port Graham, Seldovia, Tyonek, Beluga, Razdolna, Voznesenka, Kachemak-Selo, and others.

By Alaska statute, the DOF has fire protection responsibility for state, private, and municipal land; and the BLM, USFWS, and the USFS have legal responsibility for fires on federal land. In addition, the DOF works collaboratively with numerous local governments, as well as tribal and volunteer fire departments, throughout the Borough to provide wildfire protection.

Under the ANCSA, the federal government is directed to provide wildland fire suppression on land conveyed to Native regional and village corporations, as discussed in detail in the Tribal Response Resources section.

The KPB Office of Emergency Management (OEM) implements evacuation and communication plans for the Borough and, in partnership with DOF, oversees the development and maintenance of CWPPs.

FIRE MANAGEMENT OPTIONS

Wildfire response across the state is guided by the AIWFMP and fire management options. Firefighter and public safety is of the highest priority for all options. The various suppression strategies include critical protection, full protection, modified protection, and limited protection and provide a full range of suppression responses, from aggressive control to surveillance (Figure 2.13). The fire management options are described as follows (AWFCG 2021):

Critical Protection

Suppression action provided on a wildland fire that threatens human life, inhabited property, designated physical developments, and structural resources such as those designated as National Historic Landmarks. The suppression objective is to provide complete protection to identified sites and control the fire at the smallest acreage reasonably possible. The allocation of suppression resources to fires threatening critical sites is given the highest priority.

Full Protection

Suppression action provided on a wildland fire that threatens uninhabited private property, highly valued natural resource areas, and other highly valued areas such as identified cultural and historical sites. The suppression objective is to control the fire at the smallest acreage reasonably possible. The allocation of suppression resources to fires receiving the full protection option is second in priority only to fires threatening a critical protection area.

Modified Protection

Suppression action provided on a wildland fire in areas where values to be protected do not justify the expense of full protection. The suppression objective is to reduce overall suppression costs without compromising protection of more highly valued adjacent resources. The allocation of suppression resources to fires receiving the modified protection option is of a lower priority than those in critical and full protection areas. A higher level of protection may be given during the peak burning periods of the fire season than early or late in the fire season.

Limited Protection

Lowest level of suppression action provided on a wildland fire in areas where values to be protected do not justify the expense of a higher level of protection, and where opportunities can be provided for fire to help achieve land and resource protection objectives. The suppression objective is to minimize suppression costs without compromising protection of more highly valued adjacent resources.
The allocation of suppression resources to fires receiving the limited protection option is of the lowest priority. Surveillance is an acceptable suppression response as long as more highly valued adjacent resources are not threatened.

Figure 2.13. Alaska fire management options.

Costs associated with wildfires are contingent on response zones. More resources are used on wildfires in the full and critical zones due to the elevated risk to human health and property. However, there are patches within the limited and modified zones that necessitate a suppression response. For instance, Alaskan Native allotments are usually located in areas that are difficult to access. Still, fire protection is legally mandated in these areas. Although most wildfires in isolated Alaskan wilderness are permitted to burn under supervision, any wildfire threatening an Alaskan Native land allotment must be suppressed with state or federal firefighting resources (UAF 2018). Fire response resources are depicted in Figure 2.14.

MUTUAL AID AND AGREEMENTS

The wildland fire community is well known for its development of mutual aid agreements at the federal, state, and local levels. Aid agreements allow for closest forces to respond to an incident as quickly as possible regardless of jurisdiction. Such agreements may also describe how reimbursement will be conducted; state resources responding to wildfires on federal land may have their associated costs reimbursed by the responsible federal agency, and the reverse is true for federal resources suppressing a wildfire on state land. There are three main types of aid agreements within the planning area (FEMA 2017):

1. **Local Mutual Aid:** Local mutual aid agreements between neighboring jurisdictions or organizations involve a formal request for assistance and generally cover a larger geographic area than local automatic mutual aid agreements do. Under these agreements, local resources may be used to assist federal departments and agencies in fulfilling their missions under special circumstances, and vice versa. Incorporating private sector, nongovernmental organizations, and community- and faith-based organizations into the mutual aid network provides parties with access to significant additional resources.
2. **Local Automatic Aid:** Local automatic mutual aid agreements permit the automatic dispatch and response of requested resources without incident-specific approvals or consideration of entity boundaries. These agreements are usually basic contracts between or among neighboring local entities (local entities may include nearby governments (including federal government installations), private sector facilities, nongovernmental organizations, and faith-based organizations) and are used under conditions when time is of the essence to save lives, prevent human suffering, or mitigate property damage following an incident.
3. **Regional, Intrastate, or Statewide Mutual Aid:** Sub-state regional mutual aid agreements are between multiple jurisdictions and are often sponsored by a council of governments or a similar regional body. Statewide/intrastate mutual aid agreements are often coordinated through the state and incorporate both state and local governmental and nongovernmental assets in an attempt to increase preparedness statewide. This approach can help reduce the number of local and jurisdiction-to-jurisdiction mutual aid agreements. In some instances, state law requires participation in an intrastate mutual aid system.

The ADNR operates under the Master Cooperative Wildland Fire Management and Stafford Act Agreement (the agreement), which documents the coordination and exchange of personnel, equipment, supplies, services, and funds between land management agencies. The agreement details wildland fire management activities such as prevention, preparedness, communication and education, fuels treatment and hazard mitigation, fire planning, response strategies, tactics and alternatives, suppression and post-fire rehabilitation and restoration. Agencies participating in the agreement include the BLM (Region 11 [Alaska]), NPS (Region 11), Bureau of Indian Affairs (Alaska Region), USFWS (Region 11), USDA (Region 10 [Alaska]), and the ADNR. This agreement does not supersede individual agency policies and requirements.

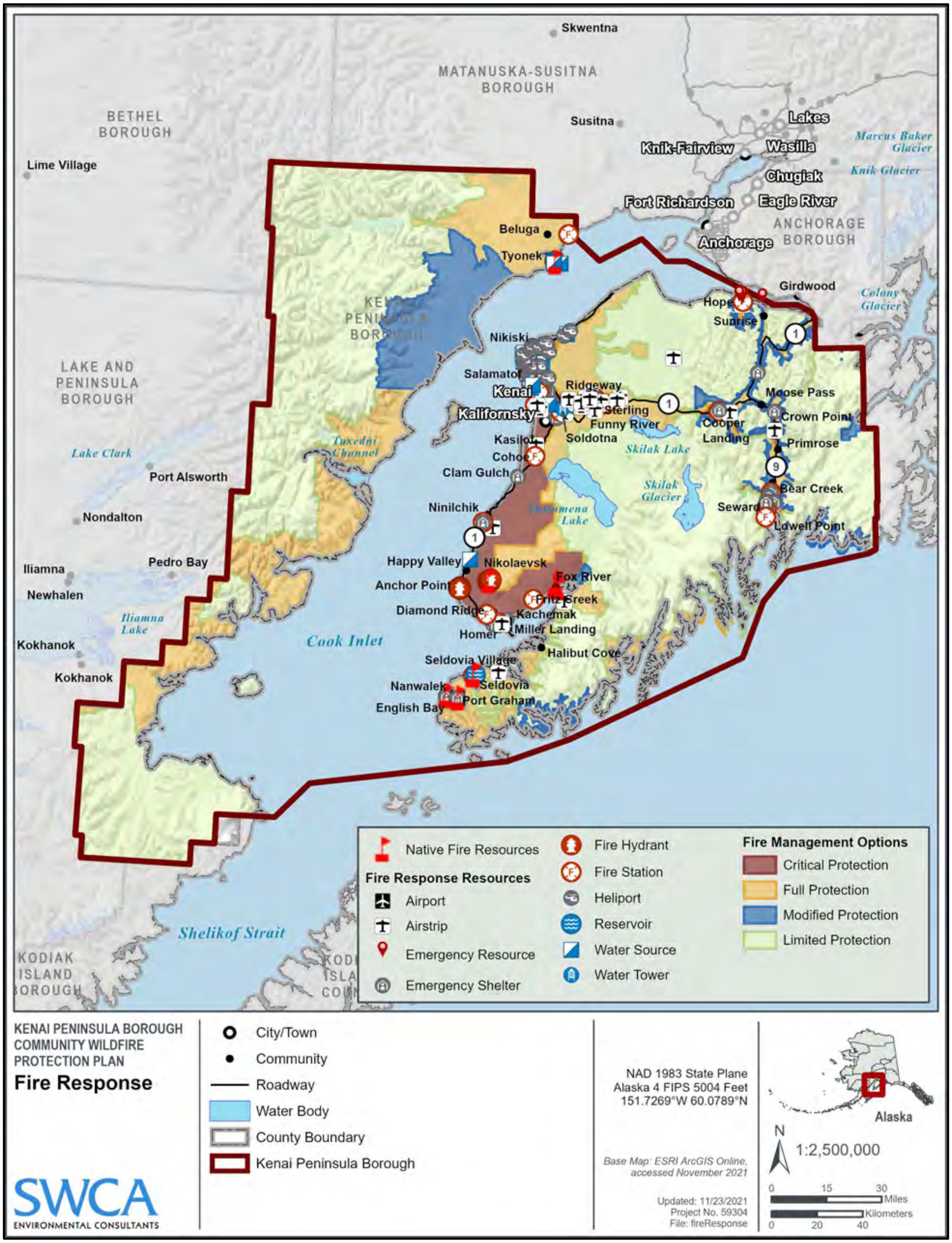


Figure 2.14. Fire management options and response resources.

LOCAL RESPONSE RESOURCES

Local Fire Departments

There are 15 fire departments, nine career and six volunteer-based, within the Borough serving a population of 58,799 people. Departments include KPB departments, volunteer departments, and regional departments, like the Central Emergency Services, which includes six stations and serves several communities. In addition to responding to calls for fire suppression, local fire departments respond to medical emergencies, incidents involving hazardous materials, rescue calls, and motor vehicle or other accidents. Due to the remote nature of some communities and varied road conditions, fire response on the peninsula can sometimes be more complicated than in other regions (Figures 2.15 and 2.16).

Figure 2.15. Narrow unsurfaced road that may make fire response difficult.

Figure 2.16. Very remote communities may be accessible only by ATV or UTV, requiring the fire departments to have suitable apparatus and equipment in order to serve these areas.

Volunteer and career firefighters at the community level have similar capabilities throughout the entire year, while state and federal responders are affected by fire season. In spite of the continuous level of capabilities, ebbs and flows occur within the volunteer service. Recruiting and retaining volunteers is challenging due to people's lifestyles and the training requirements one must follow to be a volunteer firefighter. Although several volunteer firefighters are present in the Borough, not all are available to respond to every fire.

The KPB's public information call center is managed by the Public Information Officer and overseen by the Incident Commander and/or the Emergency Management Director. For incidents that require coordination between two or more local jurisdictions, the KPB OEM is responsible for managing and coordinating those activities. The purpose of the call center is to ensure that adequate KPB emergency services, mainly its 911 center, remain in normal operations and are not hindered due to incident-specific traffic.

Incident Command Center

The KPB's public information call center is managed by the Public Information Officer and overseen by the Incident Commander and/or the Emergency Management Director. For incidents that require coordination between two or more local jurisdictions the KPB OEM is responsible for managing and coordinating those activities. The purpose of the call center is to ensure that adequate KPB emergency services, mainly its 911 center, remain in normal operations and are not hindered due to incident specific traffic. Public information and emergency notifications such as fire evacuation notices, tsunami warnings, volcano eruptions, and flood warnings are usually issued through the KPB Public Information Officer; if multiple agencies are involved in response activities, public information will be communicated through a Joint Information System/Center (JIS/C). The JIS/C is a coordinated effort between multiple emergency response agencies (KPB 2020). Local firefighting capabilities, resources, and apparatus are described in detail in Appendix D.

STATE RESPONSE RESOURCES

Alaska Division of Forestry

The DOF's Fire and Aviation Program aims to provide safe, cost-effective, and efficient fire protection services and management on state, private, and municipal land, and land negotiated through agreement. By Alaska statute, the DOF, with support from local fire departments, is responsible for fire response and protection on state, private, and municipal land. In addition, the DOF provides fire protection services to Native Alaskan land through mutual aid agreements (AWFCG 2021). Under the "closest forces" principle, applying cooperative agreements, agencies are permitted to respond to fire events within their protection areas regardless of land ownership. This approach reduces response time and duplicated efforts, thereby increasing safety, effectiveness, and cost efficacy (KPB 2006a). The DOF is not bound by federal fire management policies on land under state jurisdiction (AWFCG 2021).

For most of the KPB, dispatch, coordination, and logistical support is provided via the Kenai-Kodiak Area Office in Soldotna (AICC 2021), which operates under the AICC. The Chugach National Forest Office serves the northeastern portion of the KPB, which also operates under the AICC. The AICC functions as the focal point for initial attack resource coordination and logistics support for all state and federal agencies involved in wildland fire management and suppression in Alaska. The AICC is a collaborative effort between various agencies, including the DOF, BLM, USFS, NPS, Bureau of Indian Affairs, and USFWS (AICC 2021).

Fire response resources within the Kenai-Kodiak Area Office include 12 seasonal fire technicians and one contract helicopter (from the third week of April through the first week of August).

Success in fire-suppression efforts is influenced by an effective initial response. In turn, the effectiveness of an initial response is determined by the level of training and experience of the labor force as well as the availability of firefighting equipment. The DOF attempts to train extra staff to respond during emergencies. Emergency firefighters are hired as needed to supplement the workforce in all aspects of firefighting duties. The DOF also aims to train sufficient emergency firefighters to keep a 16-person hand crew that is ready to immediately respond to wildland fires. Extra emergency firefighters are hired to serve as helitack or engine crewmen, aviation assistants, or warehouse employees during a wildland fire event (KPB 2006a).

The DOF usually contracts two air tankers in preparedness for the fire season. Air tanker support bases are typically located at the Palmer Airport and the Kenai Airport. The BLM in Fairbanks also contracts aircraft for dispatch to the KPB contingent on the statewide fire activity level. Additionally, on-call water-scooping air tankers may be operated out of the lakes on the KPB and the Cook Inlet. Other aerial firefighting resources include aircraft rental companies on the KPB, which may have available helicopters for helitack operations and water drops. Statewide tactical resources may be strategically positioned at the Kenai Airport base during periods of high fire danger (KPB 2006a).

Firefighting resources for the DOF include (DOF 2021a):

- Wildland Fire and Resource Technicians
- Division of Forestry Agency Fire Crews
- Pioneer Peak Interagency Hotshot Crew
- Gannett Glacier Type 2 Initial Attack Crew
- White Mountain Type 2 Initial Attack Crew
- Type 2 EFF Crews

- Support Positions
- Alaska Incident Management Teams
- Interagency Resources

Fire Department Statistics: Department of Forestry, Kenai Kodiak Area

Communities Served: Soldotna, Sterling, Cooper Landing, Bear Creek, Seward, Lowell Point, Nikiski, Kenai, Kasilof, Cohoe, Clam Gulch, Ninilchik, Happy Valley, Nikolaevsk, Anchor Point, Diamond Ridge, Homer, Kachemak, Kachemak-Selo, Fritz Creek, Fox Creek, Halibut Cove, Seldovia, Seldovia Village, Nanwalek, Port Graham.

Fulltime Firefighters: 12 On-call Firefighters: 10+ Dispatch Centers: 3

Hand Crews:

- One 5-person initial attack mInitial Attack odule
- One Type 1 hotshot crew (lHotshot Crew (ocated in Palmer)
- Two Type 2 initial attack crewsInitial Attack Crews (one in Palmer one in Fairbanks)

Wildland Engines:

- Five (Type 6, 4x4)

Other resources:

- One Type 2 initial attack hInitial Attack elicopter
- One fire c1, Fire ache
- One Type 3 cache vanCache Van
- One air tanker base1, Air Tanker Base (Kenai Airport)
- Two air tankers (one2, Air Tankers (1 in Palmer and one in Fairbanks)

TRIBAL RESPONSE RESOURCES

Under the ANCSA, the federal government is directed to provide wildland fire suppression on land conveyed to Native regional and village corporations. ANCSA [43 United States Code 1620(e)] provides for forest fire protection services from the United States at no cost to Native individuals or to Native groups, villages, and regional corporations organized under ANCSA, as long as there are no substantial revenues from such land (USFWS 2013).

Jurisdictional agencies have land management responsibility for a specified geographical area as designated by federal, state, or local law. Jurisdictional agencies are required to create and implement agency planning documents detailing wildland fire and fuels management programs at the unit level. In 1971, the ANCSA transferred 45 million acres to Native corporations. However, some lands are pending conveyance; jurisdiction for the pending lands remains with the federal government. Surface and subsurface jurisdiction for a parcel of land may differ. Generally, the surface jurisdiction is responsible for fire planning and management (AWFCG 2021).

Chugachmiut -Yukon Fire Crew

Chugachmiut is a non-profit Native tribal consortium serving the seven tribes of the Chugach region of Alaska. Chugachmiut has compacted the federal trust management responsibilities for Native allotments and Trust townsite lots in and around the communities of Nanwalek and Port Graham, Alaska. Chugachmiut has been involved in developing fire fuel breaks around Sterling, Soldotna, Kenai, Nikiski, Cooper Landing, and the Moose Pass area on Native corporation, USFS, USFWS, and various state and private lands, especially areas near or adjacent to Native land.

Chugachmiut started the Yukon Fire Crew, originally based out of McGrath, Alaska, in 2005. In 2009, the crew moved to Soldotna, Alaska, and have been fighting fire on the Kenai Peninsulaeverever since since.

The Yukon Fire Crew is typically assembled between late May and October each fire season and is the only standing wildland fire crew located on the KPB. When not fighting fires, the crew spends time conducting hazard fuel mitigation projects, including the Funny River Fuel Break, the Sterling Fuel Break, hazard tree mitigation at the Russian River Campground, Firewise treatments on elders' homes, and Firewise treatment on KPB schools.

Fire Department Statistics: Yukon Fire Crew		
Communities Served: Any based in Kenai/Soldotna		
Fulltime Firefighters: 1	On-call Firefighters: 25	Dispatch Centers: 0
Hand Crews: One 20-person T2IA hand crew with a 5-person fuels squad -		
Wildland Engines: -		
Other resources: 5 pickup trucks, 1 brush chipper, 1 mini-log skidder -		

FEDERAL RESPONSE RESOURCES

U.S. Department of Agriculture: U.S. Forest Service

The USFS is responsible for fire response on all National Forest land and grasslands. Overall, the USFS provides wildfire response and management for over 193 million acres of National Forest System land (CRS 2021).

Chugach National Forest

The USFS furnishes wildfire protection services for land and inholdings within the Chugach National Forest boundary. This may involve cooperative agreements with local volunteer fire departments for mutual aid support as well as local incident requests. The Chugach National Forest facilitates the coordination and exchange of personnel, equipment, supplies, and services in sustaining wildland fire management activities such as prevention, preparedness, communication and education, fuels treatment and hazard mitigation, fire planning, response strategies, tactics and alternatives, suppression, and post-fire rehabilitation and restoration.

Fire response within the Chugach National Forest is dispatched by the Chugach National Forest Office. The USFS maintains mutual aid agreements with the BLM and DOF (AWFCG 2021).

Fire Department Statistics: Chugach National Forest		
Communities Served: **Chenega Bay, Cooper Landing, Cordova, Girdwood, Hope, Moose Pass, Seward, Tatitlek, Valdez, and Whittier.**		
Fulltime Firefighters: 17	On-call Firefighters: 40+	Chugach Wildfire Dispatch Centers: 7
Hand Crews: - One 10-person suppression module - One on-call, 20-person Type 2 initial attack		
Wildland Engines: - Two Type 6 (4×4)		
Other resources: - One fire boat/skiff - Two port-a-tanks - Eight portable pumps - One Type 3 fire cache		

U.S. Department of the Interior: U.S. Fish and Wildlife Service and National Park Service

In 1974, the state of Alaska was required to assume wildland fire responsibilities according to the Statehood Act of 1959. At that time, state forestry operations encompassed a small group of personnel in the ADNR, Division of Lands. Through an agreement with the federal government, Alaska assumed responsibility for south-central Alaska first and then expanded to cover all state land in the next 5 to 6 years. Following this shift in wildland fire responsibility, the Alaska State Legislature created the Division of Forest, Land and Water Management in 1978 and the Division of Forestry as a distinct management agency in 1981. The creation of these agencies coincided with the statewide agreement through which the BLM held responsibility for fire management north of the Yukon River and the state held responsibility for the southern portion of the state. In addition, the USFS held responsibility for fire management in national forest land. Through the agreement, the participating agencies opted to create fire management zones (full, critical, and limited protection) instead of suppressing all fires (Wahrenbrock 2022)

The BLM Alaska Fire Service is assigned the lead role as the Wildland Fire Protecting Agency for the USDI agencies in Alaska (USFWS 2013). The State of Alaska established a wildland fire suppression organization in the DOF and began to gradually assume suppression responsibilities in southwest Alaska, including the KPB, starting in the 1970s. The Master Agreement, with its exhibits, defines the roles and responsibilities of the jurisdictional and protection agencies, as well as operating procedures (USFWS 2013).

Kenai National Wildlife Refuge

The Kenai National Wildlife Refuge Fire Management Plan (USFWS 2013) guides all fire management operations on and for the refuge. The refuge is in the process of transitioning fire planning to a spatial format under the Wildland Fire Decision Support System. The fire management plan addresses a full range of potential wildfires and considers a full spectrum of tactical options (from monitoring to intensive management actions) for wildfires in order to meet Fire Management Unit objectives (USFWS 2013).

The DOF is the designated fire protection agency for the Kenai National Wildlife Refuge per the Master Agreement (AWFCG 2021). However, the refuge is responsible for collaboration with fire response and prevention activities. The Refuge Fire Management Officer is required to be available by phone or radio to respond to the DOF and other cooperating emergency management agencies at all times during fire season. In addition, qualified refuge staff commonly take part in prevention patrols during periods of high fire danger and will contribute to initial and extended attack suppression efforts on refuge fires (USFWS 2013).

Fire response in the refuge is dispatched and coordinated by the Kenai-Kodiak Area Office (USFWS 2013).

Fire Department Statistics: Kenai National Wildlife Refuge					
Communities Served: Borough-wide as requested by DOF					
Fulltime Firefighters:	4	On-call Firefighters:	20+	Dispatch Centers:	0 (Dispatched by Kenai-Kodiak Area DOF office
Hand Crews: - 0 Wildland Engines: - One Type 6 4×44x4 Other resources: - Tracked Bombardier ATV slip on pump unit - D5 dozer - Fecon FTX400 masticator - Bobcat T770 mastication head - Six portable pumps - Eight Port-A-Tanks					

Kenai Fjords National Park

The DOF is responsible for fire protection in the Kenai Fjords National Park (KFNP) (AWFCG 2021), while the NPS manages the land (NPS 1984). Dispatch, coordination, and logistical support is provided via the Kenai-Kodiak Area Office (AICC 2021).

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).

Lake Clark National Park and Preserve

The DOF is responsible for fire response in the Lake Clark National Park and Preserve (AWFCG 2021). However, the NPS is responsible for other fire management activities. NPS fire professionals and staff reduce the risk around park structures by clearing flammable vegetation. NPS personnel also monitor 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, and local, state, federal, and Native organizations to keep people and ecosystems healthy (NPS 2020b).

There is no current fire management plan for the Lake Clark National Park and Preserve. Fire response in the Lake Clark National Park is dispatched and coordinated by the Southwest District Office, which operates under the AICC (AICC 2021).

EVACUATION RESOURCES

The KPB OEM implements evacuation and communication plans for the KPB. The latest evacuation guide can be found here: https://www.kpb.us/images/KPB/OEM/EOP/Annex1.pdf

As part of emergency management protocols, the KPB has adopted the Ready, Set, Go! protocols for community evacuation: http://kpboem.blogspot.com/2019/08/82619-cooper-landing-and-sterling.html

The Kenai wildfire disaster preparedness webpage is here: https://www.kpb.us/emergency-mgmt/disaster/fire.

To increase public safety and awareness, tsunami evacuation signs are posted on evacuation routes throughout the peninsula (Figure 2.17). The OEM utilizes the Community Alert Network to telephone residents within a specified zone to convey evacuation procedures. The Community Alert Network can also dial emergency responders and assign tasks based on the results of an automated query. The OEM has pinpointed potential emergency shelters. However, emergency evacuation routes have not been designated due to the distinct nature of each wildfire event (Ecology and Environment 2006).

Figure 2.17. Tsunami evacuation signage in Lowell Point.

Livestock and Pets

Some homes on the KPB have horses and other large animals and livestock, and pets are common in homes throughout the planning area. In the event of a wildfire, it is important that residents and fire responders have a plan for evacuation of pets and livestock. Evacuation planning often neglects to describe how animals will be evacuated and where they will be taken. The loading of horses, for example, during a fire and smoke situation, and transport of stock vehicles down narrow roads under stressful situations, can be very difficult.

The Borough recommends developing an emergency plan for animals, including a safe place to bring animals during an emergency, an emergency to-go kit with supplies such as food, water, medication, first aid kid, familiar items, and photographs in case residents and pets become separated (KPB 2021).

Kenai Pet Preparedness information is here: https://www.kpb.us/emergency-mgmt/disaster/pets

The Kenai Pet Plan checklist can be viewed here: https://www.kpb.us/images/KPB/OEM/Pet_Plan.pdf

There is a need to pre-identify where animals can be taken, such as using fairgrounds as a large animal shelter. Similarly, locations where small animals such as dogs and cats picked up in the fire area should also be pre-identified, as well as the lead agencies, such as humane societies, coordinating this work.

WATER AVAILABILITY AND SUPPLY

Water supply is variable around the Borough and may be provided by hydrants, wells, lakes, sprinklers, and pumps. Many rural and unincorporated communities lack water for fire suppression. Upgrades are currently being implemented in some communities, including installation of additional water lines and hydrants. Additional water storage is still needed in many areas.

In some cases, ponds and rivers are suitable alternatives for sources of water supply for suppression.

Limited water supply can impact Insurance Services Office (ISO) ratings for fire departments, so improvements to water infrastructure have been identified as a priority for this CWPP update. The hydrant location dataset for the KPB is incomplete, and therefore, mapping is necessary in this CWPP update.

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. Detailed information on these programs is provided in Appendix A.

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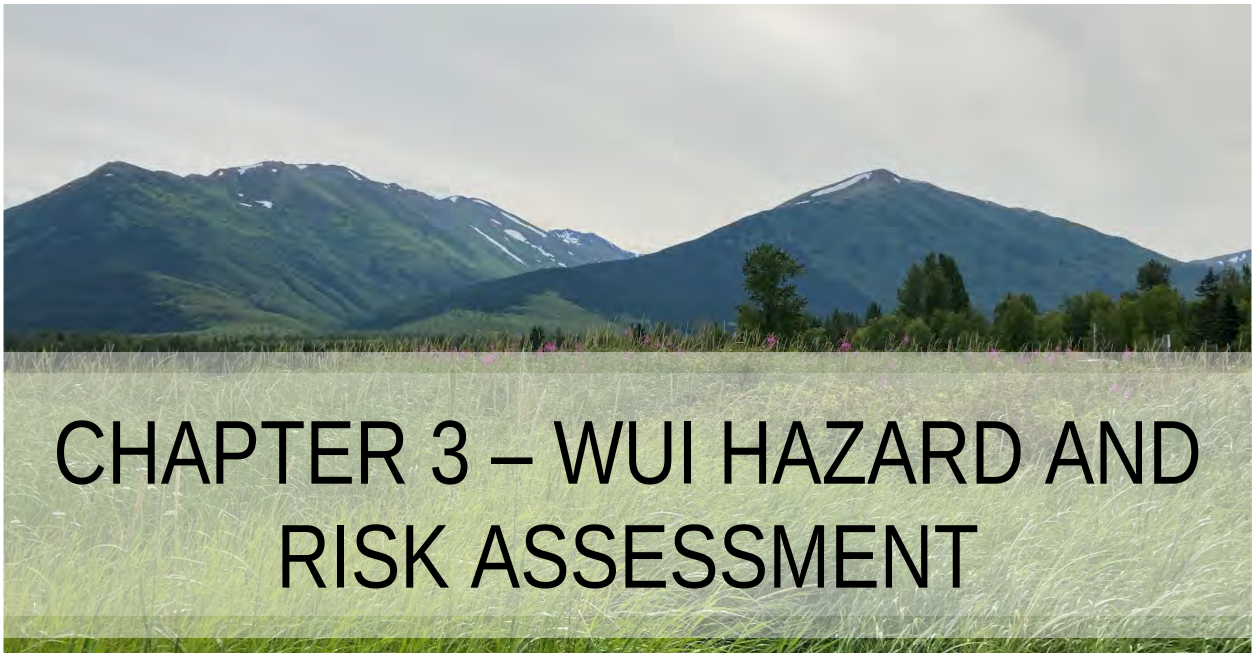


CHAPTER 3 – WUI HAZARD AND RISK ASSESSMENT

PURPOSE

The WUI hazard and risk assessment for the CWPP is based on the Chugach All-Lands Wildfire Risk Assessment (known as ARRA), developed between 2019 and 2021 by Pyrologix, under contract to the USFS.[1] The purpose of the ARRA is to provide foundational information about wildfire hazard and risk to highly valued resources and assets (HVRAs) for the Chugach National Forest and surrounding areas in south-central Alaska (Pyrologix 2021). The ARRA provides a quantitative analysis of the assets and resources across the landscape and how they are potentially impacted by fire. The analysis is described in detail in the final ARRA report, but in summary it considers (Pyrologix 2021):

- Likelihood of fire burning
- Intensity of a fire
- Exposure of assets and resources based on their locations
- Susceptibility of those assets and resources to wildfire

The assessment defines assets as "human-made features, such as commercial structures, critical facilities, housing etc., that have specific importance or value", while resources are defined as "natural features such as wildlife habitat, vegetation type, or water, that also have specific value or importance" (Pyrologix 2021).

The ARRA is based on a risk modeling framework that is a function of two main factors: 1) wildfire hazard and 2) HVRA vulnerability (Figure 3.1).

[1] ARRA is an acronym for the original title of the project – Alaska Region Risk Assessment (Pyrologix 2021).

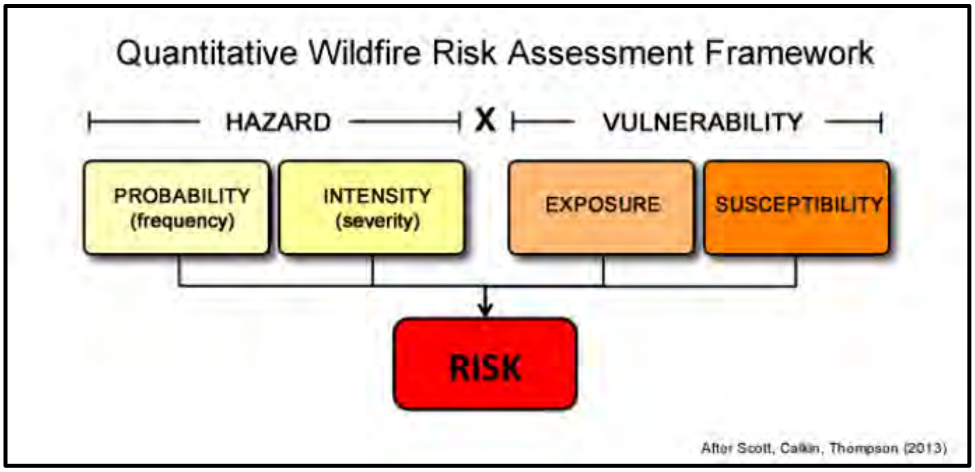


Figure 3.1. The components of the QWRA framework used for the ARRA.
Source: Pyrologix (2021)

Wildfire hazard under the QWRA framework is measured by burn probability (likelihood of burning) and fire intensity (flame length, fireline intensity, etc.) (Thompson et al. 2013). Vulnerability to identified HVRAs is composed of exposure and susceptibility. Exposure is the placement of an HVRA in a hazardous environment (e.g., a home in a flammable landscape), and susceptibility is how easily an HVRA is damaged by wildfire (e.g., some homes or structures might be hardened to mitigate wildfire damage).

The ARRA assessment is a tool that allows land use managers, fire officials, planners, and others to identify high-risk/hazard areas on the landscape and prepare strategies and methods for reducing the threat of wildfire, as well as work with community members to educate them about methods for reducing the negative consequences of fire.

The QWRA framework and the ARRA process is described in detail in the ARRA report (located in Appendix B). The following provides a synopsis of some of the main features of the report that are pertinent to the CWPP.

RISK ASSESSMENT COMPONENTS

The ARRA uses the FSim large-fire simulator to quantify the likelihood of a large fire (a fire that would grow to over 100 acres) occurring across the Analysis Area based on current fuelscape and historical weather conditions (Finney et al. 2011; Pyrologix 2021).

FUELSCAPE

The fuelscape represents the vegetative fuels and topography across the analysis area. Several geospatial datasets comprise the fuelscape, including fuel models, canopy characteristics of trees and other vegetation, and topographical characteristics. A significant degree of data compilation occurs during development of the fuelscape, as well as calibration to address disturbances from recent wildfires, mortality resulting from insect and disease, wind damage, and mechanical or prescribed fire treatments. The fuelscape development also integrated findings from the Kenai Peninsula Vegetation Mapping project, which provided information on tree cover and vegetation height.

WILDFIRE OCCURRENCE

Wildfire occurrence across the analysis area was based on data gathered from the Fire Occurrence Database for a period from 1992 through 2017. The analysis focuses only on historic fires that grew to over 100 acres. These data are used in FSim to generate the most accurate estimate of wildfire likelihood.

HISTORICAL WEATHER

FSim incorporates weather inputs for wind speed, fuel moistures, and Energy Release Component collected from Remote Automated Weather Stations (RAWS) located throughout the analysis area.

WILDFIRE SIMULATION

Figure 3.2 shows the components that go into the wildfire simulation and outputs of those simulations in FSim.

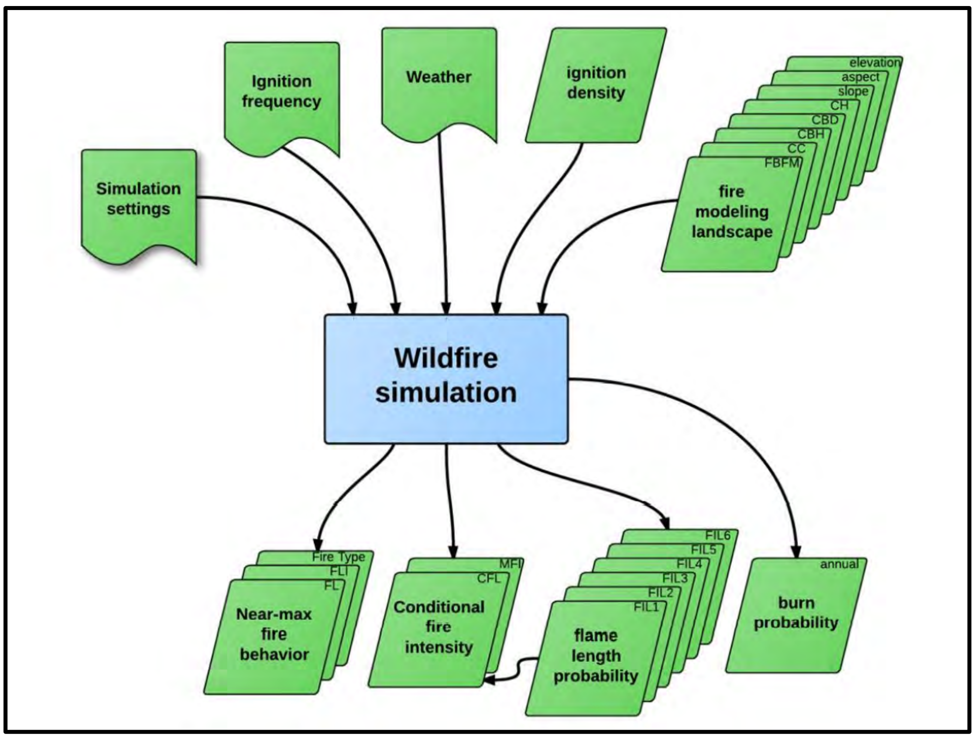


Figure 3.2. The primary elements used to derive burn probability in FSim.
Source: Pyrologix (2021)

HVRA CHARACTERIZATION

HVRAs are the resources and assets on the landscape most likely to warrant protection if found to be at risk of wildfire (Pyrologix 2021). The identification and compilation of HVRAs was a collaborative effort by stakeholders in the region. In order to be included in the ARRA, an HVRA must be of greatest importance to the region, the spatial data must be readily available, and the spatial extent of the identified HVRA must be complete (Pyrologix 2021). Eleven HVRAs were selected for the ARRA under the major categories of people and property, infrastructure, carbon, and watershed (Table 3.1). Each HVRA selected is also assigned a response function, meaning how that HVRA responds to wildfire, whether positive or negative.

Table 3.1. HVRA and sub-HVRA identified for the ARRA

HVRA & Sub-HVRA	Data Source
People and Property	
People and Property	Represents housing unity density data produced by Pyrologix using the building footprints and U.S. Census - Census Block population data. Data depicting building locations was provided by Chugach NF and adjusted by Pyrologix.
Native Allotments	The data was provided by the Bureau of Land Management, Alaska State Office, representing areas designated as 'Conveyed Native Allotments' within Alaska.
Infrastructure	
Electric transmission lines – high & low voltage	The provided linear features represent electric power transmission lines. Data was provided by Chugach NF and supplemented with data from the Homeland Infrastructure Foundation-Level Data (HIFLD) program.
Communication Sites	Data represents the location of communication sites. Data was provided by Chugach NF and supplemented with data from the Homeland Infrastructure Foundation-Level Data (HIFLD) program.
Power: Power Plants & Substations	The provided data represents the locations of power plants and substations. Data was provided by Chugach NF and supplemented with data from the Homeland Infrastructure Foundation-Level Data (HIFLD) program.
Oil & Gas Wells	The data contains the location of surface wells & structures. Well locations were limited to those designated as active wells; structures were limited to items designated as oil/gas buildings. Data was provided by Chugach NF.
Pipelines	The data depicts pipeline locations in Alaska as digitized from USGS maps. Ancillary source documentation was provided by the AK DNR and used as necessary for updates.
Fish Hatcheries	These sport subsistence sites represent the known locations of sport and commercial fish rearing facilities (commercial salmon fishery) located in Southcentral AK. Data was provided by Chugach NF.
Recreation & Administrative Sites	The data contains the locations of administrative buildings, offices, recreation sites, and service/utility structures on lands owned by Alaska State Parks, USDA (Forest Service) lands, and the National Park Service. Data was provided by Chugach NF.
Carbon	
Carbon Credits	Mapped areas represent forested land used in carbon trading markets and identify areas of biomass (forest) marketable as carbon credits. Data provided by Chugach NF.
Watershed	
Critical Watersheds	Surface drinking water protection areas (Zone C, G boundaries) were delineated from local topography and anticipated effects on the drinking water source intake. Data provided by Chugach NF and Alaska DEC Open Data.

Source: Pyrologix (2021)

During the stakeholder workshops, each HVRA was also assigned a relative importance or rank (Figure 3.3). Each HVRA and sub-HVRA, and its response function and relative importance, is described in detail in Section 3.4 of the ARRA report. That section describes the impacts that might occur to each HVRA as a result of varying levels of fire intensity (based on modeled flame length). Some HVRAs are expected to experience increasing potential loss with increasing fire intensities; for example, recreation and administrative sites are vulnerable to higher flame lengths, and therefore, the negative response function increases with flame length. Other HVRAs that are more hardened to wildfire with established defensible space (for example, oil well pads) have a very low response to fire and low potential loss. Forested carbon sequestration areas are susceptible to wildfire and therefore exhibit a strong negative response and potential loss at fire intensities over 8 feet.

Sometimes, within HVRAs there may be varying response functions based on the sub-HVRA type; for example, low-voltage power distribution lines constructed with wooden poles have a higher potential loss from fire compared with higher-voltage transmission lines that are constructed on metal pylons. Drinking water protection areas and their associated water facilities contributed 11% to the overall relative importance in the ARRA, demonstrating the importance that this resource has to communities. At high wildfire intensities, these resources have a very high potential for loss due to the potential post-fire impacts on the watershed.

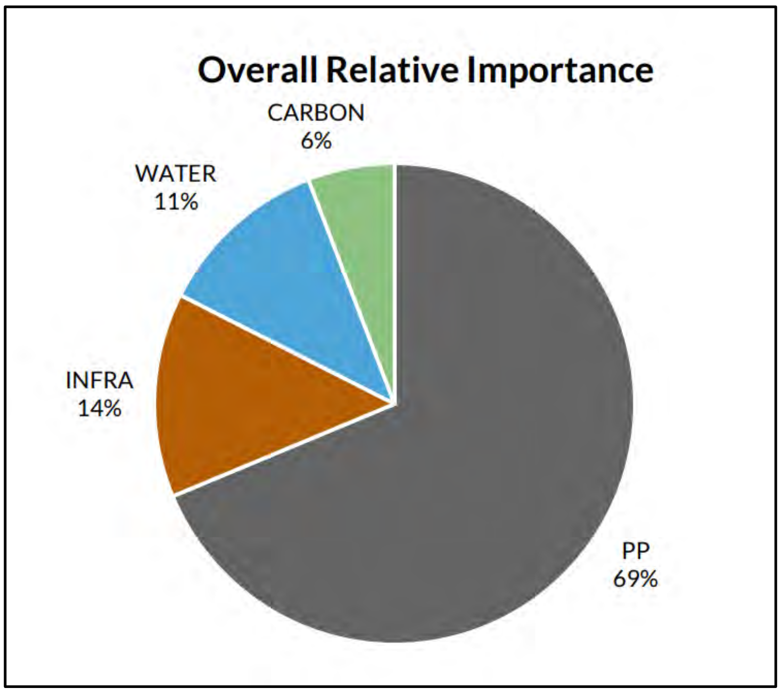


Figure 3.3. Overall HVRA relative importance included in the ARRA.

Source: Pyrologix (2021)

RISK ASSESSMENT RESULTS

The ARRA describes wildfire risk based on the conditional and expected change in value from wildfire disturbance to all HVRAs included in the analysis. The expected net value change (eNVC) has the added utility that it captures the relative likelihood of wildfire disturbance (burn probability), and therefore is the metric that is included in the CWPP. Burn probability is illustrated in Figure 3.4.

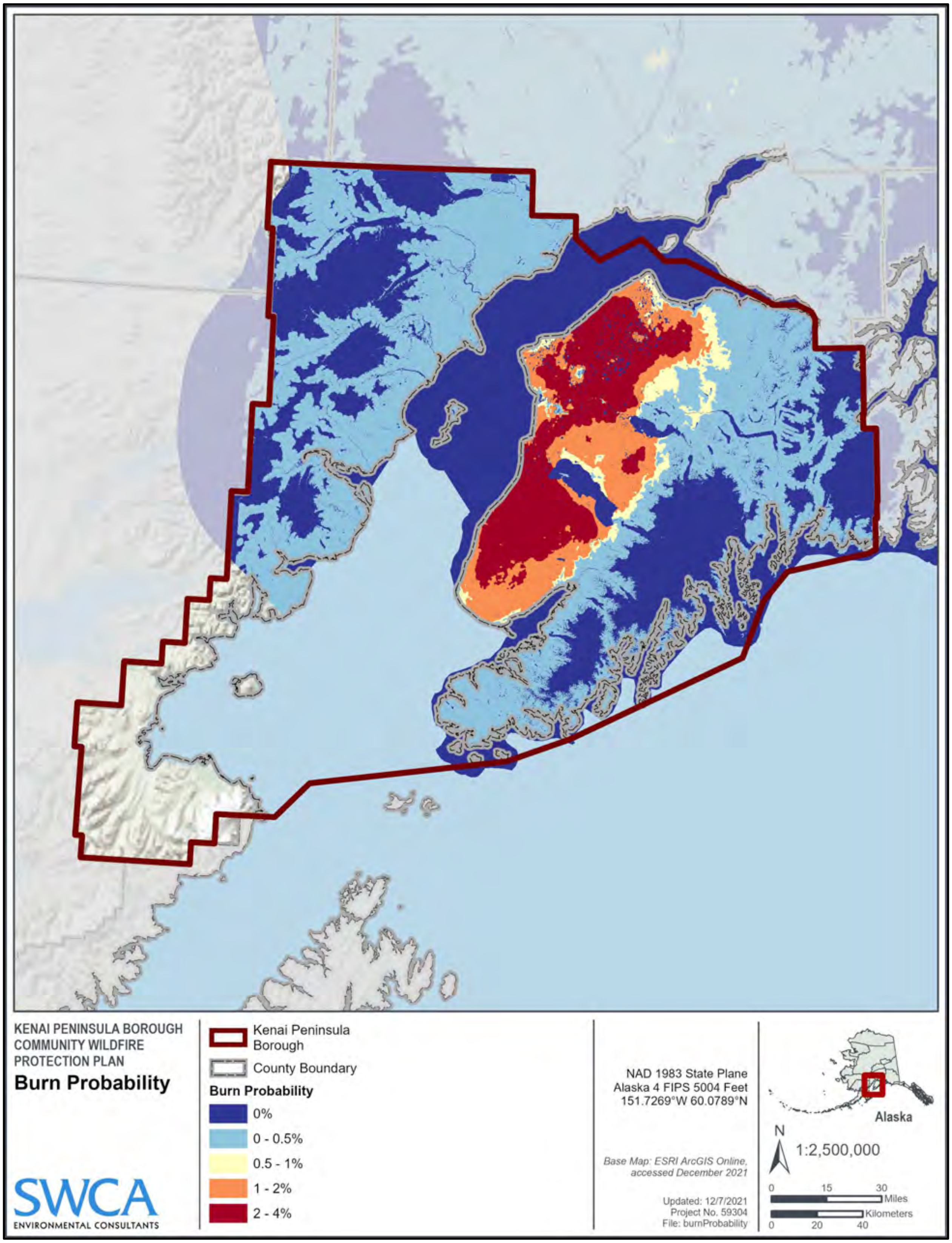


Figure 3.4. Map of integrated FSim burn probability.

Source: Pyrologix (2021)

Cumulative effects of wildfire across the landscape vary by HVRA, with a net negative eNVC for all the HVRAs. People and property show the greatest cumulative wildfire losses, followed by infrastructure, drinking water, and carbon as the HVRAs with the greatest cumulative risk (Pyrologix 2021) (Figure 3.5). Figure 3.6 illustrates the spatial spread of negative outcomes to HVRAs based on the likelihood of an HVRA being impacted by fire (burn probability).

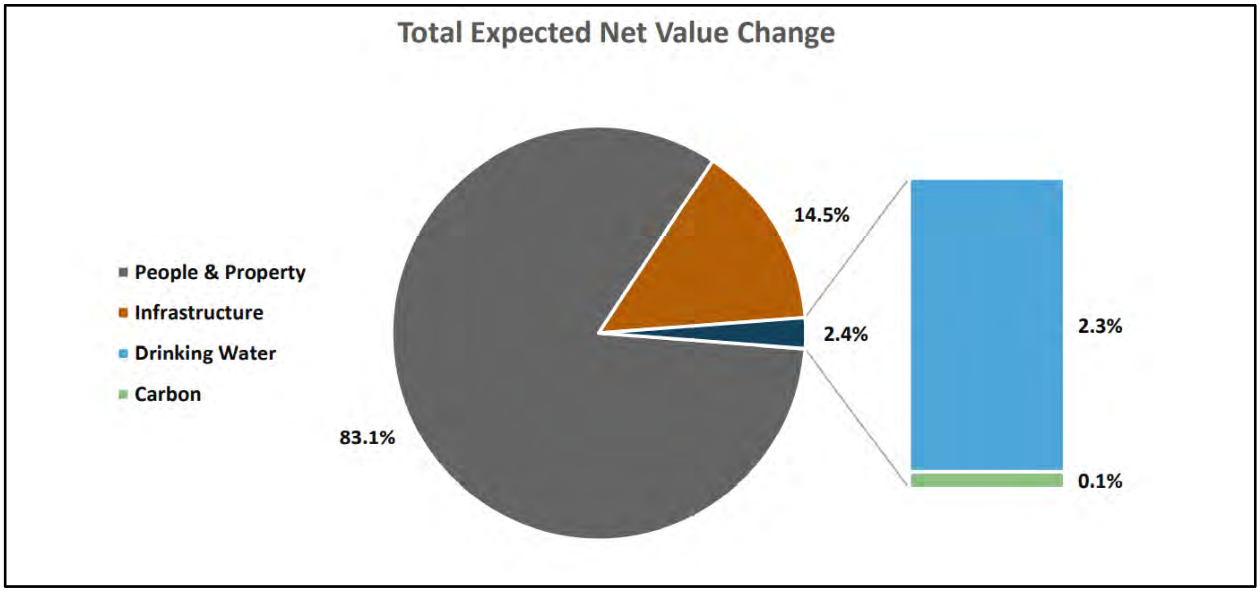


Figure 3.5. Weighted net response for HVRAs in the assessment listed in order of net value change and scaled to eNVC values for the people and property HVRA.

Source: Pyrologix (2021)

The ARRA assessment also provides an assessment of mean eNVC on a watershed scale (Figure 3.7). This metric can help to prioritize mitigation actions across the landscape by showing which watersheds house HVRAs that could experience the greatest potential loss.

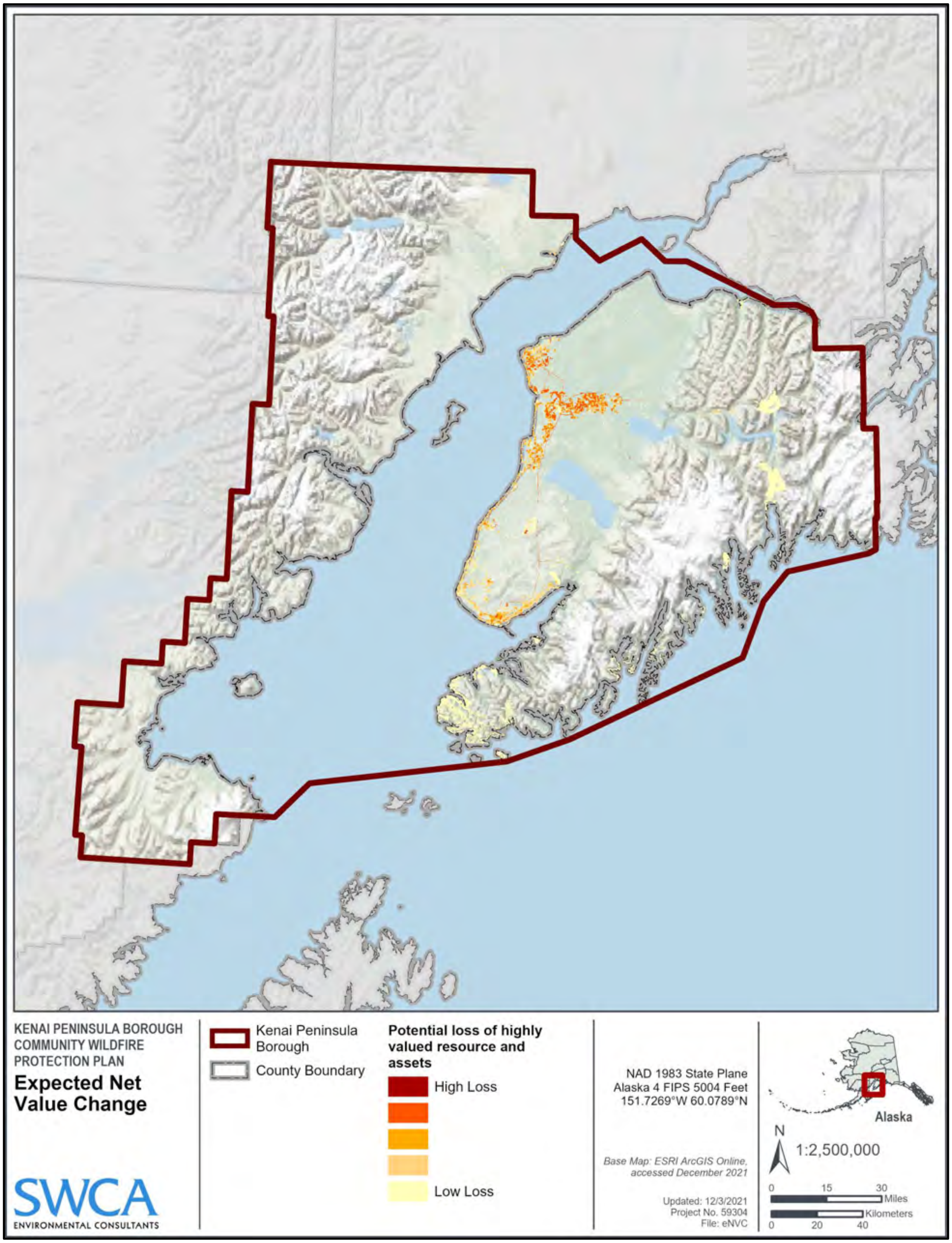


Figure 3.6. Map of eNVC for the KPB CWPP portion of the ARRA analysis area.

Source: Pyrologix (2021)

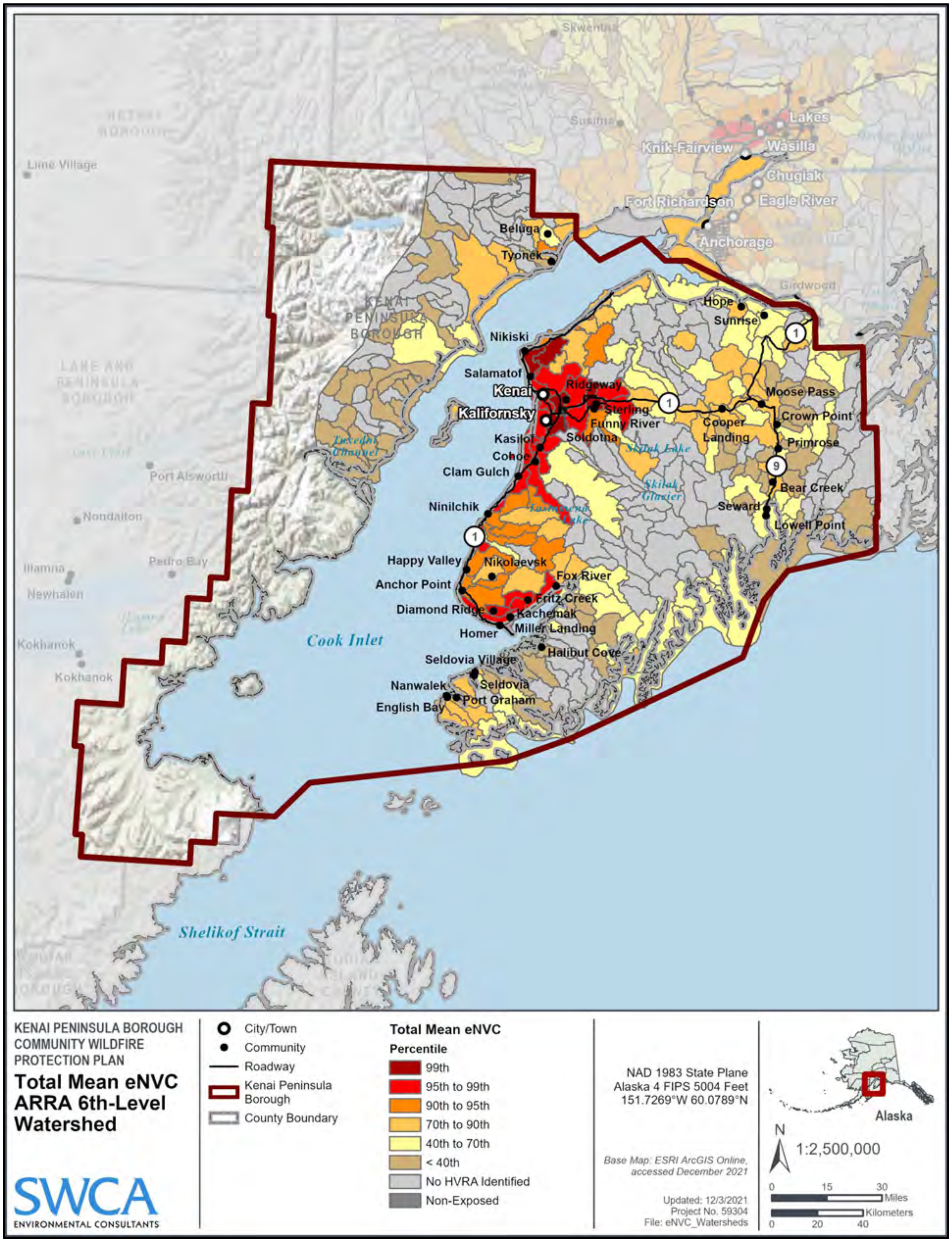


Figure 3.7. Map of total mean eNVC for the KPB CWPP portion of the ARRA Sixth-Level Watersheds.

Source: Pyrologix (2021)

COMMUNITY ASSESSMENTS

In order to properly assess the hazards in and around the Kenai Peninsula communities, a team from SWCA conducted community assessments in summer 2021 using the NFPA Wildland Fire Risk and Hazard Severity Form 1144 (Appendix E). This form is based on the NFPA Standard for Reducing Structure Ignition Hazards from Wildland Fire 2013 Edition. The NFPA standard focuses on individual structure hazards and requires a spatial approach to assessing and mitigating wildfire hazards around existing structures. It also includes ignition-resistant requirements for new construction and is used by planners and developers in areas that are threatened by wildfire and is commonly applied in the development of Firewise Communities (for more information, see www.firewise.org).

Each area was rated based on conditions within the community and immediately surrounding structures, including access, adjacent vegetation (fuels), defensible space, adjacent topography, roof and building characteristics, available fire protection, and placement of utilities. Where a range of conditions was less easily parsed out, a range of values was assigned on a single assessment form. Each score was given a corresponding adjective rating of low, moderate, or high. An example of the assessment form used in this plan is in Appendix E.

The purpose of the community WUI assessment and subsequent hazard ratings is to identify fire hazard and risks and prioritize areas requiring mitigation and more detailed planning. These assessments should not be seen as tactical pre-suppression or triage plans. The community assessment helps to drive the recommendations for mitigation of structural ignitability, community preparedness, and public education. The assessment also helps to prioritize areas for fuels treatment based on the hazard rating. The hazard ratings from the community assessment and the GIS hazard/risk assessment are provided in Appendix D.

Figure 3.8. Example of yard debris, a common finding of the 1144 assessments.

COMMUNITY VALUES

The ARRA incorporated data compilation of several HVRAs across the peninsula. In addition to those datasets, during CWPP meetings, the public and Core Team were invited to share their lists of resources and assets that they value in and around their communities, so that those resources could be integrated into development of mitigation measures (Figures 3.9 and 3.10). In addition to critical infrastructure, these community values can also include natural, social, and cultural resources.

During discussions with the Core Team and public, it became evident that wildlife resources are incredibly important to residents and to agencies entrusted with the management of public lands. However, due to complexities inherent in the risk assessment process (Pyrologix, 2021), wildlife resources were not integrated into the ARRA specifically. In order to acknowledge the importance of wildlife and integrate those values into the CWPP planning process, the Core Team considered these resources during the development of the project recommendations, for example developing recommendations to align hazardous fuels treatments with projects that provide mutual benefit for wildlife habitat improvement, and ensuring that projects to mitigate fuels are implemented in a way that is sensitive to wildlife protection measures.

During discussions with the Core Team and public, it became evident that wildlife resources are incredibly important to residents and to agencies entrusted with the management of public lands. However, due to complexities inherent in the risk assessment process (Pyrologix,

It is important to note that, although an identification of valued resources and assets can inform treatment recommendations, a number of factors must be considered in order to fully prioritize areas for treatment; these factors include appropriateness of treatment, land ownership constraints, locations of ongoing projects, available resources, and other physical, social, or ecological barriers to treatment.

The scope of this CWPP does not allow determination of the absolute natural, socioeconomic, and cultural values that could be impacted by wildfire in the planning area. In terms of socioeconomic values, the impact due to wildfire would cross many scales and sectors of the economy and call upon resources locally, regionally, and nationally.

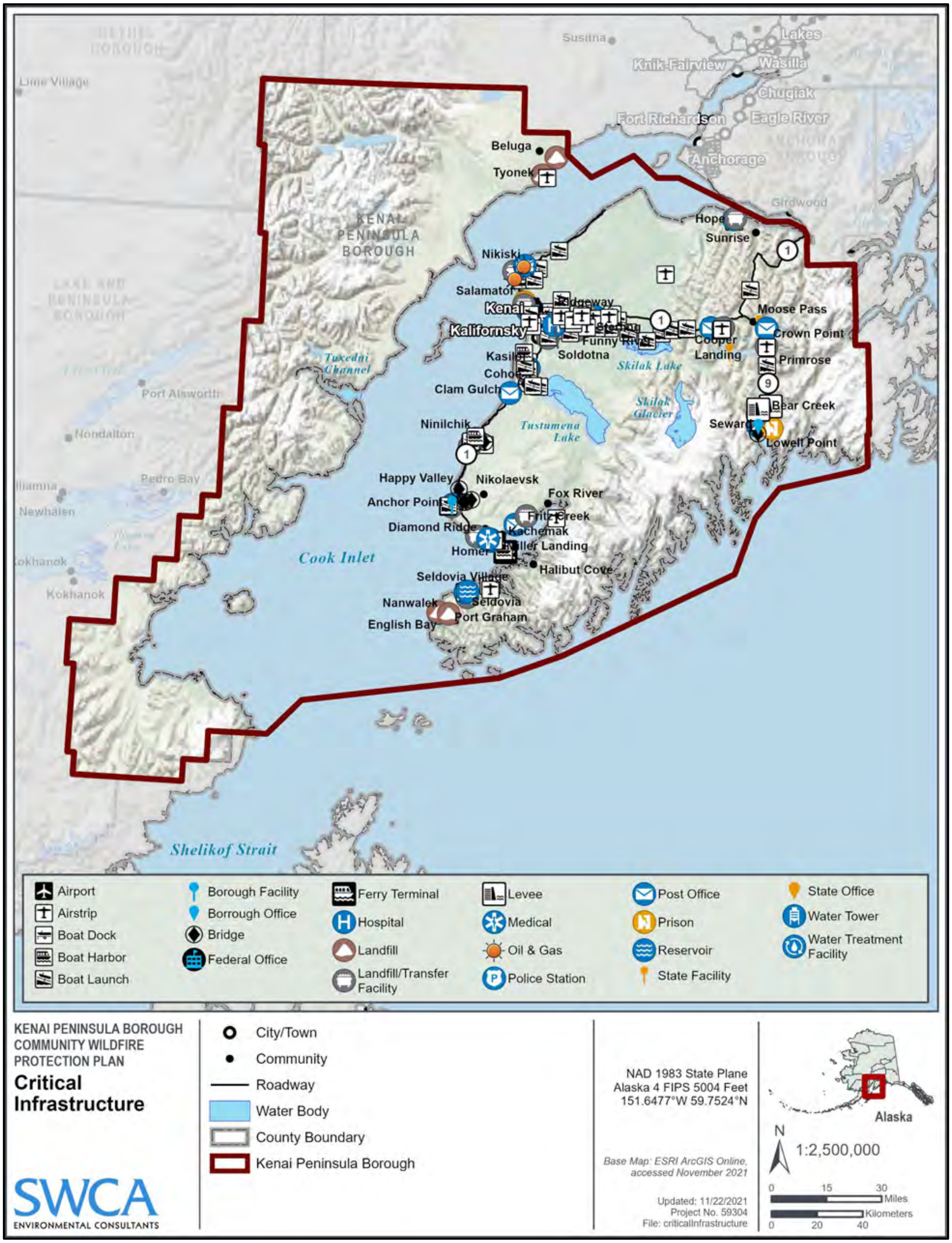


Figure 3.9. Critical infrastructure.

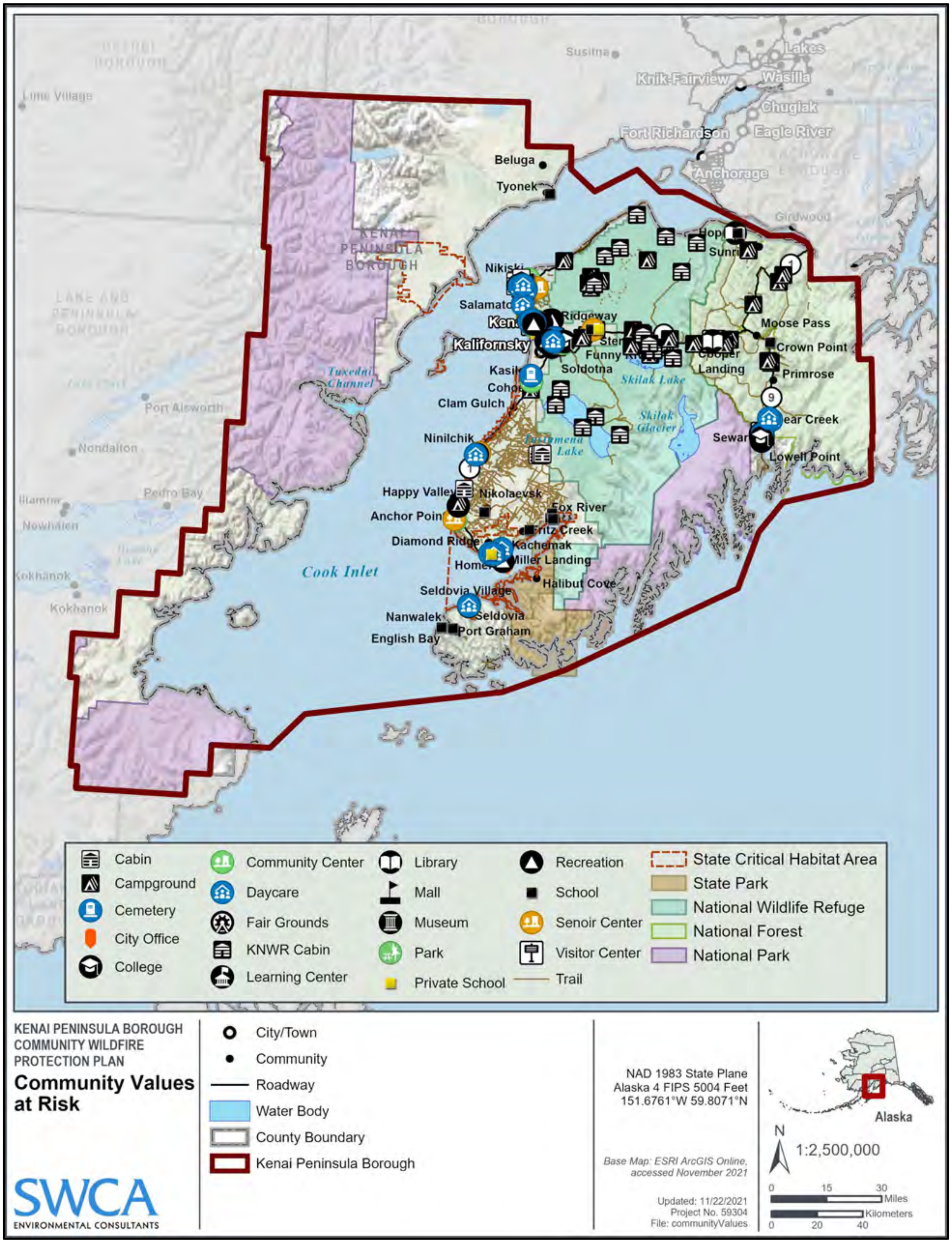


Figure 3.10. Community values across the Kenai Peninsula.

NATURAL VALUES

The CWPP planning area has a variety of natural resources of particular concern to land managers, such as rare habitats and listed plant and wildlife species. Public outreach throughout the planning area has emphasized the importance of natural/ecological values to the general public. As discussed previously, the integration of valued natural resources (especially wildlife and watershed health) into the CWPP planning process was an important component in the development of the CWPP recommendations.

Examples of natural values identified by the public and the Core Team include the following:

- Public land
- Hunting areas
- Watersheds and water quality
- Agricultural land
- Forest land
- Wildlife habitat and game species (Figure 3.11)

Figure 3.11. Example of natural values, wildlife species

SOCIOECONOMIC VALUES

Socioeconomic values include population, recreation, infrastructure, agriculture, and the built environment. Much of the built environment in the planning area falls within the WUI zones that comprise the community assessments (Appendix D). Examples include the following:

- Pipelines
- Utility facilities
- Tourism (Figure 3.12)
- Staging areas
- Docks and barge landings
- Highways and road systems
- Medical facilities
- Schools
- Water storage
- Fire departments
- Recreation sites

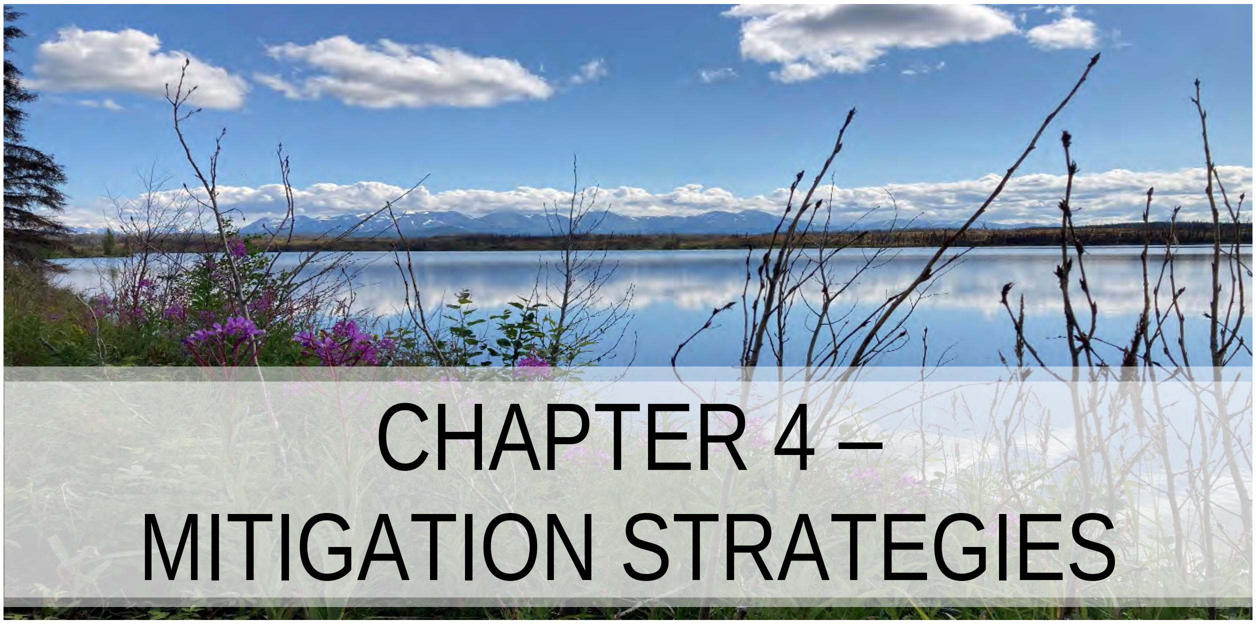
Figure 3.12. Example of a socioeconomic value, a café in a historic building.

CULTURAL VALUES

Many historical landmarks are scattered throughout the planning area. Particular cultural values that have been identified by the Core Team and the public in the CWPP planning area are the following:

- Pit houses
- Gathering centers (e.g., Tribal center)
- Village corporations
- Archeological resources
- Village cemetery
- Coastal fishing camps
- Churches (Figure 3.13)
- Shirley Lodging Facility

Figure 3.13. Example of a cultural value, a church



CHAPTER 4 – MITIGATION STRATEGIES

In developing this KPB-wide CWPP, the plan has been aligned with the Cohesive Strategy and its Phase III Western Regional Action Plan by adhering to the nationwide goal "*to safely and effectively extinguish fire, when needed; use fire where allowable; manage our natural resources; and as a Nation, live with wildland fire*" (Forests and Rangelands 2014:3).

In order to do this, the CWPP recommendations have been structured around the three main goals of the Cohesive Strategy: restoring and maintaining landscapes, fire-adapted communities, and wildfire response.

This chapter provides guidance for implementing recommendations under each Cohesive Strategy goal. Recommendations were developed based on input from Core Team, Tribal, and stakeholder meetings, including a unique stakeholder group focused on strategic infrastructure (see Strategic Infrastructure Recommendations, Appendix I, for more recommendations related to infrastructure resilience).

Many of these community-specific recommendations can be implemented at the homeowner or community level. Projects requiring large-scale support should be prioritized based on the ARRA developed for the Borough.

COHESIVE STRATEGY GOAL 1: RESTORE AND MAINTAIN LANDSCAPES

Goal 1 of the Cohesive Strategy and the Western Regional Action Plan is Restore and Maintain Landscapes: Landscapes across all jurisdictions are resilient to fire and other disturbances in accordance with management objectives.

> *"Sustaining landscape resiliency and the role of wildland fire as a critical ecological process requires a mix of actions that are consistent with management objectives. The West will use all available methods and tools for active management of the landscape to consider and conserve a diversity of ecological, social, and economic values. The West will coordinate with all partners and seek continued stakeholder engagement in developing market-based, flexible*

> *and proactive solutions that can take advantage of economies of scale. All aspects of wildland fire will be used to restore and maintain resilient landscapes. Emphasis will be placed on protecting the middle lands near communities."* (Western Regional Strategy Committee 2013:14).

Strategic actions listed within the ALAH Action Plan to serve the goal of **restoring and maintaining landscapes include** (KPB Interagency 2018):

- Develop methods to assist and inform private landowners with managing fuels.
- Promote prescribed fire certification and training to provide safe use of fire.
- Promote landscape-scale fuels management activities, such as prescribed fire and wildland fire, that address the creation and maintenance of resilient landscapes.
- Include fuels reduction and fire risk management activities into existing and future land management programs.
- Promote cost-effective, active forest management.

Forest managers in the region are addressing land management objectives through the use of mechanical and manual treatments to promote more resilient forest land. Figure 4.1 illustrates ongoing fuels management on the peninsula. Private, state, and federal lands are interspersed, creating a matrix of land ownership, which is often a hurdle to implementation of landscape-level treatments. By working with private landowners, forest managers are enhancing landscape-scale efforts to create more resilient forest communities. In this CWPP, recommendations to restore and maintain landscapes focus on vegetation management and hazardous fuel reduction.

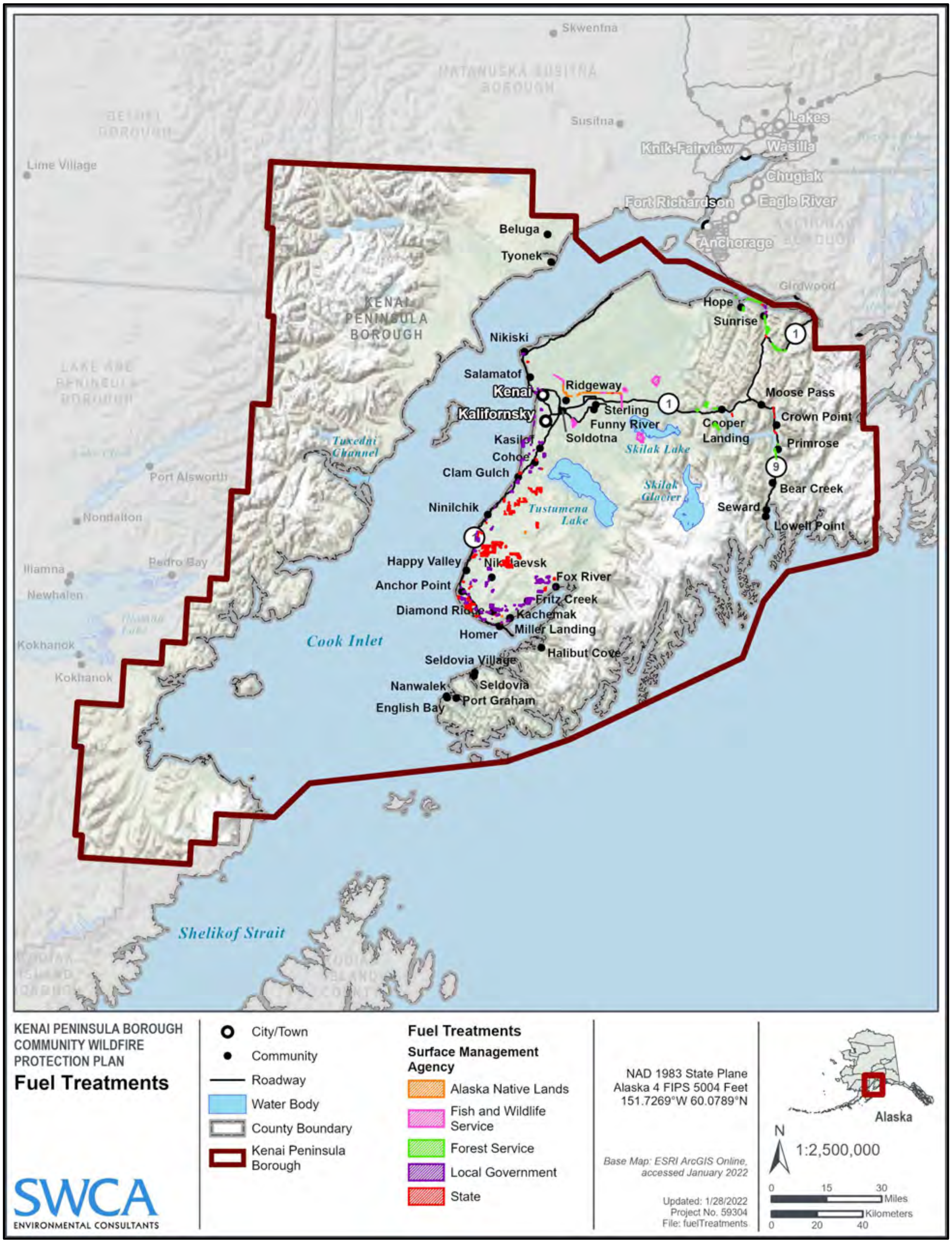


Figure 4.1. Ongoing fuel treatments implemented across the peninsula.

RECOMMENDATIONS FOR HAZARDOUS FUEL REDUCTION

Fuels management of public and private land is key to the survival of structures during a wildfire event, as well as the means to meet the criteria of Goal 1, creating resilient landscapes. As wildfire frequency, size, destruction, and restoration costs have been on an incline, the need for wildfire mitigation via fuels treatment is at an all-time high (UAF 2018). The importance of fuels management is reflected in forest policy at the federal level, with the HFRA requiring that federal land management agencies spend at least 50% of their fuels reduction funds on projects in the WUI. In addition, various Alaskan studies have proven the success of fuels treatments regarding mitigating wildfire intensity and damage (UAF 2018).

A case study done in 2014 during the Funny River Fire concluded that fuel treatments were imperative in preventing fire spread. In addition, field samples and photographic evidence from the Eagle Trail (2010), Funny River (2014), Card Street (2015), and Nenana Ridge (2009 and 2015) Fires indicate fuel treatments resulted in lower fire behavior, increased accessibility, and decreased visual obstructions (due to fuel treatments such as canopy thinning). Furthermore, those treatments gave firefighters the ability to use treatments, such as fuel breaks, to anchor backfiring operations and burn out other treated areas (UAF 2018). Of the documented cases described in UAF (2018), all showed that fuel breaks in Alaska significantly alter fire behavior; fires in untreated areas grew to active crown fires, then dropped down to surface fire in the treated areas. However, fuel breaks alone may not stop a fire from advancing, so it is important to integrate multiple treatment methods (UAF 2018).

Fuels should be modified with a strategic approach across the planning area to reduce the threat that high-intensity wildfires pose to lives, property, and other values. Pursuant to these objectives, recommendations have been developed in the context of existing and planned fuels management projects. These recommendations initially focus on areas adjacent to structures (defensible space), then near community boundaries (fuel breaks, cleanup of adjacent open spaces), and finally in the wildlands beyond community boundaries (larger-scale forest health and restoration treatments).

While not necessarily at odds with one another, the emphasis of each of these treatment types is different. Proximate to structures, the recommendations focus on reducing fire intensity consistent with Firewise. Further into open space areas, treatments will tend to emphasize forest health and increasing resiliency to catastrophic wildfire and other disturbances, including SBB infestation. Cooperators in fuels management should include federal, state, and local agencies as well as interested members of the public. Federal land management plans focus on these more landscape-level treatments, so the CWPP incorporates most federal land management by reference to those land management planning documents. The CWPP focuses primarily on projects within or adjacent to WUI areas.

Table 4.1 summarizes the types of treatments recommended throughout the planning area, and Figure 4.3 delineates areas of concern where treatments should be prioritized. These areas of concern were delineated collaboratively during the fourth Core Team meeting and were identified based on stakeholder knowledge, an intention to connect new proposed treatments to existing treatments (as illustrated in Figure 4.1), and the ARRA findings related to potential loss as a consequence of modeled extreme fire behavior. Areas projected in ARRA to have the greatest potential loss (eNVC) include HVRAs that are susceptible to intense wildfire behavior. Many of these areas are close to communities due to the density of HVRAs in those areas. These areas are delineated as areas of concern in Figure 4.3 so that land managers can prioritize fuel mitigation treatments to protect HVRAs.

It is recommended that treatment plans be developed to execute mitigation measures in these areas. Treatment types will be site specific but should address a need to slow fire spread or mitigate potential extreme fire behavior parameters, such as high flame lengths or fireline intensity.

Many of these treatment recommendations in Table 4.1 are general and apply to many communities because similar conditions and concerns were raised for all communities that border wildland areas. Community-specific recommendations can be found in Appendix D, Community Descriptions. Table 4.1 also addresses the requirement for an action plan and assessment strategy by providing monitoring guidelines and a timeline for implementation. This timeline is obviously dependent on available funding and resources, as well as National Environmental Policy Act (NEPA) protocols for any treatments pursued on public land.

The treatment list is by no means exhaustive and should be considered a sample of projects for the future management of the planning area. Many projects may be eligible for grant funds available from federal and/or state sources. A key source of funding for implementing hazardous fuel reduction are funds available through the Western Regional Action Plan, which is the reason this CWPP tiers to those goals. Because much of the wildfire risk is associated with extreme volumes of SBB infested, dead and dying trees, securing funding to address the ongoing outbreaks in these forests should be a significant focus for land managers. For an additional list of funding sources, please refer to Appendix F.

Each land management agency has a different set of policies governing the planning and implementation of fuels reduction projects. A thorough assessment of current fuel loading is an important prerequisite for any fuels prescription (see Figure 4.2 for an example of fuel loading), and all treatment recommendations should be based on the best possible science. When possible, simultaneously planning for the management of multiple resources (for example wildlife habitat improvements or watershed health initiatives) while reducing fuels will ensure that the land remains viable for multiple uses in the long term. The effectiveness of any fuels reduction treatment depends on the degree of maintenance and monitoring that is employed. Monitoring will also ensure that objectives are being met in a cost-effective manner.

Fire management cannot be a one-size-fits-all endeavor; this plan is designed to be flexible. Treatment approaches and methods will be site-specific and should be adapted to best meet the needs of the landowner and the resources available. Moreover, each treatment recommendation should address protection of valued resources and assets, particularly the protection of threatened and endangered species. Specifically, impacts to anadromous waters should be considered when designing site-specific fuel treatments.

Figure 4.2. Heavy downed trees and fuel loading due to SBB tree mortality.
Source: Wade Wahrenbrock, Forestry Consultant

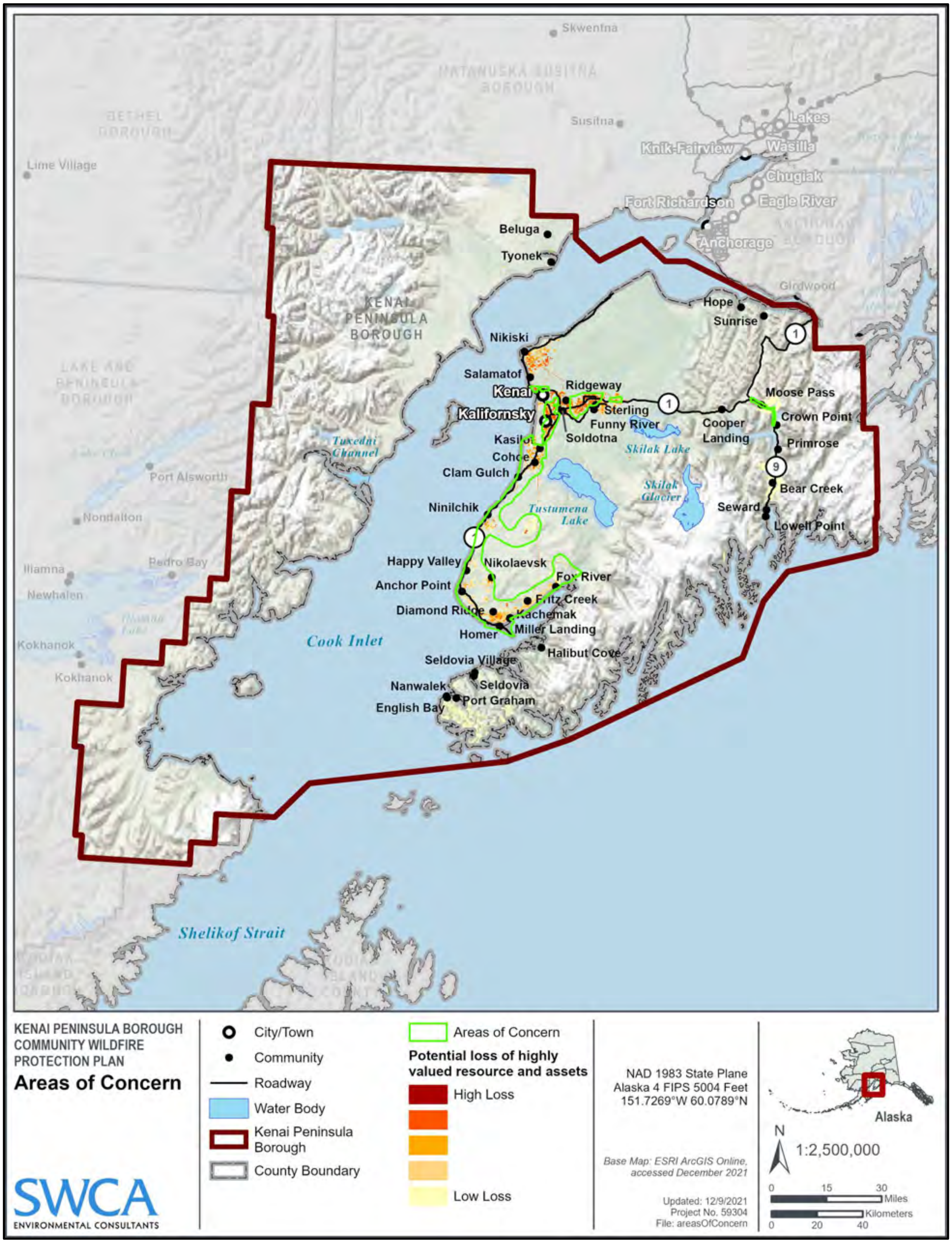


Figure 4.3. Areas of concern for future fuel treatment prioritization.

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Table 4.1. Recommendations for Creating Resilient Landscapes (Hazardous Fuel Treatments)

Project Description	Location	Land Ownership/ Lead Agency	Methodology/Approach	Serves to:	Timeline for Action	Priority (H, M, L)	Monitoring or Maintenance Requirements	Funding Sources
Agencies prioritize treatments for hazardous fuel removal	• Kenai Peninsula Borough-wide • Area for high potential loss from the QWRA • Focus cost effective fuel management treatment in critical and full protection level areas identified in the Alaska Wildland Fire Management Plan (*from 2019 KPB HMP*) (Figure 4.3, Chapter 4)	State Forestry, Kenai Peninsula Borough	• Develop and implement a process for all levels of government to collaborate on annual selection of fuel treatment projects in their jurisdictions (*from 2019 KPB HMP*) • Focus cost effective silvicultural treatments in high human use areas to minimize public safety hazards, prevent or control additional SBB impacts and/or restore forest cover *(from 2019 KPB HMP*) • Utilize GIS tools and the QWRA to increase prioritization of treatments based on risk. • Look for opportunities to create landscape level treatments wherever possible. • Use a diverse toolbox of treatment types and tailor plans to specific site conditions. • Look for opportunities to create multiple resource benefits in addition to hazard reduction (wildlife habitat, invasive species control, recreation etc.). • Build in resource protection measures to prescriptions. • Build collaboration to increase potential funding sources and develop ownership. • Develop maintenance plans to ensure sustainability. • Develop monitoring plans and adaptive management to mitigate against harmful impacts on resources. • Promote the retention of hardwoods and desirable species/habitat when possible. • Increase public engagement to build community support for projects and facilitate efficient environmental compliance to advance implementation. • Identify tracks of fuel that are contiguous – address large tracts instead of individual lots	• Assess hazard mitigation opportunities to protect values at risk within areas of highest exposure potential • Create resilient landscapes	Ongoing	H	• Implement a monitoring program on initiation of each project • Utilize the NFPORS (National Fire Plan Operations & Reporting System) data base to enter, track and report planned and completed projects in KPB (*from 2019 KPB HMP*)	• Internal budgets • Fuel reduction agency grants • Pre-disaster Mitigation (PDM) Grant Program • Hazard Mitigation Grant Program (HMGP) • Hazard Mitigation Grant Program (HMGP) – Post Fire • General Assistance Program • Public Assistance Grant Program • Emergency Forest Restoration Program (EFRP) • Matching Awards Program • U.S. Endowment for Forestry and Communities • Firewise Communities • The Urban Land Institute (ULI) • The National Fire Plan (NFP) • Urban and Community Forestry Program, 2021 National Urban and Community Forestry Challenge Cost Share Grant Program • Serve Alaska • Firewise Communities • National Fire Protection Association • Environmental Systems Research Institute (ESRI) • National Interagency Fire Center, Wildland Fire Prevention/Education • Environmental Education Grants • The Fire Prevention and Safety Grants (FP&S) • Western Wildland-Urban Interface (WUI) Grants • Private Landowner Assistance Grant • Hazard Mitigation Planning Assistance • Community Development Block Grants – Mitigation - Alaska

Project Description	Location	Land Ownership/ Lead Agency	Methodology/Approach	Serves to:	Timeline for Action	Priority (H, M, L)	Monitoring or Maintenance Requirements	Funding Sources
Continue to maintain and expand the Strategic Fuel Break (also called the Sterling Fuel Break) across multiple jurisdictions (*Meets several goals of the 2019 KPB HMP- Table 3.5 and 3.6*)	Western extension Nikiski to Grey Cliffs (Figure 4.10, Chapter 4)	Multi-agency, cross boundary projects contingent on public/ private land ownership	• Continue to work with stakeholders and land managers to expand fuel break to serve communities in northern areas (Nikiski etc.). • Consider rebranding name to disassociate just with community of Sterling. • Continue maintenance on existing sections. • Evaluate maintenance schedules based on assessment of conditions. • Utilize the Quantitative Wildfire Risk Assessment (QWRA) in future expansion of the fuel break. Prioritize areas of high and extreme potential for loss. • Enhance community outreach on the fuel break, including regular status updates. Use the story map and other mediums to share information. • Develop fuel break attributes and characteristics based on specific site conditions: assessment of wildfire risk, topography, vegetation communities and existing fuel conditions- ~300 ft break. • Identify costs and plan for long term maintenance (~$1K/acre for development)	• Protect life and property by mitigating extreme fire behavior and creating a barrier to fire spread	Ongoing (likely implementation would be during fall and winter months)	H	• Regular maintenance needed to ensure the fuel break remains clear of vegetation (+/- every 10 years). • Monitor for erosion and invasive species. • Incorporate habitat restoration into planning, especially consideration of impacts on anadromous streams.	• Agency budgets • Internal budgets • Fuel reduction agency grants • Pre-disaster Mitigation (PDM) Grant Program • Hazard Mitigation Grant Program (HMGP) • Hazard Mitigation Grant Program (HMGP) – Post Fire • General Assistance Program • Public Assistance Grant Program • Emergency Forest Restoration Program (EFRP) • Matching Awards Program • U.S. Endowment for Forestry and Communities • Firewise Communities • The Urban Land Institute (ULI) • The National Fire Plan (NFP) • Urban and Community Forestry Program, 2021 National Urban and Community Forestry Challenge Cost Share Grant Program • Serve Alaska • Firewise Communities • National Fire Protection Association • Environmental Systems Research Institute (ESRI) • National Interagency Fire Center, Wildland Fire Prevention/Education • Environmental Education Grants • The Fire Prevention and Safety Grants (FP&S) • Western Wildland-Urban Interface (WUI) Grants • Private Landowner Assistance Grant • Hazard Mitigation Planning Assistance • Community Development Block Grants – Mitigation - Alaska

Project Description	Location	Land Ownership/ Lead Agency	Methodology/Approach	Serves to:	Timeline for Action	Priority (H, M, L)	Monitoring or Maintenance Requirements	Funding Sources
Remove standing dead trees on public and private property	Kenai Peninsula-wide	Public and Private land	• Preferentially remove beetle killed trees that pose a hazard adjacent to homes or structures. • Work from structure outwards to edge of property line. • Remove slash and dispose of appropriately, following beetle slash protocols. • Avoid projects that would divert, obstruct, pollute, or change the natural flow or bed of a designated stream, river, or lake. For example, avoid crossing a protected stream with heavy equipment or disposing of vegetation in anadromous waters (Alaska State Legislature 2022). Consult with tree removal specialists (see "KPB Land Management- Kenai Peninsula Forestry Directory for qualified contractors"- Appendix X- Local Resources). • Remove hazard trees along trails and other public ROW. • Utilize best management practices outlined by the University of Alaska Cooperative Extension (see "Spruce Beetles – A Guide to Tree Management Options for Home and Woodlot Owners"- Appendix X- Local Resources). • Identify incentives to promote private operators to remove trees with removed trees as payment.	• Protect life and property by mitigating extreme fire behavior.	Ongoing	H	• Regular maintenance is required.	• Pre-disaster Mitigation (PDM) Grant Program • Hazard Mitigation Grant Program (HMGP) • Hazard Mitigation Grant Program (HMGP) – Post Fire • General Assistance Program • Public Assistance Grant Program • Emergency Forest Restoration Program (EFRP) • Matching Awards Program • U.S. Endowment for Forestry and Communities • Firewise Communities • The Urban Land Institute (ULI) • The National Fire Plan (NFP) • Urban and Community Forestry Program, 2021 National Urban and Community Forestry Challenge Cost Share Grant Program • Serve Alaska • Western Wildland-Urban Interface (WUI) Grants • Private Landowner Assistance Grant • Hazard Mitigation Planning Assistance • Community Development Block Grants – Mitigation – Alaska • Western Bark Beetle Initiative Grant Program

Project Description	Location	Land Ownership/ Lead Agency	Methodology/Approach	Serves to:	Timeline for Action	Priority (H, M, L)	Monitoring or Maintenance Requirements	Funding Sources
Enhance road ROW clearance to facilitate safe ingress and egress in areas that have been impacted by SBB infestation	Kenai Peninsula-wide	DOT, State Forestry, AK Dept of Public Safety, Kenai Peninsula Borough and municipalities	• Identify target areas impacted by SBB infestation • Increase removal of dead trees located in target areas along state highways and KPB road ROW to provide for safe egress along evacuation routes. • Tie to the QWRA, targeting areas identified as highest potential loss first. • Focus on main routes first, then move on to side roads based on priority in the risk assessment. • KPB formerly managed a successful federally funded program to remove SBB trees adjacent to the road ROW, which ended in 2014. Consider starting a new program effort to continue this work in more recent SBB-impacted areas.	• Protect life and property by mitigating extreme fire behavior.	Start within 1 year, and make this an ongoing project	H	• Annual spring maintenance of ROW • ROW sizes vary. Develop protocols based on type of ROW being treated	• Pre-disaster Mitigation (PDM) Grant Program • Hazard Mitigation Grant Program (HMGP) • Hazard Mitigation Grant Program (HMGP) – Post Fire • General Assistance Program • Public Assistance Grant Program • Emergency Forest Restoration Program (EFRP) • Matching Awards Program • U.S. Endowment for Forestry and Communities • Firewise Communities • The Urban Land Institute (ULI) • The National Fire Plan (NFP) • Urban and Community Forestry Program, 2021 National Urban and Community Forestry Challenge Cost Share Grant Program • Serve Alaska • Hazard Mitigation Planning Assistance • Community Assistance Program • Community Development Block Grants – Alaska • Community Development Block Grants – Mitigation – Alaska • Western Bark Beetle Initiative Grant Program
Increase workforce capacity to respond to hazardous fuel treatment needs	Kenai Peninsula-wide	USFS Kenai Peninsula Borough Chugachmiut/CIRI lands State Forestry	• Carryout a feasibility assessment for the creation of a hazardous fuels crew (State Type II Crew) with primary role of fuels management (secondary fire suppression role). See Fire Response Matrix for details. o Convene working group to complete feasibility assessment and identify administrative structure, budget and scope. • Use existing type 2 fire crews to work on fuel breaks and mitigation pre- and post-fire season to extend the season they work. • Develop industry support and incentives to hire forestry contractors to conduct treatments. • Use workforce development programs to increase supply of trained foresters.	• Increase capacity to address hazardous fuels and built resilient landscapes.	Within 1 year	H	• Annual review of progress, needs and accomplishments.	• Funding for Fire Departments and First Responders • Emergency Management Performance Grant (EMPG) • Regional Catastrophic Preparedness Grants • Volunteer Fire Assistance Program • Staffing for Adequate Fire and Emergency Response (SAFER) • Assistance to Firefighters Grants (AFG) • State and Private Forestry Programs – National Association of State Foresters (NASF) • National Fire Protection Association • Alaska Firewise • Hazard Mitigation Planning Assistance • Community Assistance Program

Project Description	Location	Land Ownership/ Lead Agency	Methodology/Approach	Serves to:	Timeline for Action	Priority (H, M, L)	Monitoring or Maintenance Requirements	Funding Sources
Strategically plan post-fire restoration projects to maximize future wildfire resilience on public and private lands	Kenai Peninsula-wide	State Forestry, Kenai Peninsula Borough, Federal Agencies	• Promote the use of the Forest Stewardship Program managed by the AK Department of Natural Resources, Division of Forestry, to assist private landowners with forest planning and on-the-groundwork. • Ensure that replanting areas do not unintentionally create fuel hazards in the future by including these projects in Forest Stewardship Plans (these plans have a 10-year outlook and follow the landowner's goals.) • Transplanting and planting • Integrate with Firewise landscaping (see Table 4.4) • Utilize drones to identify areas of need • Utilize the UAF Cooperative Extension Service • Encourage use of hardwoods where practical to reforest fuel reduction treatment sites and burn sites.	• Create resilient landscapes and address potential for extreme wildfire behavior in and around communities.	Start within 2 years, and make this an ongoing project	M	• Identify non-traditional participants like Cooperative Extension re UAF, etc.	• Pre-disaster Mitigation (PDM) Grant Program • Hazard Mitigation Grant Program (HMGP) • Hazard Mitigation Grant Program (HMGP) – Post Fire • General Assistance Program • Public Assistance Grant Program • Emergency Forest Restoration Program (EFRP) • Matching Awards Program • U.S. Endowment for Forestry and Communities • Firewise Communities • The Urban Land Institute (ULI) • The National Fire Plan (NFP) • Urban and Community Forestry Program, 2021 National Urban and Community Forestry Challenge Cost Share Grant Program • Serve Alaska • Western Wildland-Urban Interface (WUI) Grants • Private Landowner Assistance Grant • Hazard Mitigation Planning Assistance • Community Development Block Grants – Mitigation – Alaska • Alaska Firewise

Project Description	Location	Land Ownership/ Lead Agency	Methodology/Approach	Serves to:	Timeline for Action	Priority (H, M, L)	Monitoring or Maintenance Requirements	Funding Sources
Address existing limitations of slash disposal facilities (*Meets goal of the 2019 KPB HMP- Provide slash disposal sites near high-risk areas- Table 3.6)*	Kenai Peninsula-wide	State Forestry, Kenai Peninsula Borough, Cities and Communities	• Form a multi-agency working group (maybe a committee under the ALAH group) to discuss options and solutions to this problem. • Identify an agency(s) to address slash disposal and build ownership in the solution. • Develop multi-strategy approach to disposal. Consider the following: o Capacity of existing facilities. o Installation of air-curtain incinerator in central location. o Initiating a “chipper days” campaign and schedule. o A mix of options- 1) mobile chipper taken to the community, 2) satellite geographic areas where slash is transported and dropped, 3) fenced/staff operated drop-off with fees, 4) fenced/staff operated drop-off without fees. o Potential need to contract chipper operator (liability concerns). o Potential market/use for chips- landscaping, trails, “mushers” for use in kennels. o Creating role for a new Type 2 team to help man the chipper and slash program. o Budget for managing chipper program. Charge nominal fee for slash disposal. o Utilize chips in trail construction as a means of disposing of green waste	• Create resilient landscapes and address potential for extreme wildfire behavior in and around communities. • Create and maintain accountability with local landowners. • Reduce fuel and debris that can carry ground fire around property where trees may have been removed.	Start within 1 year, and make this an ongoing project	H	• Regular review needed to determine whether facilities are meeting demand	• Pre-disaster Mitigation (PDM) Grant Program • Hazard Mitigation Grant Program (HMGP) • Hazard Mitigation Grant Program (HMGP) – Post Fire • General Assistance Program • Public Assistance Grant Program • Emergency Forest Restoration Program (EFRP) • Matching Awards Program • U.S. Endowment for Forestry and Communities • Firewise Communities • The Urban Land Institute (ULI) • The National Fire Plan (NFP) • Urban and Community Forestry Program, 2021 National Urban and Community Forestry Challenge Cost Share Grant Program • Serve Alaska • Community Assistance Program • Community Development Block Grants – Alaska

Project Description	Location	Land Ownership/ Lead Agency	Methodology/Approach	Serves to:	Timeline for Action	Priority (H, M, L)	Monitoring or Maintenance Requirements	Funding Sources
Agencies to increase defensible space around publicly owned structures and infrastructure	Kenai Peninsula-wide	State Forestry, Kenai Peninsula Borough, Cities and Communities	• Develop and adopt local land use plans and ordinances that provide maintenance of defensible space and fuel management on municipal and public property (*from 2019 KPB HMP*) • Defensible space will help increase protection of values at risk and to act as demonstration site for increasing public engagement in structure ignitability mitigation. • Utilize the QWRA to prioritize protection of areas modeled has having greater potential for loss. • Utilize the CWPP and public engagement to identify values at risk that they would like to see protected. • Identify state parcels that are located near strategic infrastructure and plan treatment near roadways and property lines.	• Create resilient landscapes and address potential for extreme wildfire behavior in and around communities.	Within 2 years	H	• Carry out a 2-year review of accomplishments in improving defensible space across the Borough	• Pre-disaster Mitigation (PDM) Grant Program • Hazard Mitigation Grant Program (HMGP) • General Assistance Program • Public Assistance Grant Program • Emergency Forest Restoration Program (EFRP) • Matching Awards Program • U.S. Endowment for Forestry and Communities • Firewise Communities • The Urban Land Institute (ULI) • The National Fire Plan (NFP) • Urban and Community Forestry Program, 2021 National Urban and Community Forestry Challenge Cost Share Grant Program • Serve Alaska • National Fire Protection Association • National Interagency Fire Center • Hazard Mitigation Planning Assistance • Community Assistance Program • Community Development Block Grants – Alaska • Community Development Block Grants – Mitigation - Alaska

Project Description	Location	Land Ownership/ Lead Agency	Methodology/Approach	Serves to:	Timeline for Action	Priority (H, M, L)	Monitoring or Maintenance Requirements	Funding Sources
Initiate campaign to encourage defensible space actions on private lands	Kenai Peninsula-wide	State Forestry, Kenai Peninsula Borough, Cities and Communities to promote action by residents	• Defensible space will help increase protection of life and property. • Utilize the QWRA to outreach to the public the areas that should be prioritized for protection based on modeled potential loss. • Provide educational materials and outline available resources. • Consider use of incentives to encourage participation in campaign (i.e., tax incentives, working with insurance agents on reduced premiums etc.)	• Create resilient landscapes and address potential for extreme wildfire behavior in and around communities. • Building fire adapted communities • Facilitate safe deployment of fire suppression resources	Within 2 years	H	• Carry out a 2-year review of accomplishments in improving defensible space in WUI areas across the Peninsula.	• Firewise Communities • National Fire Protection Association • Environmental Systems Research Institute (ESRI) • National Interagency Fire Center, Wildland Fire Prevention/Education • Environmental Education Grants • The Fire Prevention and Safety Grants (FP&S) • Urban and Community Forestry Program, 2021 National Urban and Community Forestry Challenge Cost Share Grant Program • Serve Alaska • The National Fire Plan (NFP) • Western Wildland-Urban Interface (WUI) Grants • Private Landowner Assistance Grant • Hazard Mitigation Planning Assistance • Community Development Block Grants – Mitigation – Alaska • Alaska Firewise
Plan for increased grass fuel fire regimes	Kenai Peninsula-wide	State Forestry, Kenai Peninsula Borough	• Build into long-term planning the potential for the Borough to exhibit more of a grass fuel fire regime as large areas of timber are removed in large fires. This cover type change would increase fire frequency and fire suppression resource needs and tactics. • Identify how these new fuels will impact fire season (longer) or months of year this fuel is susceptible to extreme fire spread • Develop vegetation management treatment methods and strategies to disrupt grass continuity on the landscape. • Employ prescribed fire to reduce grass populations; moderate-intensity fires help to clear the ground of grass and enhance spruce seedling establishment (Baltzer et al. 2020; USFS 2017)	• Prepare for more resilient landscapes and address potential for extreme wildfire behavior in and around communities.	Start within 1 year, and make this an ongoing project	M	• Identify as an agenda item for discussion annually by the ALAH group.	• Pre-disaster Mitigation (PDM) Grant Program • General Assistance Program • Multipurpose Grants to States and Tribes • Environmental Quality Incentives Program (EQIP) • Urban and Community Forestry Program, 2021 National Urban and Community Forestry Challenge Cost Share Grant Program • Catalog of Federal Funding Sources; Land Resources • Matching Awards Program • U.S. Endowment for Forestry and Communities • Hazard Mitigation Planning Assistance

Project Description	Location	Land Ownership/ Lead Agency	Methodology/Approach	Serves to:	Timeline for Action	Priority (H, M, L)	Monitoring or Maintenance Requirements	Funding Sources
Increase capacity for use of prescribed fire	Kenai Peninsula-wide	ADFG, State Forestry, Federal Agencies, Alaska Native Corp.	• Form a working group to explore options for collaboration and increased application of fire into existing management practices and strategies (maybe a committee under the ALAH group). • Prescribed fire needs to occur at same time as wildfire for optimum benefits. • Develop and train interagency prescribed burn team (*from 2019 KPB HMP*) • Increased crew capacity would allow prescribed fires to continue even during active fire seasons. • Expand the use of crews beyond the Peninsula. • Utilize inter-agency burn crews (include local FD's and VFD's).	• Create resilient and fire adapted landscapes and address potential for extreme wildfire behavior in and around communities.	Within 5 years	H	• Review progress annually • Number of acres treated • Number of agencies collaborating	• Funding for Fire Departments and First Responders • Emergency Management Performance Grant (EMPG) • Volunteer Fire Assistance Program • Staffing for Adequate Fire and Emergency Response (SAFER) • Assistance to Firefighters Grants (AFG) • State and Private Forestry Programs – NASF • National Fire Protection Association • Matching Awards Program • Serve Alaska • Hazard Mitigation Planning Assistance • Community Development Block Grants – Mitigation - Alaska
Continue to promote wildlife habitat improvements through forest management	Kenai Peninsula-wide	ADFG, State Forestry, Federal Agencies, Alaska Native landowners	• Increase promotion of the use of prescribed fire for moose habitat • Utilize science-based literature from agencies • Utilize literature that shows multiple wildlife benefits • Reforest/restore burn areas for wildlife habitat improvements. • Address "shrubification" concerns- shrubs moving to higher elevations and encroaching on alpine tundra. • Highlight the perils of returning to a suppression era on wildlife habitat. • Utilize science on beetle infestations. • Continue to buffer WUI communities so that wildfire can play a larger role in the broader landscape.	• Protection of wildlife habitat	Ongoing	H	• Review progress annually • Identify metrics and monitor accomplishments in promoting wildlife habitat	• Pre-disaster Mitigation (PDM) Grant Program • General Assistance Program • Multipurpose Grants to States and Tribes • Environmental Quality Incentives Program (EQIP) • Urban and Community Forestry Program, 2021 National Urban and Community Forestry Challenge Cost Share Grant Program • Catalog of Federal Funding Sources; Land Resources • Emergency Forest Restoration Program (EFRP) • The National Fire Plan (NFP) • Matching Awards Program • U.S. Endowment for Forestry and Communities • Hazard Mitigation Planning Assistance • Community Development Block Grants – Mitigation – Alaska • Western Wildland-Urban Interface (WUI) Grants • Western Bark Beetle Initiative Grant Program • Community Development Block Grants – Disaster Recovery - Alaska

Project Description	Location	Land Ownership/ Lead Agency	Methodology/Approach	Serves to:	Timeline for Action	Priority (H, M, L)	Monitoring or Maintenance Requirements	Funding Sources
Collaboratively plan for vegetation management treatments that serve a demand for increasing recreation opportunities	Kenai Peninsula-wide	ADFG State Forestry USFS State Div. of Parks City rec depts.	• Plan for mutually beneficial goals by coordinating fire and vegetation management with recreation to build public support. • Work with utility companies to seek opportunities to create recreational spaces in existing or proposed ROW. • Consider the use of dozer lines (fire suppression actions) for increased access for fire protection. • Develop new recreational trails strategically to provide for increased access for fire suppression. • Integrate with stewardship planning • Address hazard trees on trails and ROW to enhance public safety • Identify and work with communities interested in recreational use and fuel breaks- Cooper Landing, Moose Pass, Hope, Sunrise, Seward, Homer.	• Create mutual benefits for hazardous fuels treatments.	Ongoing	H	• Review progress annually • Update and revise plans annually	• State Parks funding • NRCS EQUIP • Pittman-Robinson dollars can be used on trails and fuel breaks • Look for cost-match opportunities- i.e., utilizing Chugachmiut crews. • The National Fire Plan (NFP) • Urban and Community Forestry Program, 2021 National Urban and Community Forestry Challenge Cost Share Grant Program • Serve Alaska • Pre-disaster Mitigation (PDM) Grant Program • Staffing for Adequate Fire and Emergency Response (SAFER) • Assistance to Firefighters Grants (AFG) • State and Private Forestry Programs – NASF • Firewise Communities • National Fire Protection Association • National Interagency Fire Center, Wildland Fire Prevention/Education • Western Wildland-Urban Interface (WUI) Grants • Private Landowner Assistance Grant • Hazard Mitigation Planning Assistance • Community Development Block Grants – Mitigation – Alaska • Alaska Firewise

Project Description	Location	Land Ownership/ Lead Agency	Methodology/Approach	Serves to:	Timeline for Action	Priority (H, M, L)	Monitoring or Maintenance Requirements	Funding Sources
Reinvigorate timber industry to provide market for lumber removed through treatments, when possible if land management policies allow. (*Meets goal of the 2019 KPB HMP- Decrease fuels in high-risk areas-Table 3.6*)	Kenai Peninsula-wide	Commercial Industry KPB Planning Dept Will require long term commitment by USFWS and USFS	• Form a working group to explore options for building and maintaining a forest industry (maybe a committee under the ALAH group). • Complete a feasibility study for markets, infrastructure, and transportation. • Improve technical assistance program to promote commercial uses for fuel reduction materials (*from 2019 KPB HMP*) • Look for market options for beetle killed trees- i.e., harvest dead white spruce prior to rot so as to maximize value. • Harvest SBB trees within 1 year of mortality to maximize value as sawlogs • Develop plan for shipping/transit out of state. • Coordinate federal, state, and local efforts to provide public firewood cutting areas as a means to reduce potential wildfire fuel sources by taking dead and downed trees (*from the 2019 KPB HMP*) • Identify land where commercial timber opportunities are allowable. Many public land management agencies have policies that prohibit commercial timber operations.	• Reduce hazardous fuel loads and increase future resiliency against continued beetle outbreaks.	Over next 10 years	M	• Incentives likely at first to develop the system	• Funds: federal infrastructure spending • Pre-disaster Mitigation (PDM) Grant Program • Building Resilient Infrastructure and Communities (BRIC) program • RAISE Discretionary Grants • Rural Opportunities to Use Transportation for Economic Success (ROUTES) • Matching Awards Program • U.S. Endowment for Forestry and Communities • Western Bark Beetle Initiative Grant Program • Community Assistance Program
Work with utilities/ infrastructure entities to address wildfire risk along utility/infrastructure ROW (see Strategic Infrastructure Recommendations, Appendix I, for more recommendations related to infrastructure resilience).	Along ROWs & utility easements	Utilities, Energy Industry and associated landowners	• Developed fire management plans for utilities focused on vegetation management, infrastructure hardening, situational awareness etc. • Look for opportunities to provide multiple benefits from ROW clearance and maintenance – recreation, fire suppression access etc. • Index different types of ROWs and develop specific treatment protocols • Accompany fire management and fuels treatment plans with strategies to address debris removal and maintenance. • Deploy resources to ensure ROW and utilities are maintained • Identify policy incentives for utilities to invest in aggressive ROW clearing	• Increase security afforded by transportation, electricity, communications & natural gas. • Reduce potential ignitions in the WUI. • Enhance fire suppression tactics	Within 1 year	H	• Maintenance and monitoring plans	• Company budgets • Pre-disaster Mitigation (PDM) Grant Program • Hazard Mitigation Grant Program (HMGP) • General Assistance Program • Public Assistance Grant Program • Emergency Forest Restoration Program (EFRP) • Matching Awards Program • U.S. Endowment for Forestry and Communities • Firewise Communities • The Urban Land Institute (ULI) • The National Fire Plan (NFP) • Urban and Community Forestry Program, 2021 National Urban and Community Forestry Challenge Cost Share Grant Program • Serve Alaska • Environmental Quality Incentives Program (EQIP) • Hazard Mitigation Planning Assistance • Community Assistance Program • Community Development Block Grants – Alaska • Community Development Block Grants – Mitigation - Alaska

Project Description	Location	Land Ownership/ Lead Agency	Methodology/Approach	Serves to:	Timeline for Action	Priority (H, M, L)	Monitoring or Maintenance Requirements	Funding Sources
Streamline grant management	Kenai Peninsula-wide	Kenai Peninsula Borough State Forestry Conservation Districts	• Develop and implement consistent and effective procedures for procurement, contracting, grants and agreements to support interagency projects (*from 2019 KPB HMP*) • Use one agency to manage grants for fuels treatments on all lands instead of having each agency competing for grant monies • Establish KPB internet-based information system to ID funding opportunities (*from 2019 KPB HMP*) • Assign 1 person or agency to monitor funding opportunities, prepare application assistance for grant monies and coordinate with other agencies	• Increase capacity and leverage agency resources	Within 2 years	H	• Annual review of progress, needs and accomplishments.	• Agency Budgets • Community Assistance Program

Fuels Treatment Scales

Defensible Space

Defensible space is perhaps the fastest, most cost-effective, and most efficacious means of reducing the risk of loss of life and property. Although fire agencies can be valuable in providing guidance and assistance, creating defensible space is the responsibility of the individual homeowner (Figure 4.4).

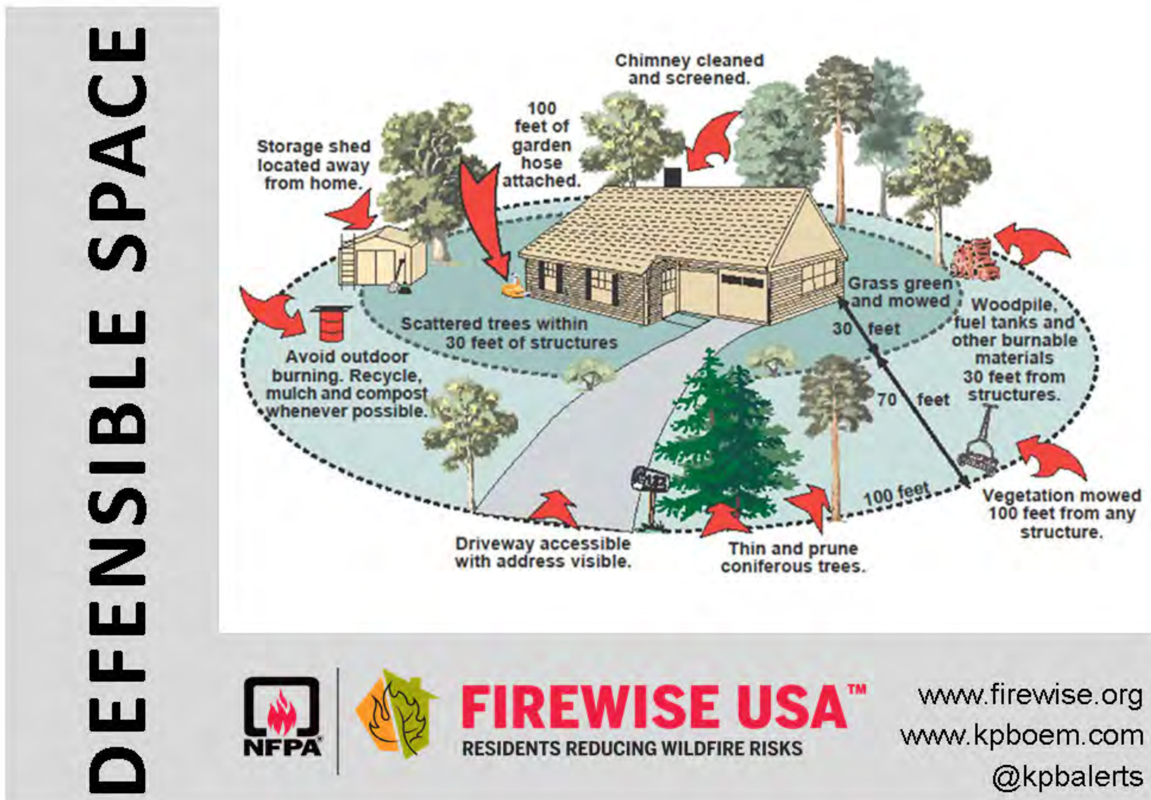

Figure 4.4. Defensible space providing clearance between a structure and adjacent woodland or forest fuels.

Source: Alaska Firewise

Effective defensible space consists of creating an essentially fire-free zone adjacent to the home, a treated secondary zone that is thinned and cleaned of surface fuels, and (if the parcel is large enough) a transitional third zone that is basically a managed forest area. These components work together in a proven and predictable manner. Zone 1 keeps fire from burning directly to the home; Zone 2 reduces the adjacent fire intensity and the likelihood of torching, crown fire, and ember production; and Zone 3 does the same at a broader scale, keeping the fire intensity lower by maintaining a more natural, historic condition (Figures 4.4 and 4.5).

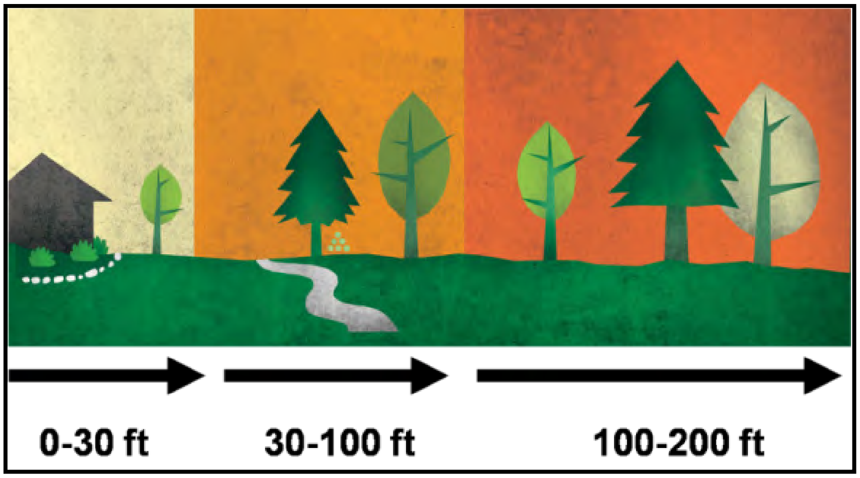

Figure 4.5. Defensible space zones.
Source: www.firewise.org.

Three zones for defensible space actions are described below:

Zone 1: This zone, which consists of an area of 0 to 30 feet around the structure, features the most intense modification and treatment. This distance is measured from the outside edge of the home's eaves and any attached structures, such as decks. Do not plant directly beneath windows or next to foundation vents. Frequently prune and maintain plants in this zone to ensure vigorous growth and a low growth habit. Remove dead branches, stems, and leaves. Do not store firewood or other combustible materials in this area. Enclose or screen decks with metal screening. Extend gravel coverage under the decks. Do not use areas under decks for storage. Prune low-lying branches (ladder fuels that would allow a surface fire to climb into the tree) and any branches that interfere with the roof or are within 10 feet of the chimney. In all other areas, prune all branches of shrubs or trees up to a height of 10 feet above ground (or one-third the height, whichever is the least).

Zone 2: This zone features fuel reduction efforts and serves as a transitional area between Zones 1 and 3. The size of Zone 2 depends on the slope of the ground where the structure is built. Typically, the defensible space should extend at least 100 feet from the structure. Remove stressed, diseased, dead, or dying trees and shrubs, following guidance from forestry professionals (Appendix G). Thin and prune the remaining larger trees and shrubs. Be sure to extend thinning along either side of your driveway all the way to your main access road. These actions help eliminate the continuous fuel surrounding a structure while enhancing home site safety and the aesthetics of the property. Keep grass and wildflowers under 8 inches in height. Regularly remove leaf and needle debris from the yard.

Zone 3: This area extends from the edge of your defensible space to your property boundaries. The healthiest forest is one that has multiple ages, sizes, and species of trees where adequate growing room is maintained over time, so maintain a distance of at least 10 feet between the tops of trees. Remove ladder fuels, creating a separation between low-level vegetation and tree branches to keep fire from climbing up trees. A greater number of wildlife trees can remain in Zone 3, but regularly remove dead trees and shrubs. Ensure trees in this area do not pose a threat to power lines or access roads.

It should be emphasized that defensible space is just that—an area that allows firefighters to work effectively and with some degree of safety to defend structures. While defensible space may increase a home's chance of surviving a fire on its own, a structure's survival is not guaranteed, with or without firefighter protection. Nevertheless, when these principles are consistently applied across a neighborhood, everybody benefits.

Specific recommendations should be based on the hazards adjacent to a structure such as slope steepness and fuel type. Firewise guidelines and the Homeowner's Guide (Appendix G) are excellent resources but creating defensible space does not have to be an overwhelming process. The National Fire Protection Association (NFPA) offers a free Community Wildfire Risk Assessment Tutorial and an online learning module, Understanding the Wildfire Threat to Homes. Both tools are great resources for learning about, and implementing, defensible space.

Assisting neighbors in defensible space activities may be essential in many cases in order to expand the extent of treatments on private lands. Homeowners should consider assisting the elderly, sharing ladders for gutter cleaning, and assisting neighbors with large thinning needs. Homeowner actions have been found to also motivate neighbors to act, increasing the scope of the wildfire mitigation across a community (Evans et al. 2015). The DOF has been tracking homeowners' activities related to defensible space. Figure 4.6 shows the number of completed homeowners' defensible space activities beginning in 2015 and through 2021. This information conveys that many residents are already taking responsibility for mitigating their own properties, but more work is needed in order to provide greater effect on fuels in the WUI (Figure 4.7).

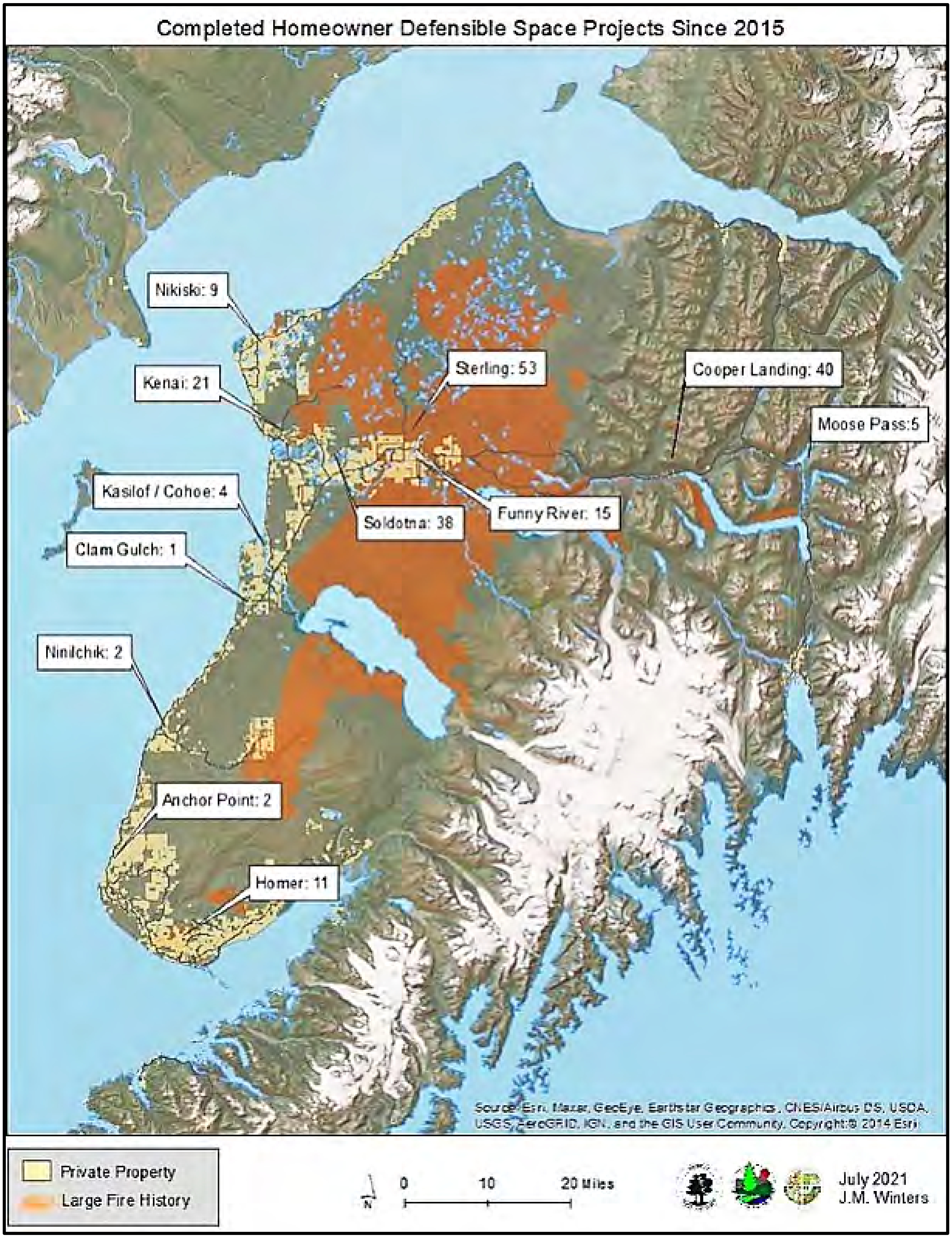

Figure 4.6 Homeowner defensible space from 2015 through 2021.

Source: DOF.

Figure 4.7. Example of poor defensible space.

Adopting a phased approach to home hardening can make the process more manageable and encourage maintenance (Table 4.2).

Table 4.2. Example of a Phased Approach to Mitigating Home Ignitability

Year	Project	Actions
1	Basic yard cleanup (annual)	Dispose of clutter in the yard and under porches. Remove dead branches from yard. Mow and rake. Clean off roofs and gutters. Remove combustible vegetation near structures. Coordinate disposal as a neighborhood or community. Post 4-inch reflective address numbers visible from road.
2	Understory thinning near structures	Repeat basic yard cleanup. Limb trees up to 6–10 feet. Trim branches back 15 feet from chimneys. Trim or cut down brush. Remove young trees that can carry fire into forest canopy. Coordinate disposal as a neighborhood or community. To limit the spread of invasive grasses, familiarize yourself with invasive plants in your area and treat them on your property. Wash and dry all equipment before and after thinning vegetation.
3	Understory thinning on private property along roads and drainages	Limb trees up to 6–10 feet. Trim or cut down brush. Remove young trees that can carry fire into forest canopy. Coordinate disposal as a neighborhood or community.

Year	Project	Actions
4	Overstory treatments on private property	Evaluate the need to thin mature or diseased trees. Prioritize and coordinate tree removal within neighborhoods to increase cost effectiveness.
5	Restart defensible space treatment cycle	Continue the annual basic yard cleanup. Evaluate need to revisit past efforts or catch those that were bypassed.

Fuel Breaks

Fuel treatments are methods for controlling live and dead vegetation with the purpose of minimizing the negative impacts of an area burning during a wildfire. Fuel breaks are not expected to stop fires entirely but are typically designed to provide fire managers with strategic locations near communities or important infrastructure that allow crews to conduct burnout of fuels to limit advancement of wildland fires. Fuel breaks may stop fire spread during mild weather conditions but usually require tactical response from fire suppression personnel to effectively contain the spread (Wahrenbrock 2022).Furthermore, fuel break utility is contingent upon regular maintenance, as regrowth in a fuel break can quickly reduce its effectiveness and vegetation in this ecosystem is known to quickly re-sprout and reestablish. Maintenance of existing breaks could be more cost efficient than installation of new features.

Well-managed fuels reduction projects often result in ecological benefits to wildlife and watershed health. Simultaneously, planning and resource management efforts should occur when possible while reducing fuels to ensure that the land remains viable for multiple uses in the long term. For example, fuel breaks could be aligned with existing areas of ROW clearance by working with utility companies and combining resources. Similarly, fuel breaks could be developed in conjunction with recreational trails to serve multiple purposes and provide access to the community. The effectiveness of any fuels reduction treatment will increase over time with a maintenance and monitoring plan. Monitoring will also ensure that objectives are being met in a cost-effective manner.

It is not possible to provide a standard treatment prescription for the entire landscape because fuel break dimensions should be based on the local fuel conditions and prevailing weather patterns. For example, in some areas, clearing an area too wide could open the landscape to strong winds that could generate more intense fire behavior and/or create wind throw. Fire behavior in the CWPP planning area has been modeled as part of the QWRA. This assessment provides estimates of flame length and other fire behavior; the information should be used by land managers when prescribing treatments.

Strategic placement of fuel breaks is critical to prevent fire from moving from wildland fuels into adjacent neighborhoods. For effective management of most fuels, fuel breaks should be prescribed based on the conditions in each particular treatment area. Some examples of this would be to place fuel breaks in areas where fuels are heavier, in areas with easy access for fire crews, or in areas where strong winds are expected to increase fire spread. In areas where the vegetation is discontinuous, fuel treatments may not be necessary. In this situation it is best to leave the site in its current condition to avoid the introduction of more flammable, exotic species which may respond readily following disturbance.

Fuel Breaks on the Peninsula

The use of fuel breaks is well practiced across the Borough, with several large fuel break projects in place or in planning. The majority of fuel treatments in Alaskan communities have been inserted as firebreaks (a section of bare, open space to stop the spread of fire) or fuel breaks (a section of vegetation that has been modified to decrease fire behavior) (UAF 2018). The idea is that fuel treatments that reduce fuel loading or alter fuel properties can result in modifications in fire behavior such as limiting a fire to the surface as opposed to a canopy fire (UAF 2018). Lower intensity surface fires may even be beneficial to the ecosystem and allow for improved firefighter access.

Fuel treatments can have a wide range of impacts on the local ecosystem, including unintended impacts. For instance, a study by the UAF and USFS, *Evaluating Fuel Treatments in Alaska* (the study) (UAF 2018), found that a couple sites receiving cleared fuel breaks experienced surface drying, increased flammable surface fuels, and higher mid-flame windspeeds. Another important finding of the study was that fuel breaks can result in unintended tree damage and loss. Pruning punctures and thinning shock increase susceptibility to insect infestation and increases the risk of tree mortality. Additionally, the degree of change in understory plant communities is influenced by fuel treatment type. For example, the study found that significant vegetation shifts occurred with a higher frequency in cleared breaks than in shaded breaks.

Removing or significantly reducing canopy cover alters the ecology of the treated landscape. Negative impacts such as the growth of light and flashy fuels, thawing of the permafrost layer, and increasing tree susceptibility to wind and insect infestation have been noted in treated areas. Therefore, fuel treatments should be planned to keep as much of the canopy cover as possible to shade the understory, decrease wind speeds, and decrease the potential growth of light and flashy fuels. The study determined that a maximum spacing of 8 × 8 feet with pruning from below in interior Alaskan black spruce forests could decrease the potential negative ecological effects of fuel treatment while maintaining the positive benefits of lowering canopy fire potential and allowing for easier fire response access. The study also discovered that rates of spread were often higher in cleared breaks (canopy removal) relative to shaded fuel breaks in white spruce hardwood stands. They also detected the shift from timber understory to a grass and shrub community, with the associated increased rates of spread and flame lengths due to the nature of the new fuels.

Models gauging the effect of fuel breaks on fire behavior indicate that changes to fire behavior persist as much as 14 years post treatment, specifically in interior Alaskan black spruce forests. (UAF 2018). The models were executed under average summer conditions and drier summer conditions; both scenarios showed that fuel treatment lowered fire behavior properties, including rate of spread, flame length, and Fireline intensity (UAF 2018). Overall, the study found that fuel treatments minimize fire behavior potential under a range of weather conditions; however, benefits start decreasing with increasing wind speed. It should also be noted that fuel treatments, particularly around communities, should not be expected to stop a fire without human intervention. Instead, fuel treatments should be planned and implemented within a cohesive fire suppression plan or CWPP that details how the treated area will be utilized to assist fire suppression efforts.

Maintenance of fuel treatments on a consistent schedule will allow for treatments to retain the properties required for reducing fire behavior potential. UAF's 2018 modeling results indicate that changes to fire behavior remain as long as 14 years after treatment, particularly in interior Alaskan black spruce forests. Therefore, UAF (2018) recommends fuel treatments maintenance on a 10- to 15-year period, although slow-growing interior black spruce stands may necessitate longer maintenance periods. UAF (2018) also recommends fuel treatments to be arranged and maintained within a broad fire management plan that details how the treated areas will be utilized by fire personnel in the event of advancing wildfires and the frequency of treatment maintenance.

An example of a recent fuel break on the KPB is the Strategic (also known as Sterling) Fuel Break. The fuel break has been under construction since 2016, and in 2020, the fuel break covered approximately 12 miles along the WUI between Sterling and the Kenai Wildlife Refuge. The fuel break is around 300 feet wide and was constructed using an assortment of methods, equipment, and resources. The next phase of the project is a proposed extension, named the Kenai Fuel Break. This break would be around 8 miles long and 300 feet wide, situated on Kenai Wildlife Refuge land roughly 8 miles northwest of the community of Kenai, and connecting an area between Marathon Road and Spirit Lake, buffering the Homer Electric and ENSTAR natural gas utility corridor. The proposed area for the Kenai Fuel Break is unique in that the area has a large amount of beetle-killed spruce trees; treatment of these areas would require felling of dead trees (USFWS 2020a).

Fuel Breaks and Open Space Cleanup

The next location priority for fuels treatments should be where the community meets the wildland. This may be the outer margins of a town or an area adjacent to occluded open spaces such as a park. Fuel breaks (also known as shaded fuel breaks) are strips of land where fuel (for example living trees and brush, and dead branches, leaves or downed logs) has been modified or reduced to limit the fire's ability to spread rapidly (Figure 4.8). Fuel breaks should not be confused with firebreaks, which are areas where vegetation and organic matter is removed down to mineral soil. Shaded fuel breaks may be created to provide options for suppression resources or to provide opportunities to introduce prescribed fire. In many cases, shaded fuel breaks may be created by thinning along roads. This provides access for mitigation resources and firefighters, as well as enhancing the safety of evacuation routes.

Figure 4.8. Fuel break area with deciduous regrowth.

Larger-scale Treatments

Farther away from WUI communities, the emphasis of treatments often becomes broader. While reducing the buildup of hazardous fuels remains important, other objectives are often included, such as forest health and resiliency to catastrophic wildfire and climate change considerations. Wildfires frequently burn across jurisdictional boundaries, sometimes on landscape scales. As such, these larger treatments need to be coordinated on a strategic level. This requires coordination between projects and jurisdictions, as is currently occurring. Land managers have carried out numerous forest restoration projects across the

Borough and have ongoing projects planned on public land that are designed to reduce hazardous fuels to protect communities and resources, while restoring fire-adapted communities (see Figure 4.1).

SBB 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. The length of time it takes for SBB-killed trees to fall varies from site to site and is contingent on factors such as existing diseases, wind patterns, and ground moisture (UAF 2013). SBB-killed trees have been reported falling as early as 1 to 3 years (USFS 2021e) to as late as 15 years after mortality, with a typical period of 5 years (Wahrenbrock 2022). The buildup of dead and downed trees on the surface can impact wildfire behavior. As such, SBB mitigation efforts are in progress in the Chugach National Forest. The mitigation efforts are being implemented in five USFS campgrounds: Cooper Creek, Quartz Creek, Russian River, Crescent Creek, and Tenderfoot. Mitigation methods are focused on removing dead and dying trees to minimize the risk of wildfire hazards. Contingent on the degree of SBB infestation, treatment options include removal of entire stands of infected trees, thinning infected areas of dense stands, or applying inhibitory agents to protect healthy trees from SBB infestation (USFS 2021e).

Another large-scale treatment currently in progress on the Kenai Peninsula is the Kenai Peninsula Habitat Enhancement project. The project area comprises over 117 acres and is located on the southern Kenai Peninsula in the Anchor River/Fritz Creek critical habitat area. The project focuses on enhancing moose habitat by stimulating willow regeneration. Treatment consists mainly of mowing mature willows to stimulate regeneration from the base of plants. Other treatments include top-killing or felling of hardwood trees, such as cottonwoods, to encourage stump sprouting (ADFG 2021b).

Fuel Treatment Methods

Since specifics of the treatments are not provided in detail in Table 4.1, different fuels reduction methods are outlined in the following narrative.

Several treatment methods are commonly used, including manual and mechanized treatments and targeted treatments to address hazard trees and beetle kill (Appendix G); prescribed fire is another treatment option that is being considered for additional use in forest and fuels management (Table 4.3). This brief synopsis of treatment options is provided for general knowledge; specific projects will require further planning. The appropriate treatment method and cost will vary depending on factors such as the following:

- Diameter of materials
- Proximity to structures
- Acreage of project
- Fuel costs
- Steepness of slope
- Area accessibility
- Density of fuels
- Project objectives

It is imperative that long-term monitoring and maintenance of all treatments is implemented. Post-treatment rehabilitation such as seeding with native plants and erosion control may be necessary.

Table 4.3. Summary of Fuels Treatment Methods

Treatment	Comments
Machine mowing	Appropriate for large, flat, grassy areas on relatively flat terrain.
Prescribed fire	Not widely used on the Borough but could be integrated into vegetation management through further interagency coordination. Can be very cost effective. Ecologically beneficial. Utilize fire to maintain fire adapted ecosystems. Can be used as training opportunities for firefighters. May require manual or mechanical pretreatment. Carries risk of escape, which may be unacceptable in some WUI areas. Unreliable scheduling due to weather and smoke management constraints.
Brush mastication	Brush species tend to re-sprout vigorously after mechanical treatment. Frequent maintenance of treatments are typically necessary. Mastication tends to be less expensive than manual (chainsaw) treatment and eliminates disposal issues.
Timber mastication	Materials up to 10 inches in diameter and slopes up to 30% can be treated. Eliminates disposal issues. Environmental impact of residue being left on site is still being studied.
Manual treatment with chipping or pile burning	Requires chipping, hauling, pile burning of slash in cases where lop and scatter is inappropriate. Pile burning must comply with smoke management policy.
Feller buncher	Mechanical treatment on slopes more than 30% or of materials more than 10 inches in diameter may require a feller buncher rather than a masticator. Costs tend to be considerably higher than masticator.

Manual Treatment

Manual treatment refers to crew-implemented cutting with chainsaws. Although it can be more expensive than mechanized treatment, crews can access many areas that are too steep or otherwise inaccessible with machines. Treatments can often be implemented with more precision than prescribed fire or mechanized methods allow. Merchantable materials and firewood can be removed, while non-merchantable materials are often lopped and scattered, chipped, or piled and burned on-site. Care should be exercised to not increase the fire hazard by failing to remove or treat discarded material in a site-appropriate manner. In addition, impacts to anadromous waters should be considered when designing and implementing site-specific fuels treatments.

Strategic timing and placement of fuels treatments is critical for effective fuels management practices and should be prescribed based on the conditions of each particular treatment area. Some examples of this would be to place fuel breaks in areas where the fuels are heavier and in the path of prevailing winds and to mow grasses just before they cure and become flammable. Also, burning during the hotter end of the prescription is important since hotter fires are typically more effective at reducing heavy fuels and shrub growth. In areas where the vegetation is sparse and not continuous, fuels treatments may not be necessary to create a defensible area where firefighters can work. In this situation, where the amount of fuel to carry a fire is minimal, it is best to leave the site in its current condition to avoid the introduction of exotic species.

Mechanized Treatments

Mechanized treatments include mowing, mastication (ground-up timber into small pieces), and whole tree felling. These treatments allow for more precision than prescribed fire and are often more cost-effective than manual treatment (Figures 4.9–4.13).

Figure 4.9. Fire crew burning out a treated area.
Photo Credit: USFWS 2014

Figure 4.10. Strategic Fuel Break (also called Sterling Fuel Break).
Photo Credit: InciWeb

Figure 4.11. Yukon Fire Crew.
Photo Credit: Chugachmiut Forestry

Figure 4.12. Example of treated stand.
Photo Credit: Chugachmiut Forestry

Figure 4.13. Sterling Fuel Break.
Photo Credit: USFWS (2017)

Mechanized treatments utilize heavy equipment, which may involve crossing over water bodies during transportation. As such, impacts to anadromous waters should be considered when designing site-specific mechanized treatments.

Mowing, including ATV- and tractor-pulled mower decks, can effectively reduce grass fuels adjacent to structures and along highway rights-of-way (Figure 4.14) and fence lines. For heavier fuels, a number of different masticating machines can be used, including drum- or blade-type masticating heads mounted on machines and ranging in size from a small skid-steer to large front-end loaders. Some masticators are capable of grinding standing timber up to 10 inches in diameter. Other masticators are more effective for use in brush or surface fuels. Mowing and mastication do not actually reduce the amount of on-site biomass but alter the fuel arrangement to a less combustible profile.

In existing fuel break areas, maintenance is crucial especially in areas of encroaching shrubs or trees. In extreme risk areas more intensive fuels treatments may be necessary to keep the fire on the ground surface and reduce flame lengths. Within the fuel break, shrubs should be removed, and the branches of trees should be pruned from the ground surface to a height of 4 to 8 feet, depending on the height of the fuel below the canopy, and thinned with a spacing of at least two to three times the height of the trees to avoid movement of an active fire into the canopy.

Mechanical shears mounted on feller bunchers are used for whole tree removal (Figure 4.15). The stems are typically hauled off-site for utilization while the limbs are discarded. The discarded material may be masticated, chipped, or burned in order to reduce the wildfire hazard and to speed the recycling of nutrients.

Figure 4.14. Example of fuels along roadways.

Figure 4.15. Feller equipped with a full-tree processing head that fells, delimbs, and then cuts tree stem to desired length or diameter log size.

Prescribed Burning

Prescribed burning is also a useful tool to reduce the threat of extreme fire behavior by removing excessive standing plant material, litter, and woody debris while limiting the encroachment of shrubby vegetation. Intentionally burning many areas of small acreage through prescribed fire can mitigate the potential damage (in terms of acreage burned) of uncontrolled wildfires. While not commonly practiced currently on the Borough, in the future, the reintroduction of fire through prescribed methods, would provide ecological benefit to many vegetation communities. Land managers are currently strategizing to increase prescribed burning within the Borough.

If a prescribed burn program is introduced, all prescribed fire operations would be conducted in accordance with federal and state laws and regulations. Public safety would be the primary consideration in the design of any prescribed burn plan so as to not negatively impact the WUI. Agency use of prescribed fire on public lands would be carried out within the confines of the agency's fire management planning documents and would require individual prescribed burn plans that consider smoke management concerns, air quality criteria, and sensitive receptors within the WUI. All burn plans must be approved by the Agency Administrator (AWFCG 2021). In addition, all prescribed burn operations must be in accordance with the latest Alaska Department of Environmental Conservation (ADEC) Enhanced Smoke Management Plan. The Interagency Prescribed Fire Planning and Implementation Procedures Guide may be used to supplement burn planning. Furthermore, under Alaska regulation, permits are required for prescribed burn operations depending on the burn size and/or time of year. The ADEC administers permits for burns 40 acres or larger, and the DOF administers permits for burns 40 acres or less from April 1 through September 1.

Following any type of fuels reduction treatment, post-treatment monitoring should ensure that management actions continue to be effective throughout the fire season. The vegetation within this ecosystem can change rapidly in response to drought or moisture from year to year and during the course of the season, so fuels treatments should be adjusted accordingly.

Several re-entries may be needed to meet full resource management objectives, so a solid maintenance plan is needed to ensure success.

Impacts of Prescribed Fire on Communities

Managing smoke from prescribed fires is an important part of planning for prescribed burning. The ADEC, Division of Air Quality, has smoke management guidelines to protect the health and welfare of Alaskans from the impacts of smoke (AWFCG 2021). Smoke from burning vegetation produces air pollutants that are regulated by both the U.S. Environmental Protection Agency and the State of Alaska.

More information regarding open burn regulations is provided here: https://dec.alaska.gov/air/air-permit/open-burn-info

Thinning and Prescribed Fire Combined

Combining thinning and prescribed fire can be the most effective treatment (Graham et al. 2004).
In forests where fire exclusion or disease has created a buildup of hazardous fuels, prescribed fire cannot be safely applied, and pre-burn thinning is required. The subsequent use of fire can further reduce residual fuels and reintroduce this ecologically imperative process.

Management of Non-Native Plants

The ADNR, Division of Agriculture, maintains a list of noxious weeds rated from A to C based on the current degree of infestation of the species and the potential for eradication (ADNR 2021a). Fuel treatment approaches should always consider the potential for introduction or proliferation of invasive non-native species as a result of management actions.

The list of noxious weeds is available here: http://plants.alaska.gov/invasives/noxious-weeds.htm

The Strategic Plan for Invasive Weed & Agricultural Pest Management and Prevention in Alaska is located here: http://plants.alaska.gov/invasives/strategic-plan.htm

Wildlife Habitat and Species Protections

Alaska contains 365.5 million acres of land, 28.8 million acres of freshwater lakes, rivers and ponds, and 6,640 miles of coastline. Around 88% of the state is in public ownership and many areas are set aside to protect their natural features, including a broad variety of fish and wildlife habitats. These areas differ in their specific purposes and include sanctuaries, critical habitat areas, state wildlife refuges, and waters important to anadromous fish (ADFG 2021c).

Many of the rivers, lakes, and streams in Alaska support a variety of anadromous fish, including Pacific salmon, several species of trout, char, whitefish, lamprey, and smelt. Due to the importance of these fish to Alaska's economy and environment, these waters receive special protections to ensure they keep supporting abundant runs of fish. These protections require that individuals or governmental agencies seeking to construct a hydraulic project or use, divert, obstruct, pollute, or change the natural flow or bed of a specified river, lake, or stream must notify the ADFG (ADFG 2021d). The protections apply to all parts of streams, rivers, and lakes—regardless of size—that are important for the spawning, rearing, or migration of anadromous fish (Alaska State Legislature 2022).

Critical habitat areas, state wildlife refuges, and wildlife sanctuaries are designated as special areas by the Alaska State Legislature. These areas were created to protect fish and wildlife habitats. Most recreational activities such as fishing, hunting, and wildlife viewing on these lands do not require a permit. However, many other activities that have the potential to impact fish, wildlife, or habitats require a permit. Activities requiring a permit include, but are not limited to, clearing or disturbing vegetation, construction or placement of structures, streambank or shoreline modifications, and any activity that is likely to have a significant effect on vegetation, drainage, water quality, soil stability, fish, wildlife, or their habitat (ADFG 2021e).

Because stream crossing and water withdrawals during wildland fire suppression activities constitute a disruption to fish and their habitat, the DOF has obtained a permit from the ADFG for fire response activities on the peninsula. The permit is valid from December 21, 2020, through December 31, 2025. The permit applies to waterbodies throughout the state and allows for the following (ADFG 2020):

- Crossing all resident fish waterbodies and the extents of catalogued waterbodies not designated as spawning habitat for anadromous fish with vehicles and heavy equipment.
- The potential construction of reinforced crossing structures, aerial scooping, and subsurface pumping of water from waterbodies during wildland fire–related suppression activities.

In addition, the permit stipulates that projects proposed by the DOF should not have adverse impacts on anadromous fish or their habitat and should not obstruct the free passage of fish, in accordance with the Anadromous Fish Act and Fishway Act (ADFG 2020).

There are several special areas within the KPB managed by a number of agencies that may require special treatment.

More information about ADFG protected areas can be found here: https://www.adfg.alaska.gov/index.cfm?adfg=conservationareas.locator

The ADFG protected waters on the Kenai Peninsula can be found in the Anadromous Water Catalog: https://www.adfg.alaska.gov/sf/SARR/AWC/index.cfm?ADFG=maps.displayViewer Information about protected areas on federally managed land is provided in Appendix A.

Land treatments that are used to reduce fuels are also potentially beneficial to wildlife and their habitats. Crushing and burning vegetation may not appear to be ecosystem enhancements, but wildland fires are a natural part of the interior Alaska ecosystem, and animals and plants have adapted to periodic fires. Plants like willow, fireweed, aspen, and birch are nutritious, high-quality forage for moose. These plants typically regenerate and thrive after specific kinds of disturbances, such as mechanical crushing by roller choppers or fire. Renewing growth isn't the only benefit of fire. Standing dead trees provide roosts for birds of prey and homes for cavity nesters such as woodpeckers. Downed trees provide cover for hares, voles, and marten—shelter that is critically needed in winter (ADFG 2015).

Another process that stimulates plant growth is ice scouring where large chunks of ice that are rafted down rivers and rake riverbanks and gravel bars shear off willow and thereby stimulate regeneration in the next growing season. Mechanical crushing imitates the process on upland sites and encourages plant regeneration as well. For instance, when aspen are cut down, they resprout quickly by producing root suckers. Different age classes of aspen provide varied resources to ruffed grouse throughout the year. Older aged aspens provide breeding and wintering habitat. Younger, denser aspen stands provide cover for clutches of chicks in summer, shielding them from predators (ADFG 2015).

COHESIVE STRATEGY GOAL 2: FIRE ADAPTED COMMUNITIES

Goal 2 of the Cohesive Strategy/Western Regional Action Plan is Fire-Adapted Communities: Human populations and infrastructure can withstand a wildfire without loss of life and property. The basic premise of this goal is:

> *"Preventing or minimizing the loss of life and property due to wildfire requires a combination of thorough pre-fire planning and action, followed by prudent and immediate response during a wildfire event. Post-fire activities can also speed community recovery efforts and help limit the long-term effects and costs of wildfire. CWPPs should identify high-risk areas and actions residents can take to reduce their risk. Fuels treatments in and near communities can provide buffer zones to protect structures, important community values and evacuation routes. Collaboration, self-sufficiency, acceptance of the risks and consequences of actions (or non-action), assisting those who need assistance (such as the elderly) and encouraging cultural and behavioral changes regarding fire and fire protection are important concepts. Attention will be paid to values to be protected in the middle ground (lands between the community and the forest) including: watersheds, viewsheds, utility and transportation corridors, cultural and historic values, etc."* (Western Regional Strategy Committee 2013:15).

Strategic actions listed within the ALAH Action Plan that serve the goal of **creating fire adapted communities** include (KPB Interagency 2018) the following:

- Inform and support communities that want to participate as a FAC that shares the responsibility for wildland fire mitigation practices.
- Collaboratively update and implement CWPPs.
- Promote fire resilient structures and defensible space practices advocated through nationally recognized programs.
- Support local response agencies with the capability to help communities prepare for and respond to wildland fires, including but not limited to establishing and promoting evacuation procedures and routes.

- Ensure that cooperative agreements among response agencies are current.
- Influence governing codes or ordinances that guide development within the WUI.
- Include as many stakeholders as possible in the design and implementation of fuel breaks to ensure a community-wide approach to fuels reduction projects.

In this CWPP update, recommendations for fire-adapted communities include public education and outreach actions and actions to reduce structural ignitability.

RECOMMENDATIONS FOR PUBLIC EDUCATION AND OUTREACH

Just as environmental hazards need to be mitigated to reduce the risk of fire loss, so do the human hazards. Lack of knowledge, lack of positive actions, and negative actions all contribute to increased risk of loss in the WUI.

Many residents understand the risk that wildfire poses to their communities. However, it is important to continually raise awareness of fire risk and improve fire education, particularly because the Borough is composed of such a vast area of forested public land that has been experiencing an intensified wildfire pattern (IARC 2021a). It is also important to keep in mind the ways in which wildfire impacts vulnerable populations. In particular, people who rely on electricity-dependent medical equipment and devices could experience life-threatening consequences due to prolonged power outages in the event of a wildfire. Table 4.4 lists recommendations for improving public education and outreach.

There are currently no Firewise certified communities within the Kenai Peninsula Borough. The Borough would benefit from greater exposure to the Firewise Communities (NFPA 2021), Fire Adapted Communities (Fire Adapted 2021), and a modified Ready, Set, Go! Program that is not dependent on color themes (International Association of Fire Chiefs 2021). Firewise programs have been found to motivate residents to carry out defensible space and other actions within their community, empower residents to take control of addressing wildfire risk, improve community cohesion through collective actions, and encourage coordination of outside agencies (Evan et al. 2019). Continuing enthusiasm over long periods is difficult however, particularly if a community “spark plug” or active coordinator leaves or steps down (Evans et al. 2015). Greater participation in these programs could improve local understanding of wildfire and, in turn, improve protection and preparedness.

Other methods to improve public education could include increasing awareness about fire department response and fire department resource needs; providing workshops at demonstration sites showing Firewise Communities landscaping techniques or fuels treatment projects; organizing community cleanups to remove green waste; publicizing availability of government funds for thinning and prescribed burning on private lands; and, most importantly, improving communication between homeowners and local land management agencies to improve and build trust, particularly because the implementation of fuel treatments and better maintenance of existing treatments needs to occur in the interface between public and private lands.

Considering the shared nature of wildfire risk experienced by numerous WUI communities, getting homeowners to implement fuel treatments on their property is usually a challenging task. However, it has been suggested that willingness to private wildfire risk mitigation activities is influenced by the presence and category of fuel treatment on adjacent public lands. A survey conducted by UAF (2018) found that homeowners were more likely to perform fuel treatments on their property if the neighboring lands had been treated. Homeowners were also more likely to execute the fuel treatment if the type was shaded fuel breaks as opposed to cleared fuel breaks. Furthermore, fuel breaks around communities endow a sense of protection in the event of a wildfire; thus, allowing communities to respond calmly in the event of a potentially dangerous situation (UAF 2018). However, it is important to stress that fuel breaks are not expected to stop a fire, rather they provide a place where firefighters can strategically locate resources to contain a fire. Table 4.4 lists public education and outreach projects recommended for implementation in the Borough.

RECOMMENDATIONS FOR REDUCING STRUCTURAL IGNITABILITY

Table 4.4 also provides a list of community-based recommendations to reduce structural ignitability that should be implemented throughout the CWPP planning area. Reduction of structural ignitability depends largely on public education that provides homeowners the information they need to take responsibility for protecting their own properties. A list of action items that individual homeowners can follow can be found below. Carrying out fuels reduction treatments on public land may only be effective in reducing fire risk to some communities; however, if homeowners have failed to provide mitigation efforts on their own land, the risk of home ignition remains high, and firefighter lives are put at risk when they carry out structural defense.

Preparing for wildland fire by creating defensible space around the home is an effective strategy for reducing structural ignitability. Studies have shown that burning vegetation beyond 120 feet of a structure is unlikely to ignite that property through radiant heat (Butler and Cohen 1996), but fire brands that travel independently of the flaming front have been known to destroy houses that had not been impacted by direct flame impingement. Hardening the home to ignition from embers, including maintaining vent coverings and other openings are also strongly advised as measures to protect a home from structural ignitability. Education about managing the landscape around a structure, such as removing weeds and debris within a 30-foot radius and keeping the roof and gutters of a home clean, are maintenance measures proven to limit combustible materials that could provide an ember bed and ignite the structure. Educating people about the benefits of proper maintenance of their property that includes pruning and trimming trees and shrubs and, where warranted, the removal of trees and other vegetation, and using Firewise Communities landscaping methods on their property is also essential for successful household protection.

It is important to note that no two properties are the same. Homeowners and communities are encouraged to research which treatments would have the most effect for their properties. Owners of properties on steep slopes, for example, should be aware that when constructing defensible space, they have to factor in slope and topography, which would require extensions to the conventional 30-foot recommendations. More detailed information on reducing structural ignitability can also be found in Appendix G (Additional Resources).

Some structural ignitability hazards are related to homes being in disrepair, vacant or abandoned lots, and minimal yard maintenance. In order to influence change in homeowner behavior, local ordinances may be needed.

In addition to protection of residences and other values, the Core Team convened a focus group meeting with KPB utility providers and fire responders, to discuss protection of strategic infrastructure. Those recommendations are provided in Table 4.4.

Table 4.4. Recommendations for Creating Fire-Adapted Communities (Public Education and Outreach and Structural Ignitability)

Project Description	Location	Land Ownership/ Lead Agency	Methodology/Approach	Serves to:	Timeline for Action	Priority (H, M, L)	Monitoring or Maintenance Requirements	Funding Sources
Increase understanding of the importance that fire plays in maintaining resilient landscapes	Kenai Peninsula-wide	FWS - Kenai Refuge Kenai Peninsula Borough ADFG State Forestry USFS	• Create interpretative trails in burn areas. • Place education signage at strategic turnouts along highways that show history / recovery, etc. • Build upon existing efforts to educate residents and visitors on the benefits of wildfire for forest health, wildlife habitat and resilience to insect and disease. • Project for ALAH group.	• Create resilient landscapes and address potential for extreme wildfire behavior in and around communities.	Ongoing	H	• Review progress annually • Number of educational initiatives	• National Interagency Fire Center • Firewise Communities • Serve Alaska • Matching Awards Program • Western Wildland-Urban Interface (WUI) Grants • Private Landowner Assistance Grant • Hazard Mitigation Planning Assistance • Community Development Block Grants – Mitigation - Alaska • Alaska Firewise
Promote publicly the use of a mixed mosaic of fuel types and structures for wildfire risk reduction in the WUI	Kenai Peninsula-wide	State Forestry, Kenai Peninsula Borough, ADFG, Kenai Peninsula Builders Association, Watershed Forum, Nature Conservancy, others.	• Create mosaic landscapes in public places (demonstration site) to serve as example of vegetation management actions for wildfire mitigation and wildlife habitat improvement- i.e., refuge around high valued infrastructure. • Promote using a multi-media outreach campaign to build understanding and support. • Develop vegetation graphic that can be shared across multiple agencies on the use of vegetation management to create resilient landscapes in the WUI. Build on existing educational materials developed by State Forestry. • Cooperative Extension education outreach, tree / shrub giveaways	• Create resilient landscapes and address potential for extreme wildfire behavior in and around communities.	Start within 1 year, and make this an ongoing project	H	• Review progress annually	• National Interagency Fire Center • Firewise Communities • Serve Alaska • The National Fire Plan (NFP) • Matching Awards Program • Environmental Education Grants • The Fire Prevention and Safety Grants (FP&S) • Environmental Systems Research Institute (ESRI) • Western Wildland-Urban Interface (WUI) Grants • Private Landowner Assistance Grant • Hazard Mitigation Planning Assistance • Community Development Block Grants – Mitigation - Alaska • Alaska Firewise
Build self-assessment ("self-planning") tools into existing forest stewardship planning.	Kenai Peninsula-wide	KPB, State Forestry	• Create self-assessment protocol. Consider NFPA 1144 (or similar) protocols. • Create a train-the-trainer methodology for assessment. Train the fire departments, HOAs, etc. • Post to stewardship website (State Forestry) • Utilize consistent literature for defensible space etc. • Utilize consistent literature for structure hardening. • Capitalize on elevated interest in structural ignitability and stewardship plans due to bark beetle concerns and increased fire activity.	• Increase adoption of measures to reduce structural ignitability	Start within 1 year, and make this an ongoing project	H	• Annual review of number of assessments completed	• Firewise Communities • National Fire Protection Association • Hazard Mitigation Grant Program (HMGP) • Alaska Firewise • Hazard Mitigation Planning Assistance • Community Assistance Program • Community Development Block Grants – Alaska

Project Description	Location	Land Ownership/ Lead Agency	Methodology/Approach	Serves to:	Timeline for Action	Priority (H, M, L)	Monitoring or Maintenance Requirements	Funding Sources
Target fire prevention efforts to "younger" or first-time homeowners	Kenai Peninsula-wide	Kenai Peninsula Borough Area banks, mortgage companies, local realtor assn.	• Capitalize on a thirst for knowledge from younger generation of land/homeowners. Show them to protect their investments. Build messaging around following patterns: o Younger demographic of landowners o Market to seasonal properties owners • Provide the resources residents need to take action: 1) stewardship self-assessment 2) creating a toolbox (house within the Story Map) • Encourage the use of the Forestry Self Study Guide: here	• Build capacity of residents to address their own wildfire risk.	Start within 1 year, and make this an ongoing project	H	• Annual review of materials developed and assess future needs	• Firewise Communities • National Fire Protection Association • National Interagency Fire Center • Environmental Education Grants • Alaska Firewise
Encourage Firewise participation (*Meets goal of the 2019 KPB HMP- Protect residents and structures in the WUI- Table 3.5*) and overall risk-reduction participation	Kenai Peninsula-wide	Multi-agency	• Restore the Firewise Program (*from the 2019 KPB HMP*) • Capitalize on elevated interest in structural ignitability and stewardship plans due to bark beetle concerns and increased fire activity. • Increase number of Firewise certified communities. • Provide education for citizens on defensible space and encourage self-assessment • Host community chipper days and/or long-term compost dumps • Construct a living example of defensible space around a public structure • Send reminders of defensible space management to seasonal property owners. • Host community events/workshops o provide hands-on training o distribute educational materials o invite vendors who can assist in risk reduction to the events	• Build visibility of fire prevention efforts.	Start within 1 year, and make this an ongoing project	H	• Document the number of new Firewise communities.	• Firewise Communities • National Fire Protection Association • Environmental Systems Research Institute (ESRI) • National Interagency Fire Center • Environmental Education Grants • The Fire Prevention and Safety Grants (FP&S) • Community Development Block Grants – Mitigation - Alaska • Alaska Firewise
Increase promotion/ awareness of agency actions (*Meets goal of the 2019 KPB HMP- Shared public messaging to reduce human caused fires- Table 3.6*)	Kenai Peninsula-wide	Kenai Peninsula Borough	• Form a working group to develop consistent and continuous messaging to the public on ongoing activities related to forestry, fuels and fire mitigation (maybe a committee under the ALAH group). • Post maps of treatments on the story map. • Provide updates on ongoing initiatives online and through public meeting formats- i.e., Strategic (also called Sterling) Fuel Break progress. • Create a video series to communicate that forest crews are working on activities. • Encourage community engagement through regular meetings to gather input. • Encourage community participation in fuel load education and planning.	• Build visibility of fire prevention efforts and benefits. • Improve understanding of ongoing work to protect communities and infrastructure	Start within 1 year, and make this an ongoing project	H	• Review of number of meetings held • Review of number of posts provided on online media • Assess understanding of public through surveys.	• Firewise Communities • National Fire Protection Association • Environmental Systems Research Institute (ESRI) • National Interagency Fire Center • Environmental Education Grants • The Fire Prevention and Safety Grants (FP&S) • Serve Alaska • Alaska Firewise • Community Assistance Program • Hazard Mitigation Planning Assistance
Promote and utilize a range of outreach types (*Meets goal of the 2019 KPB HMP- Notify landowners in high-risk areas- Table 3.7*)	Kenai Peninsula-wide	All agencies	• Bring awareness beyond social media – utilize brick and mortar venues and other media like prints (post offices, grocery stores, utility flyers) chamber of commerce, senior citizen centers • Provide in-person and radio education and outreach for people that do not engage in "online" activities • Promote all existing multi-media educational materials- i.e., Chugachmiut video series, Division of Forestry media, outreach videos (created by John Winters) and other materials • Utilize Public Service Announcements when appropriate	• Enhance education and outreach	Start within 1 year, and make this an ongoing project	M	• Assess effectiveness of messaging through surveys	• Firewise Communities • Environmental Systems Research Institute (ESRI) • National Interagency Fire Center • Environmental Education Grants • The Fire Prevention and Safety Grants (FP&S) • Alaska Firewise

Project Description	Location	Land Ownership/ Lead Agency	Methodology/Approach	Serves to:	Timeline for Action	Priority (H, M, L)	Monitoring or Maintenance Requirements	Funding Sources
Invest in workforce training for forestry and wildfire careers	Kenai Peninsula-wide	Kenai Peninsula Economic Development District Multi-agency working group	• Build capacity and interest in forest-based careers through development and maintenance of youth forestry/fire programs • Utilize existing programs to support youth development – i.e., Student Conservation Association, Forest Service Pathways Program. • Work with Peninsula based academic institutions to identify potential opportunities for associate degree programs in fire management and fire ecology • Work with KPB School District to have a fire danger component added to curriculum in spring, prior to leaf out (*from 2019 KPB HMP*)	• Enhance and build future workforce to manage wildfire management and fuels concerns • Increase opportunities for Peninsula youth	Within next 5 years	M	• Annual program review	• Agency budgets • Firewise Communities • Environmental Systems Research Institute (ESRI) • National Interagency Fire Center • Environmental Education Grants • The Fire Prevention and Safety Grants (FP&S) • Alaska Firewise • Community Assistance Program
Build consistent messaging for wildfire mitigation actions	Kenai Peninsula-wide	Kenai Peninsula Borough CWPP Story Map	• Utilize the CWPP Story Map as a one-stop shop for education materials and literature. • Create an inventory (database) of existing materials • Create a QR code list of literature • Work with ALAH group to determine consistent messaging and outreach	• Build capacity for fire adapted communities	Ongoing	H	• Ensure maintenance and update of Story Map. • Refresh messaging as policies changes.	• Agency budgets • Alaska Firewise
Increase scope and frequency of outreach (*Meets goal of the 2019 KPB HMP- Encourage fire adapted communities- Table 3.6*)	Kenai Peninsula-wide	Kenai Peninsula Borough CWPP Story Map	• Review existing programs (Ready, Set, Go! [RSG], Firewise, FAC) for suitability of existing fire prevention materials and where necessary fund development of unique adapted materials and presentations to highlight how a fire might affect particular groups within the community while promoting the fire adapted community framework. • Consider development of alternative RSG materials that don't rely on a color theme to reduce potential confusion with the Fire Management Options. • Increase number and frequency of face-to-face opportunities to engage with the public in wildfire mitigation education and activities. • Highlight the fact that fire is impacting protection of values at risk and sensitive environmental concerns like habitat management. • Consider hiring a communications officer for the Peninsula who should pursue continuous and repeat interactions with residents to generate greater mitigation actions. • Utilize local events for outreach on wildfire mitigation. • Increase community education and outreach about climate change hazards, emergency preparedness and sheltering options. • Develop educational messages that are locally relevant to help residents be more prepared for wildfire, including a defensible space checklist specific to local structural and wildland fuel considerations. • Continue to emphasize message of personal responsibility for hazard reduction in regard to structural ignitability.	• Engage a broad cross-section of the population instead of attracting only those residents who are already engaged in fire prevention and risk reduction activities. • Social science has shown that face-to-face engagement is the most effective way to generate action. • Deliver a clear and consistent message that impacts of wildfire are far-reaching and that it is in the best interest of a diverse set of stakeholders to become involved in planning and preparing for fire.	Initiate focus on this task within 3 months of completion of CWPP	H	• Develop a regular meeting cadence	• Agency budgets • Firewise Communities • Environmental Systems Research Institute (ESRI) • National Interagency Fire Center • Environmental Education Grants • The Fire Prevention and Safety Grants (FP&S) • Hazard Mitigation Planning Assistance • Community Assistance Program • Community Development Block Grants – Alaska • Alaska Firewise

Project Description	Location	Land Ownership/ Lead Agency	Methodology/Approach	Serves to:	Timeline for Action	Priority (H, M, L)	Monitoring or Maintenance Requirements	Funding Sources
Develop education campaign for beetle kill tree removal	Kenai Peninsula-wide	State Forestry, Kenai Peninsula Borough, Cities and Communities	• Provide directions on best management practices for the treatment and removal of dead trees. • Develop multi-media education materials for distribution. • Develop printed materials for distribution. • Example content- Inform citizens to only cut dead trees if they have a plan to remove them. o If they are unable to remove them, the cut trees present a greater risk than leaving them standing. • Use "sleeves up for the summer" as an example campaign • Have a familiar face or someone who is trusted by the public to deliver the message • Develop campaigns year-round to continue to raise awareness	• Protect communities and infrastructure through increasing public awareness	Within next 6 months	H	• Review annually the success of campaign and additional information needs	• Agency budgets • Firewise Communities • Environmental Systems Research Institute (ESRI) • National Interagency Fire Center • Environmental Education Grants • The Fire Prevention and Safety Grants (FP&S) • Western Bark Beetle Initiative Grant Program • Hazard Mitigation Planning Assistance
Increase messaging to the public about the potential for slow response times at distance from fire departments.	Kenai Peninsula-wide	Fire Departments State Forestry, Kenai Peninsula Borough, Cities and Communities	• Greater transparency and facts are needed regarding fire dept capacity to respond to fires that are located in rural areas. • Emphasize the importance of personal responsibility in these areas. • Provide list of realistic measures homeowners can implement to be more prepared for fire in areas with slow response times.	• Increase education to enhance homeowner capacity to address fire risk	Start within 1 year, and make this an ongoing project	H	• Review annually the success of campaign and additional information needs	• Agency budgets • Firewise Communities • Alaska Firewise • Community Assistance Program
Increase education and outreach on Fire Management Options	Kenai Peninsula-wide	State Forestry, State Forestry, Kenai Peninsula Borough, ADFG, USFS Kenai Refuge	• Create public outreach campaign that avoids terminology and jargon as much as possible. • Multi-agency effort and messaging needed. • Utilize the story map and share via a range of platforms. • Use models from large companies, such as Marathon, to spread the word to employees. • Possibly hire a marketing group to help with messaging to the public. • People understand critical response but have inadequate understanding of "limited and moderate" response. Focus on these issues. • Modify the RSG! campaign colors to avoid confusion with the DOF fire management actions color scheme.	• Increase education to enhance understanding and trust between public and fire response agencies.	Start within 1 year, and make this an ongoing project	H	• Review annually and update as needed	• Agency budgets • Firewise Communities • Environmental Systems Research Institute (ESRI) • National Interagency Fire Center • Environmental Education Grants • The Fire Prevention and Safety Grants (FP&S)
Provide liability insurance education	Kenai Peninsula-wide	Insurance companies in partnership with Kenai Peninsula Borough and Fire Depts.	• Provide information for homeowners about liability insurance and wildfire. • Look for incentives by insurance companies for implementation of defensible space.	• Protect communities and infrastructure through increasing public awareness	Start within 2 years, and make this an ongoing project	M	• Update frequently as insurance policies and requirements change • Market incentives widely.	• Agency budgets
Increase awareness about burn permits	Kenai Peninsula-wide, especially in communities located on the east side	State Forestry	• Need to increase people's awareness about the importance of burn permits and why they are needed. • Increase outreach through different channels- fire dept, dispatch, community events, printed materials in utility bills, etc. • Use burn permit interactions to also emphasize Firewise actions. • Need to address the (unintended) consequence of online burn permits. After accessing an online burn permit, people are no longer calling the fire departments when they start a fire, but fire departments still need this information. • Have a "closed" season for debris burning • Ensure funding accounts for personnel time for CES, Dispatch, Municipalities	• Protect communities and infrastructure through increasing public awareness	Start within 1 year, and make this an ongoing project	M	• Assess awareness annually and restructure outreach as needed. • Ensure more continuous boots-on-the-ground messaging	• Agency budgets • Firewise Communities • National Interagency Fire Center • Environmental Education Grants • The Fire Prevention and Safety Grants (FP&S) • Funding for Fire Departments and First Responders • Alaska Firewise

Project Description	Location	Land Ownership/ Lead Agency	Methodology/Approach	Serves to:	Timeline for Action	Priority (H, M, L)	Monitoring or Maintenance Requirements	Funding Sources
Develop educational messages for recreationist (*Meets goal of the 2019 KPB HMP- Notify public and visitors of fire danger and procedures- Table 3.7*)	Kenai Peninsula-wide	State Forestry, Kenai Peninsula Borough, Cities and Communities	• Target public outreach to recreationist • Install signage at popular recreation sites • Educate recreationists about risk of fire, particularly in the spring when there is a greater risk of grass fire • Provide digital signs at highly visible Borough locations (highway or main thoroughfare locations such as the Solid Waste site, transfer facilities, highway fronting schools) showing hazard danger as needed (*from 2019 KPB HMP*).	• Protect communities and infrastructure through increasing public awareness	Start within 1 year, and make this an ongoing project	H	• Assess awareness annually and restructure outreach as needed if ignitions increase	• Agency budgets • National Interagency Fire Center • Environmental Education Grants • The Fire Prevention and Safety Grants (FP&S) • Alaska Firewise
Increase structure hardening of public buildings and structures	Kenai Peninsula-wide	All government agencies	• Number of wooden bridges on KPB lands • Harden for long term use, maintain more often • Retrofit/replace flammable roofs on public buildings	• Increase structure resilience to wildfire	Start within 1 year, and make this an ongoing project	H	• Document accomplishments	• RAISE Discretionary Grants • Infrastructure For Rebuilding America • Pre-disaster Mitigation (PDM) Grant Program • Building Resilient Infrastructure and Communities (BRIC) program • Hazard Mitigation Planning Assistance • Community Assistance Program • Community Development Block Grants – Alaska • Community Development Block Grants – Mitigation - Alaska
Identify vulnerable populations who may require assistance during fire prevention, fire response and post fire recovery phases.	Kenai Peninsula-wide	Kenai Peninsula Borough, Cities and Communities	• Convene a working group to collectively identify and document vulnerable populations (elderly, disabled, low income, indigenous populations) who may need additional assistance to carryout defensible space treatments, structure hardening, enhancing ingress/egress, preparing their family for evacuation, safely navigating evacuation processes, and returning post-fire. • Identify and plan for vulnerable populations, living independently in their homes, who rely on electricity-dependent medical equipment and devices. Prolonged power outages can be life threatening for these populations. • Identify and evaluate funding needs to provide sufficient support.	• Reduces hurdles for residents to achieve fire prevention • Provides for public safety in the event of an incident	Within 2 years	H	• Document number of meetings held to address these issues.	• Agency budgets • Serve Alaska • Firewise Communities • National Fire Protection Association • Environmental Systems Research Institute (ESRI) • National Interagency Fire Center • Private Landowner Assistance Grant • Alaska Firewise • Hazard Mitigation Planning Assistance • Community Development Block Grants – Mitigation - Alaska

Action Items for Homeowners to Reduce Structural Ignitability

Low or No Cost Investment (<$50)	Regularly check fire extinguishers and have a 100-foot hose available to wet perimeter.
	Maintain defensible space for 30 feet around home. Work with neighbors to provide adequate fuels mitigation in the event of overlapping property boundaries.
	Make every effort to keep lawn mowed and green during fire season.
	Screen vents with non-combustible meshing with mesh opening not to exceed nominal ¼-inch size.
	Ensure that house numbers are easily viewed from the street.
	Keep wooden fence perimeters free of dry leaves and combustible materials. If possible, non-combustible material should link the house and the fence.
	Keep gutters free of vegetative litter. Gutters can act as collecting points for fire brands and ashes.
	Store combustible materials (firewood, propane tanks, grills) away from the house; in shed, if available.
	Clear out materials from under decks and/or stacked against the structure. Stack firewood at least 30 feet from the home, if possible.
	Reduce your workload by considering local weather patterns. Because prevailing winds in the area are often from the west-southwest, consider mitigating hazards on the west corner of your property first, then work around to cover the entire area.
	Seal up any gaps in roofing material and enclose gaps that could allow fire brands to enter under the roof tiles or shingles.
	Remove flammable materials from around propane tanks.
Minimal Investment (<$250)	When landscaping in the home ignition zone (HIZ) (approximately 30 feet around the property), select non-combustible plants, lawn furniture, and landscaping material. Combustible plant material like junipers and ornamental conifers should be pruned and kept away from siding. If possible, trees should be planted in islands and no closer than 10 feet to the house. Tree crowns should have a spacing of at least 18 feet when within the HIZ. Vegetation at the greatest distance from the structure and closest to wildland fuels should be carefully trimmed and pruned to reduce ladder fuels, and density should be reduced with approximately 6-foot spacing between trees crowns.
	Box in eaves, attic ventilation, and crawl spaces with non-combustible material.
	Work on mitigating hazards on adjoining structures. Sheds, garages, barns, etc., can act as ignition points to your home.
	Enclose open space underneath permanently located manufactured homes using non-combustible skirting.
	Clear and thin vegetation along driveways and access roads so they can act as a safe evacuation route and allow emergency responders to access the home.
	Purchase or use a National Oceanic and Atmospheric Administration weather alert radio to hear fire weather announcements.

Moderate to High Investment (>$250)	Construct a non-combustible wall or barrier between your property and wildland fuels. This could be particularly effective at mitigating the effect of radiant heat and fire spread where 30 feet of defensible space is not available around the structure.
	Construct or retrofit overhanging projections with heavy timber that is less combustible.
	Replace exterior windows and skylights with tempered glass or multilayered glazed panels.
	Invest in updating your roof to non-combustible construction. Look for materials that have been treated and given a fire-resistant roof classification of Class A. Wood materials are highly combustible unless they have gone through a pressure-impregnation fire-retardant process.
	Construct a gravel turnaround in your driveway to improve access and mobilization of fire responders.
	Treat construction materials with fire-retardant chemicals.
	Install a roof irrigation system.
	Replace wood or vinyl siding with nonflammable materials.
	Relocate propane tanks underground.

COHESIVE STRATEGY GOAL 3: WILDFIRE RESPONSE

Goal 3 of the Cohesive Strategy/Western Regional Action Plan is Wildfire Response:
All jurisdictions participate in making and implementing safe, effective, efficient risk-based wildfire management decisions.

> *"A balanced wildfire response requires integrated pre-fire planning with effective, efficient, and coordinated emergency response. Pre-fire planning helps tailor responses to wildfires across jurisdictions and landscape units that have different uses and management objectives. Improved prediction and understanding of weather, burning conditions, and various contingencies during wildfire events can improve firefighting effectiveness, thereby reducing losses and minimizing risks to firefighter and public health and safety. Wildfire response capability will consider the responsibilities identified in the Federal Response Framework. Local fire districts and municipalities with statutory responsibility for wildland fire response are not fully represented throughout the existing wildland fire governance structure, particularly at the NWCG, NMAC, and GACC levels."* (Western Regional Strategy Committee 2013:15).

Strategic actions listed within the ALAH Action Plan to serve the goal of **safe and effective wildfire response** include (KPB Interagency 2018):

- Develop and implement standards and protocols that strengthen national mobilization capabilities.
- Invest in the wildland firefighting workforce at all levels (federal, state, tribal, territorial, and local) to meet the increasing complexities and demands of firefighting in the wildland urban interface.
- Manage wildfires to both protect values and accomplish resource management objectives

RECOMMENDATIONS FOR IMPROVING FIRE RESPONSE CAPABILITIES

Educating the public so they can reduce dependence on fire departments is essential because these resources are often stretched thin due to limited personnel and the scale of the response area. Table 4.5 provides recommendations for improving firefighting capabilities. Many of these recommendations are general in nature with more specific community related recommendations presented in Appendix D.

Table 4.5. Fire Response Capability Recommendations

Project Description	Location	Land Ownership/ Lead Agency	Methodology/Approach	Serves to:	Timeline for Action	Priority (H, M, L)	Monitoring or Maintenance Requirements	Funding Sources
Enhance situational awareness and communications	Kenai Peninsula-wide	ALAH group	• ALAH provides a model for interagency cooperation. • Continue to encourage open communication. • Pursue annual updates. • Utilize the QWRA to guide treatments. • Develop a master spreadsheet to track accomplishments.	• Add more capacity	Ongoing	H	• Regular meetings and email updates	• Agency budgets • Emergency Management Performance Grant (EMPG) • Community Assistance Program
Support additional wildland crews with increased Peninsula-wide capacity	Kenai Peninsula-wide	State Forestry USFS	• In addition to the Yukon Crew, add another State sponsored Type 2 crew (See Resilient Landscape Matrix – feasibility study). • Type 2 crews would: o Receive training for fire response and fuels management o operate seasonally (April-October) o serve in a fuel management role initially until fire suppression quals are expanded o Once qualified, crew members could be "farmed out" to local initial attack crews, for training etc. • Need to carefully consider the evolution of a new type 2 crew. • Closely plan out crew qualifications. • Budget sufficient funds for administration and oversight. • Fully consider budget line items.	• Add more capacity and provide for safe and effective wildfire response	Start within 1 year, and make this an ongoing project	H	• Closely assess accomplishment, needs, budgetary constraints annually. • Plan goals each year as part of multi-agency meeting.	• Funding for Fire Departments and First Responders • Volunteer Fire Assistance Program • Staffing for Adequate Fire and Emergency Response (SAFER) • Assistance to Firefighters Grants (AFG) • State and Private Forestry Programs – NASF • National Fire Protection Association • GSA-Federal Excess Personal Property • Community Assistance Program • Community Development Block Grants – Alaska
Improve fire notifications and coordination between Alaskan Native Villages and Incident Command Teams	Kenai Peninsula-wide	Fire response agencies and Alaskan Native Villages	• Need to improve fire notifications and coordination between Alaskan Native Villages and incident management teams to make sure cultural values are considered when developing suppression strategies on land owned by Alaskan Native Villages. Encourage use of MIST (minimum impact suppression strategies) in these areas.	• Use of MIST tactic to limit harmful impacts to cultural resources	Ongoing	H	• Annual review and update of contacts at Alaskan Native Villages	• Pre-disaster Mitigation (PDM) Grant Program • Building Resilient Infrastructure and Communities (BRIC) program • General Assistance Program • Regional Catastrophic Preparedness Grants • Community Development Block Grants – Alaska

Project Description	Location	Land Ownership/ Lead Agency	Methodology/Approach	Serves to:	Timeline for Action	Priority (H, M, L)	Monitoring or Maintenance Requirements	Funding Sources
Increase the number of "red-carded" individuals in each fire department	Kenai Peninsula-wide	All fire departments	• NWCG Basic Wildland Fire Fighting and Fire Behavior, S-130/ S-190 classes to VFDs every Fall with an option to attend on weekends. • Possible incentives needed to encourage attendance. • Use online forum to facilitate scheduling. • Work with State and federal agencies to develop evening and weekend courses for volunteers (volunteers on fire line can be a liability and labor law problem). • Pursue online training programs and have trainees work with an in-house trained mentor to complete training. • Utilize available funds for volunteers to participate in annual Wildfire Academy. • Educate fire departments on the availability of volunteer fire assistance grants that could be used to purchase equipment and support training. • Seek funding to increase availability of state training specialists.	• Add more capacity to the local fire departments and provide for safe and effective wildfire response • Not just suppression staff but others such as staging area/ supply, ground support, Public Information Officers, Liaison Officer, Logistics support, admin positions	Ongoing	H	• Annual review of training opportunities and barriers to attendance	• Volunteer Fire Assistance (VFA) Grant • Funding for Fire Departments and First Responders • Emergency Management Performance Grant (EMPG) • Regional Catastrophic Preparedness Grants • Volunteer Fire Assistance Program • Staffing for Adequate Fire and Emergency Response (SAFER) • Assistance to Firefighters Grants (AFG) • State and Private Forestry Programs – NASF • National Fire Protection Association • GSA-Federal Excess Personal Property • Community Assistance Program • Community Development Block Grants – Alaska
Need better preparation for emerging fire and fuels issue, fire behavior and climate change	Kenai Peninsula-wide	USFS (have climate assessment)	• WUI is growing, but fire resources are not. • Need climate vulnerability assessment for resource needs. Utilize and expand upon Chugach NF climate vulnerability assessment to identify vulnerable areas to prioritize treatments and strategies. • Occasional resampling of vegetation and updated mapping of vegetation classification is key to detecting changes in fuel/fire characteristics.	• Increase capabilities of existing personnel	Within next 3 years	H	• Review progress of discussions annually.	• Urban and Community Forestry Program, 2021 National Urban and Community Forestry Challenge Cost Share Grant Program • Leonardo DiCaprio Foundation Grants • Community Development Block Grants – Mitigation – Alaska • Hazard Mitigation Planning Assistance • Western Wildland-Urban Interface (WUI) Grants • Alaska Climate Change Impact Mitigation Program

Develop and coordinate a Peninsula wide comprehensive online emergency preparedness, response, and recovery plan.
(*Meets goal of the 2019 KPB HMP- Maintain a viable and functional response plan- Table 3.5*)
	Kenai Peninsula-wide	Collaborative effort, led by Kenai Peninsula Borough OEM	• Create an online dashboard for use by emergency management agency decision support.
			• Dashboard would be created in a Story Map or "Hub" format and would include:
			  o Break dashboard into sections of the emergency management cycle: preparedness, response, recovery
			  o Identify roles and responsibilities for each agency/partner under each section of the cycle
			  o Include BMPs for each section of the cycle
			  o Include coordination plan for interagency communications before, during and after an event
			  o Include a tracking module to track actions needed and status
			  o Include a funding matrix to support implementation of actions
			  o Align actions as closely as possible with the Peninsula and State HMP
				• Improve fire response and readiness across the Peninsula.
				• Could be used to initiate an assessment of Peninsula-wide emergency management protocols.
					Within 2 years	H	• Would be an active and live platform, updated in real time and reviewed on an annual basis	• FEMA
								• Agency budgets
								• Emergency Management Performance Grant (EMPG)
								• Regional Catastrophic Preparedness Grants
								• Hazard Mitigation Planning Assistance
								• Community Assistance Program
								• Community Development Block Grants – Alaska
								• Alaska Firewise

Project Description	Location	Land Ownership/ Lead Agency	Methodology/Approach	Serves to:	Timeline for Action	Priority (H, M, L)	Monitoring or Maintenance Requirements	Funding Sources
Complete inventory of available equipment for inter-operations	Kenai Peninsula-wide	All agencies	• Inventory apparatus and equipment across Peninsula to assess agency sharing options. • Identify apparatus needs that could be fulfilled through sharing agreements- i.e., UTV for accessing inaccessible areas, boat for coastal access. • Identify non-suppression support services such as caterers, camp support, car / truck rental, etc. (i.e., local oil field support contractors do this).	• Improve fire-fighting response when available equipment is identified	Start within 1 year	H	• Annual inventory of equipment needs, including assessment of equipment condition	• Agency budgets • Emergency Management Performance Grant (EMPG) • Regional Catastrophic Preparedness Grants • GSA-Federal Excess Personal Property • Funding for Fire Departments and First Responders • Community Assistance Program • Community Development Block Grants – Alaska
Facilitate greater preparedness for evacuations (*Meets goal of the 2019 KPB HMP- Evacuation and Response Routes- Table 3.5*)	Kenai Peninsula-wide	Kenai Peninsula Borough Fire Departments Department of Transportation? Department of Public Safety (Troopers) Local Police Departments.	• Identify and map alternate routes for ingress/egress for WUI areas as a specific part of the KPB Transportation Plan (*from 2019 KPB HMP*). • Prioritize capital improvement projects (CIPs) based on need for response and evacuation routes (*from 2019 KPB HMP*). • Encourage all residents to sign-up to KPB alert system. • Utilize pre-season planning to identify roles for departments to address evacuation. • Draft up scenarios and contingencies in the event of slow response times. • Identify vulnerable populations who may require assistance during evacuation (i.e., critical facilities – daycare, medical facilities, school, mass care center, elderly housing). • Seek grant opportunities to support assistance for vulnerable populations. • Develop contingency plans. • Build in plan for livestock and animal evacuation, including transportation needs and shelter options. • Build emergency ingress and egress routes for those areas without sufficient access. Plan for proper ingress and egress in new development.	• Improve safe and effective wildfire response	Start within 1 year	H	• Annual review of how many residents are registered for KPB Alert. • Test system annually • Annual review of activities	• Firewise Communities • Emergency Management Performance Grant (EMPG) • Regional Catastrophic Preparedness Grants • Pre-disaster Mitigation (PDM) Grant Program • Hazard Mitigation Grant Program (HMGP) • Infrastructure For Rebuilding America • Building Resilient Infrastructure and Communities (BRIC) program • Western Wildland-Urban Interface (WUI) Grants • Private Landowner Assistance Grant • Hazard Mitigation Planning Assistance • Community Development Block Grants – Mitigation - Alaska • Alaska Firewise

Project Description	Location	Land Ownership/ Lead Agency	Methodology/Approach	Serves to:	Timeline for Action	Priority (H, M, L)	Monitoring or Maintenance Requirements	Funding Sources
Increase water availability for suppression	Kenai Peninsula-wide	Kenai Peninsula Borough Public Water Systems Fire Departments ADF&G – waterway / lake drafting sites / permits	• Initiate a detailed study of feasible locations for water development improvements. • Map all water fill sites and hydrants across jurisdictions. • Update any existing inventories. • Incorporate wildlife habitat concerns into inventory to avoid potential impacts- i.e., anadromous streams. Integrate statewide permits into planning. • Incorporate information on avoidance of aquatic invasives into inventory. • Utilize inventory to stage fire tanks in areas with limited water availability. • Install dry hydrants to pump pond water for firefighting. • Install hand pumps or other methods independent of the grid for accessing private well water. • Pre-identify and address permit issues for natural waterbody drafting sites.	• Improve fire-fighting response if water is more readily available or closest locations could be identified on a GIS map on a tablet/computer. • Alleviates public and agency concern for limited water supply in remote areas.	Start within 1 year	H	• Review number of water improvements annually and remaining needs.	• Pre-disaster Mitigation (PDM) Grant Program • Building Resilient Infrastructure and Communities (BRIC) program • Emergency Management Performance Grant (EMPG) • Multipurpose Grants to States and Tribes • Emergency Watershed Protection (EWP) Program • Fire Management Assistance Grant • Catalog of Federal Funding Sources; Water Resources • Hazard Mitigation Planning Assistance • Community Assistance Program • Community Development Block Grants – Alaska • Community Development Block Grants – Mitigation - Alaska
Continued support on Volunteer Fire Assistance (VFA) grant	Kenai Peninsula-wide	State Forestry	• Need to continue to fund it over time to follow through with financial commitments previously made. • Use funding to increase training.	• Increase capabilities of existing personnel	Already in progress, continue as long as possible.	H	• Annual review	• N/A

POST-FIRE RESPONSE AND REHABILITATION

Fires, especially severe fires, can have significant impacts on vegetation and soil. The significant physical properties of soil affected by a fire are structure stability, water repellency, texture, temperature, and amount of surface organic matter. Erosion is typically associated with post-fire effects because of its impact on water quality and the potential for debris flow (USFS 2011c). Although post-fire flooding and mudflows are uncommon on the KPB, high intensity fires may destabilize soil and increase runoff rates. Typical concerns for areas that have recently burned include the potential for debris flow to nearby transportation corridors and recreational areas, and impacts to fish habitat (National BAER Team 2020).The potential impacts of wildfires may be observed in a recent large fire that occurred on the Kenai Peninsula. The 2019 Swan Lake Fire was a lightning-caused fire that burned roughly 170,000 acres between Sterling and Cooper Landing. Main concerns for the burned area consisted of (National BAER Team 2020):

- The threat of increased runoff and potential debris flow to public safety and highway infrastructure
- The threat of excess runoff and sediment reaching streams and deteriorating fish habitat in anadromous streams
- Damage to recreational areas and associated hazards
- Damage to historic structures, archaeological sites, and traditional cultural properties

The time needed for a forest to recover following a fire is contingent on three factors: whether vegetation survives a fire, seedling recruitment from either seed banks in the soil or transported to the site or sprouting new growth from roots (USFS 2011c). However, each forest is unique in how it recovers following a wildfire. The degree to which a forest can recover following a fire is contingent on the forest composition, soils, fire frequency, and climate. For instance, birch has seeds that disperse long distances; aspen has prolific roots that allow sprouting after a fire; black spruce has cones that open when exposed to heat; and white spruce produces large seed crops following a hot, dry summer (USFS 2011c). Additionally, some sections of the local forests on the Kenai Peninsula have evolved with fire, including large and severe fires. As such, these forests are typically adapted to large and severe fires (Wahrenbrock 2022).

Furthermore, post-fire restoration patterns in forest stands affected by SBB infestation vary significantly from those with little or no SBB-induced tree mortality. Typically, most spruce trees that survive the SBB outbreak are killed from canopy fire and surface fire heat. As such, spruce seed is scarcely available for dispersion in the burn areas. The early recovery period in forest stands affected by SBB is dominated by birch trees. The 2001 Kenai Lake Fire illustrates this pattern. Prior to the fire, birch represented around 1% to 2% of the forest composition within the fire perimeter. However, birch represented roughly 95% of the forest stand in the post-fire environment, with the exception of some patches of hemlock and cottonwood in low-intensity burn sites (Wahrenbrock 2022).

Figure 4.16. Vegetation recovery in the Swan Lake burn area.

Creating a plan that outlines steps for agencies, municipalities, and the local government to follow will streamline post-fire recovery efforts and reduce the inherent stress to the community.

There are many facets to post-fire recovery, including but not limited to:

- Ensuring public health and safety—prompt removal of downed and hazard trees, addressing watershed damage, and mitigating potential flooding.
- Rebuilding communities and assessing economic needs—securing the financial resources necessary for communities to rebuild homes, business, and infrastructure.
- Restoring the damaged landscape—restoration of watersheds, soil stabilization, and tree planting.
- Reducing fire risk in the future—identifying hazard areas and implementing mitigation.
- Prioritizing the needs of vulnerable and disadvantaged communities during response and disaster recovery efforts.
- Reducing post fire recovery time by replanting native species.
- Ensuring fire protection measures enhance sustainability of restoration projects.
- Retaining downed logs for erosion control and habitat maintenance.
- Evaluating and updating disaster recovery plans every 5 years to respond to changing needs and characteristics of the community.
- Coordinating with planning, housing, health, and human services, and other local, regional or state agencies to develop contingency plans for meeting short-term, temporary housing needs of those displaced during a catastrophic wildfire event.
- Incorporating forecasted impacts from climate change intro trends and projections of future risk and consideration of policies to address identified risk.

Recovery of the vegetated landscape is often more straightforward than recovery of the human environment. Assessments of the burned landscape are often well-coordinated using interagency crews who are mobilized immediately after a fire to assess the post-fire environment and make recommendations for rehabilitation efforts.

For the community impacted by fire, however, there is often very little planning at the local level to guide their return after the fire. Residents impacted by the fire need assistance making insurance claims; finding temporary accommodation for themselves, pets, and livestock; rebuilding or repairing damaged property; removing debris and burned trees; stabilizing the land for construction; mitigating potential flood damage; repairing infrastructure; reconnecting to utilities; and mitigating impacts to health. Oftentimes, physical impacts can be mitigated over time, but emotional impacts of the loss and change to surroundings are long-lasting and require support and compassion from the community.

AFTER THE FIRE: RECOMMENDATIONS FOR HOMEOWNERS

Returning Home

First and foremost, follow the advice and recommendations of emergency management agencies, fire departments, utility companies, and local aid organizations regarding activities following the wildfire. Do not attempt to return to your home until fire personnel have deemed it safe to do so.

Even if the fire did not damage your house, do not expect to return to normal routines immediately. Expect that utility infrastructure may have been damaged and repairs may be necessary. When you return to your home, check for hazards, such as gas or water leaks and electrical shorts. Turn off damaged utilities if you did not do so previously. Request that the fire department or utility companies turn the utilities back on once the area is secured. Similarly, water supply systems may have been damaged; do not drink from the tap until you have been advised that it is safe to do so. Finally, keep a “fire watch”; look for smoke or sparks in houses and other buildings.

When returning home after a wildfire (FEMA 2021a):

- Avoid hot ash, charred trees, smoldering debris, and embers. The ground may have hot spots that can burn you or ignite another fire.
- Use a respirator to limit your exposure to dust particles; wet debris to minimize aerosolization. People with asthma, chronic obstructive pulmonary disease, or other lung ailments should take precautions in areas with poor air quality.
- Send text messages or use social media to contact family and friends. Phone lines are often busy following a disaster. Limit calls to emergencies only.

Once at home, conduct the following (AWFCG 2009):

- Check the roof and perimeter of the home right away; extinguish any smoldering debris and sparks.
- Be aware of downed power lines and other hazards.
- Check propane tanks, regulators, and lines before turning on gas. Only a qualified technician should turn on utilities.
- Check the house carefully for hidden embers or smoldering fires.

- Check inside the attic for embers.
- Check the yard for burning vegetation, woodpiles, fences, or other materials.
- Keep doors and windows closed.
- Document property damage with photographs. Conduct an inventory of damaged or missing items and contact your insurance company for assistance.

Wildland fire smoke is particulate matter, a mixture of micro solids and liquid droplets suspended in air. The size of the particles is linked to their potential for causing health issues. Particles less than 2.5 micrometers in diameter present the greatest issues, since they can penetrate deep into the lungs, or even the bloodstream. Wildland fire smoke particles are generally smaller than 0.5 microns in diameter. Exposure to these particles can impact both lung and heart health. Particles larger than 10 micrometers in diameter are less of a concern; however, they can irritate eyes, nose, throat, and skin. Follow these tips to reduce your exposure to smoke (ADEC 2021):

- Pay attention to local air quality reports and stay alert to any health warnings related to smoke.
- Use common sense. If it's smoky outside, limit time outdoors and do not allow children to play outdoors.
- Close windows and doors when smoky.
- Clean air filters and vents in home.
- Plan activities away from dense smoke.

Insurance Claims

Preparedness is a crucial factor in the event of a catastrophe. Reviewing your insurance policy now can prevent total loss later. Once there is an imminent disaster, insurance carriers may decide against adding or amending coverage. Be aware whether you have adequate coverage—if you have replacement cost or actual cash value coverage. Replacement cost is the amount it would take to rebuild or replace your home and its contents with similar materials or goods. Actual cash value is replacement cost minus depreciation (Alaska Department of Commerce, Community, and Economic Development [ADCCED] 2021).

Tips for knowing your insurance coverage (ADCCED 2021):

- Carefully read and understand your insurance policy, particularly all endorsements/riders.
- Verify that your policy covers additional living expenses, including temporary housing, if you can't return home.
- Consider adding increased cost of construction or building ordinance coverage. This pays for any increased cost to replace or repair the home to meet requirements of current laws or ordinances.
- Consider special coverage for valuables. This covers jewelry, furs, coins, guns, stamps, computers, antiques, musical instruments, and other high-value possession that exceed normal policy limits.

Your insurance agent is the best source of information for submitting a claim. It is recommended you take photos of your home in preparation of an emergency and keep the photos in a safe place as this will make the insurance claim process easier. Most of the expenses incurred during the time you are forced to live elsewhere may be reimbursed, so be sure to keep all receipts.

Tips for streamlining insurance claims (ADCCED 2019):

- Keep copies and records of all communication between you and the adjuster.
- Take photos and videos of the damage before things are repaired to present to the adjuster.
- Prepare a detailed list of the destroyed or damaged items.
- Wait on making repairs until your insurance company has inspected the property and you have reached an agreement on the cost of repairs.
- If it's safe, make temporary repairs to prevent further damage by covering leaking roofs, broken windows, and damaged walls. Keeps receipts for the adjuster.
- If you can't stay in your home due to damage, most policies have coverage for additional living expenses while repairs are being made.
- Save all receipts, including food and hotel as well as any other necessities.

Community Safety: Post-Fire Floods and Debris Flows

Large-scale wildfires significantly modify the terrain and surface conditions. Usually, vegetation absorbs rainfall, reducing the amount of runoff. However, wildfires leave the ground, barren, charred, and unable to absorb water, creating the perfect conditions for flash flooding, mudflows, and debris flows. Floods are the most common and costly natural hazard in the nation. Flash floods are particularly common after wildfires and can occur within minutes after the beginning of a rainstorm. Even areas that are not usually susceptible to floods are at risk, due to the altered landscape (FEMA 2021b).

Factors that contribute to flooding and debris flows are steep slopes, heavy rainfall, weak or loose rock and soil, and improper construction and grading. Even small rainfall can cause a flash flood, transporting debris and damaging homes and other structures. Flood risk remains significantly higher until vegetation is restored, which can be up to 5 years after a wildfire. Flooding and flood damage is likely more extreme, as debris and ash left from the fire can form mudflows. As rainwater moves across barren terrain, it can also pick up and transport soil and sediment—causing greater damage (FEMA 2021b).

A post-fire flood doesn't have to be a catastrophic event to bring high damage expenses, and it is not necessary to live in a high-risk flood area to incur flood damage. In fact, from 2014 to 2018, policyholders not residing in high-risk flood areas filed over 40% of all National Flood Insurance Program claims (FEMA 2021b).

Property owners should remember to (FEMA 2021b):

- Be prepared. Develop an evacuation plan, keep important papers in a safe, waterproof place, and itemize and record (take photos) of valuables and other possessions inside and outside the home.
- Buy flood insurance. Most standard policies do not cover flood damage.
- Plan ahead. Gather supplies in case of a storm, upgrade your home against damage, and review insurance coverage.

Mobilizing Your Community

Several factors make the KPB face significant emergency management challenges. Some of the factors include the lack of a widespread interconnected road system; unusual and unpredictable weather;

geographic isolation; an aging community infrastructure; and communication issues. In some cases, it may take up to a week for disaster assistance to reach impacted communities. Thus, it is important to create local community response and recovery teams. The local Emergency Manager will collaborate with state and federal partners to manage disaster response and urgent needs. Still, mobilizing a response and recovery team or a group of teams in a community can function as a vital part of the recovery procedure (Alaska Division of Homeland Security & Emergency Management [DHSEM] 2011).

Objectives for response and recovery teams include (DHSEM 2011):

- Safety/damage assessment of homes, businesses, and public infrastructure.
- Identity people in shelters who require special care and those who need to be relocated into specialized-care facilities.
- Locating and opening relief-supply food-distribution points.
- Produce, update, and distribute a disaster fact sheet. Include critical public information to aid emergency responders, residents, and the media.
- Track costs for local responders. This will help recovering costs if determined eligible for state or federal disaster assistance.
- Monitor and address hazardous environmental situations such as air quality, mudslides, and weakened trees.
- Assess the need to identify specific routes and timeframes for critical relief supplies.

Residents throughout Alaska are encouraged to join forces to create local Alaskan Firewise Communities (AFCs) to minimize and prevent wildfire losses. AFCs are community-based organizations that mobilize residents to protect their properties, communities, and environments from disastrous wildfires. AFCs educate homeowners about community wildfire preparedness activities while collaborating with local fire officials to plan and implement projects that increase the wildfire resilience of their communities (AWFCG 2009).

The following resources may be helpful for the post-fire and volunteer coordinators (DHSEM 2011):

- Alaska Housing Finance Corporation
- Food Bank of Kenai Peninsula
- American Red Cross
- Salvation Army
- AK Division of Homeland Security & Emergency Management
- FEMA
- Small Business Administration
- Tribal nonprofits
- Churches and other faith-based organizations
- Voluntary organizations active in disaster
- National Flood Insurance Program
- Individual and family assistance programs

Communication

After a team is assembled and immediate tasks are identified, find the best way to spread information in your community. You may distribute flyers, set up a voicemail box, work to find pets or livestock that have been displaced, develop a mailing list for property owners, hold regular public meetings, etc. It is important that a long-term communications plan is developed (FEMA 2011). Applying the following steps can aid in successful communication (FEMA 2011):

- Convey post-wildfire hazards to the public.
- Develop and maintain emergency notification systems that allow authorized official to alert residents of emergency situations.
- Public meetings to inform the public about programs and services available in the community.
- Determine the best way to relay information, e.g., phone calls, radio, TV, or social media.
- Find out how emergency response teams, local officials, and volunteers will communicate with the community.

Post-Fire Rehabilitation and Resources

Wildfires that cause extensive damage necessitate dedicated efforts to avert issues afterwards. Loss of vegetation increases soil susceptibility to erosion; water runoff may increase and lead to flooding; sediment and debris may be transported downstream and damage properties or saturate reservoirs putting endangered species and water reserves at risk (USFS 2021b). Following a fire, the primary priority is emergency stabilization to prevent additional damage to life, property, or natural resources. The soil stabilization work starts immediately and may proceed for up to a year. The rehabilitation effort to restore damage caused by the fire starts after the fire is out and may persist for various years. For the most part, rehabilitation efforts focus on the lands not likely to recover naturally from wildfire damage (USFS 2021b).

The USFS's post-fire emergency stabilization program is called the Burned Area Emergency Response (BAER) program. The goal of the BAER program is to discover post-wildfire threats to human life and safety, property, and critical natural or cultural resources on USFS lands and take appropriate actions to mitigate unacceptable risks (USFS 2021c). BAER groups are composed of trained professionals in different fields: soil scientists, engineers, hydrologists, biologists, botanists, archaeologists, and others who quickly assess the burned area and advise emergency stabilization treatments (USFS 2021c).

The Natural Resources Conservation Service (NRCS) Emergency Watershed Protection (EWP) program aids communities recover from natural disasters by providing technical and financial services for watershed repair on public (state and local) and private land. The goal is reduced flood risk via funding and expert advice for land treatments. The EWP program can provide up to 75% of funds; local sponsors must acquire the remaining 25% in cash or in-kind services (NRCS 2021a).

Examples of potential treatments include (USFS 2021c):

- Hillside stabilization (for example, placing bundles of straw parallel to the slope to slow erosion)
- Hazard tree cutting
- Felling trees perpendicular to the slope contour to reduce runoff
- Mulching areas seeded with native vegetation
- Stream enhancements and construction of catchments to control erosion, runoff, and debris flows

- Planting or seeding native species to limit spread of invasive species

A comparison of potential hillside, channel, and road treatments is available at https://www.afterwildfirenm.org/post-fire-treatments/which-treatment-do-i-use.

The effectiveness of various treatments is described at https://www.fws.gov/fire/downloads/ES_BAR/Post-Fire_Hillslope_Treatment_Synthesis.pdf.

Specific Treatment Details

Hillslope Treatments

Cover Applications:

- Dry mulch provides immediate ground cover with mulch to reduce erosion and downstream flow.
- Wet mulch (hydromulch) provides immediate cover to hold moisture and seeds on slopes using a combination of organic fibers, glue, suspension agents, and seeds (most effective on inaccessible slopes).
- Slash spreading provides ground cover to reduce erosion by felling trees in burned areas.
- Seeding reduces soil erosion over time with an application of native seed mixtures (most successful in combination with mulching). Breaking up and loosening topsoil to break down the hydrophobic layer on top of the soil is also effective.

Erosion Barrier Applications:

- Erosion control mat: organic mats staked on the soil surface to provide stability for vegetation establishment.
- Log erosion barrier: trees felled perpendicular to the hillslope to slow runoff.
- Fiber rolls (wattles): rolls placed perpendicular to the hillslope to reduce surface flows and reduce erosion.
- Silt fencing: permeable fabric fencing installed parallel to the slope contour to trap sediment as water flows down the hillslope.

Channel Treatments

- Check dam: small dams built to trap and store sediment in stream channels.
- In-channel tree felling: felling trees in a staggered pattern in a channel to trap debris and sediment.
- Grade stabilizer: structures made of natural materials placed in ephemeral channels for stabilization.
- Stream bank armoring: reinforcing streambanks with natural materials to reduce bank cutting during stream flow.
- Channel deflector: an engineered structure to direct flow away from unstable banks or nearby roads.
- Debris basin: constructed to store large amounts of sediment moving in a stream channel.

Road and Trail Treatments

- Outsloping and rolling dips (water bars) alter the road shape or template to disperse water and reduce erosion.
- Overflow structures protect the road by controlling runoff and diverting stream flow to constructed channels.
- Low water stream crossing: culverts replaced by natural fords to prevent stream diversion and keep water in the natural channel.
- Culvert modification: upgrading culvert size to prevent road damage.
- Debris rack and deflectors: structure placed in a stream channel to collect debris before reaching a culvert.
- Riser pipes filter out debris and allow the passage of water in stream channels.
- Catchment-basin cleanout: using machinery to clean debris and sediment out of stream channels and catchment basins.
- Trail stabilization: constructing water bars and spillways to provide drainage away from the trail surface.

These treatments and descriptions are further detailed at https://afterwildfirenm.org/post-fire-treatments/treatment-descriptions.

For more information about how to install and build treatments, see the Wildfire Restoration Handbook at https://www.rmfi.org/sites/default/files/hero-content-files/Fire-Restoration-HandbookDraft_2015_2.compressed_0.pdf.

Timber Salvage

Many private landowners may decide to harvest trees killed in the fire, a decision that can be highly controversial. Any remaining trees post-fire can be instrumental for soil and wildlife habitat recovery. Furthermore, burned soils are especially susceptible to soil compaction and erosion. Therefore, timber salvage must be performed by professionals. Several programs assist landowners with timber salvage, including the NRCS Environmental Quality Incentives Program (EQIP) (NRCS 2021b).

Invasive Species Management and Native Revegetation

The BLM has identified more than 27,000 invasive weed infestations in Alaska. Further complicating the invasive weed problem are more frequent and intense wildfires. Wildfire provides opportunity for many invasive species to dominate the landscape because many of these species thrive on recently burned landscapes. Therefore, it is imperative that landowners prevent invasive establishment by eradicating weeds early, planting native species, and limiting invasive seed dispersal (BLM 2021).

Planting native seeds is an economical way to restore a disturbed landscape. Vegetation provides protection against erosion and stabilizes exposed soils. To be successful, seeds must be planted during the proper time of year and using correct techniques. Use a native seed mixture with a diversity of species and consider the species' ability to compete with invasive species. Before planting, the seedbed must be prepared with topsoil and by raking to break up the hydrophobic soil layer. If you choose to transplant or plant native species, consider whether the landscape has made a sufficient recovery to ensure the safety of the individuals (ADNR, Division of Agriculture [DOA] 2008).

A comprehensive revegetation manual for Alaska can be found here: http://dnr.alaska.gov/ag/akpmc/pdf/RevegManual.pdf

Long-Term Community Recovery

On non-federal land, recovery efforts are the responsibility of local governments and private landowners. Challenges associated with long-term recovery include homes that were severely damaged or were saved but are located in high-severity burn areas. Furthermore, homes saved but located on unstable slopes or in areas in danger of flooding or landslides present a more complicated challenge. Economically, essential businesses that were burned or were otherwise forced to close pose a challenge to communities of all sizes. Given these complications, rebuilding and recovery efforts can last for years, with invasive species control and ecosystem restoration lasting even longer (CUSP 2016). It is critical that a long-term plan is in place and there is sufficient funding and support for all necessary ecosystem and community recovery. To learn about more post-fire recovery resources, visit the After the Flames website here: https://aftertheflames.com/resources/

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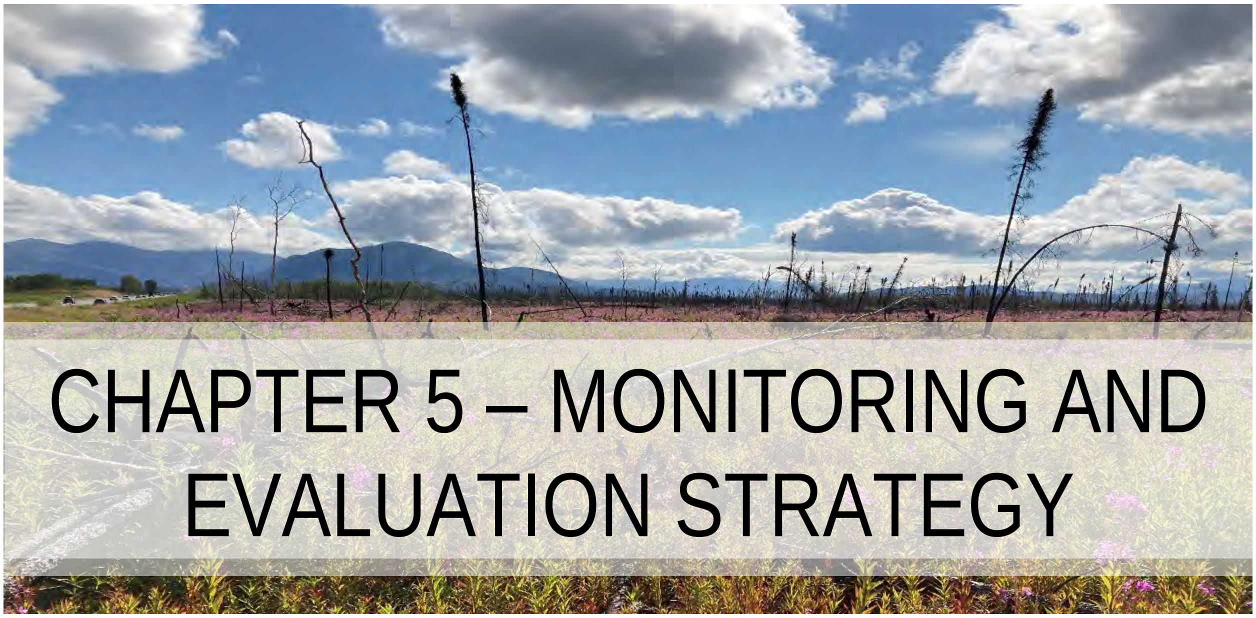

CHAPTER 5 – MONITORING AND EVALUATION STRATEGY

Developing an action plan and an assessment strategy that identifies roles and responsibilities, funding needs, and timetables for completing highest-priority projects is an important step in organizing the implementation of the CWPP. Table 4.1 in the previous section identifies tentative timelines and monitoring protocols for fuels reduction treatments, the details of which are outlined below.

All stakeholders and signatories to this CWPP desire worthwhile outcomes. Risk reduction work on the ground, for the most part, is often not attainable in a few months—or even years. The amount of money and effort invested in implementing a plan such as this requires that there be a means to describe, quantitatively or qualitatively, if the goals and objectives expressed in this plan are being accomplished according to expectations.

This section will present a suite of recommended CWPP monitoring strategies intended to help track progress, evaluate work accomplished, and assist planners in adaptive management.

The strategies outlined in this section take into account several variables:

- Do the priorities identified for treatment reflect the goals stated in the plan? Monitoring protocols can help address this question.
- Can there be ecological consequences associated with fuels work? We may be concerned about soil movement and/or invasive species encroachment post-treatment. Relatively cost-effective monitoring may help clarify changes.
- Vegetation will grow back. Thus, fuel break maintenance and fuels modification in both the home ignition zone and at the landscape scale require periodic assessment. Monitoring these changes can help decision-makers identify appropriate treatment intervals.

As the CWPP evolves over time, there may be a need to track changes in policy, requirements, stakeholder changes, and levels of preparedness. These can be significant for any future revisions and/or addendums to the CWPP.

Table 5.1 identifies recommended monitoring strategies, both quantifiable and non-quantifiable, for assessing the progress of the CWPP. It must be emphasized that these strategies are 1) not exhaustive (new strategies and protocols can evolve with new CWPP action items) and 2) dependent on available funds and personnel to implement them.

There are many resources for designing and implementing community based, multi-party monitoring that could support and further inform a monitoring program for the CWPP (Egan 2013). Multiparty monitoring involves a diverse group consisting of community members, community-based groups, regional and national interest groups, and public agencies. This approach increases understanding of the effects of restoration efforts and trust among restoration partners. Multiparty monitoring may be more time-consuming due to the collaborative nature of the work; therefore, a clear and concise monitoring plan must be developed.

Table 5.1. Recommended Monitoring Strategies

Strategy	Task/Tool	Lead	Remarks
Photographic record (documents pre- and post-fuels reduction work, evacuation routes, workshops, classes, field trips, changes in open space, treatment type, etc.)	Establish field global positioning system (GPS) location; photo points of cardinal directions; keep photos protected in archival location	Core Team member	Relatively low cost; repeatable over time; used for programs, and tracking objectives
Number of acres treated (by fuel type, treatment method)	GPS/GIS/fire behavior prediction system	Core Team member	Evaluating costs, potential fire behavior
Number of home ignition zones/defensible space treated to reduce structural ignitability	GPS	Homeowner	Structure protection
Number of residents/citizens participating in any CWPP projects and events	Meetings, media interviews, articles	Core Team member	Evaluate culture change objective
Number of homeowner contacts (brochures, flyers, posters, etc.)	Visits, phone	Agency representative	Evaluate objective
Number of jobs created	Contracts and grants	Core Team member	Evaluate local job growth
Education outreach: number, kinds of involvement	Workshops, classes, field trips, signage	Core Team member	Evaluate objectives
Emergency management: changes in agency response capacity	Track changes in capacity	Agency representative	Evaluate mutual aid
Codes and policy changes affecting CWPP	Qualitative	Core Team	CWPP changes
Number of stakeholders	Added or dropped	Core Team	CWPP changes
Wildfire acres burned, human injuries/fatalities, infrastructure loss, environmental damage, suppression and rehabilitation costs	Wildfire records	Core Team	Compare with 5- or 10-year average

An often overlooked but critical component of fuel treatment is monitoring. It is important to evaluate whether fuel treatments have accomplished their defined objectives and whether any unexpected outcomes have occurred. In addition to monitoring mechanical treatments, it is important to carry out comprehensive monitoring of burned areas to establish the success of fuels reduction treatments on fire behavior, as well as monitoring for ecological impacts, repercussions of burning on wildlife, and effects on soil chemistry and physics. Adaptive management is a term that refers to adjusting future management based on the effects of past management. Monitoring is required to gather the information necessary to inform future management decisions. Economic and legal questions may also be addressed through monitoring. In addition, monitoring activities can provide valuable educational opportunities for students.

The monitoring of each fuel's reduction project would be site-specific, and decisions regarding the timeline for monitoring and the type of monitoring to be used would be determined by project. Monitoring and reporting contribute to the long-term evaluation of changes in ecosystems, as well as the knowledge base about how natural resource management decisions affect both the environment and the people who live in it.

The most important part of choosing a monitoring program is selecting a method appropriate to the people, place, and available time. Several levels of monitoring activities meet different objectives, have different levels of time intensity, and are appropriate for different groups of people. They include the following:

Minimum—Level 1: Pre- and Post-project Photographs

Appropriate for many individual homeowners who conduct fuels reduction projects on their properties.

Moderate—Level 2: Multiple Permanent Photo Points

Permanent photo locations are established using rebar or wood posts, global positioning system (GPS)-recorded locations, and photographs taken on a regular basis. Ideally, this process would continue over several years. This approach might be appropriate for more enthusiastic homeowners or for agencies conducting small-scale, general treatments.

High—Level 3: Basic Vegetation Plots

A series of plots can allow monitors to evaluate vegetation characteristics such as species composition, percentage of cover, and frequency. Monitors then can record site characteristics such as slope, aspect, and elevation. Parameters would be assessed pre- and post-treatment. The monitoring agency should establish plot protocols based on the types of vegetation present and the level of detail needed to analyze the management objectives.

Intense—Level 4: Basic Vegetation Plus Dead and Downed Fuels Inventory

The protocol for this level would include the vegetation plots described above but would add more details regarding fuel loading. Crown height or canopy closure might be included for live fuels. Dead and downed fuels could be assessed using other methods, such as Brown's transects (Brown 1974), an appropriate photo series (Ottmar et al. 2000), or fire monitoring (Fire Effects Monitoring and Inventory System [FIREMON]; Lutes et al. 2006) plots.

CWPP EVALUATION

CWPPs are intended to reduce the risk from wildfire for a community and surrounding environment. However, over time, communities change and expand, vegetation grows back, and forests and wildlands evolve. As such, the risk of wildfire to communities is constantly changing. The plans and methods to reduce risk must be dynamic to keep pace with the changing environment. An evaluation of the CWPP will gather information and identify whether the plans and strategies are on course to meet the desired outcomes or if modifications are needed to meet expectations.

Four general steps can be used to evaluate the CWPP:

1. Identify objectives: What are the goals identified in the plan? How are they reached? Is the plan performing as intended?

   a. Structural ignitability
   b. Fuel treatments
   c. Public education and outreach
   d. Multi-agency collaboration
   e. Emergency response

2. Assess the changing environment: How have population characteristics and the wildfire environment changed?
   a. Population change
      i. Increase or decrease
      ii. Demographics
   b. Population settlement patterns
      i. Distribution
      ii. Expansion into the WUI
   c. Vegetation
      i. Fuel quantity and type
      ii. Drought and disease impacts
3. Review action items: Are actions consistent with the plan's objectives?
   a. Check for status, i.e., completed/started/not started
   b. Identify completed work and accomplishments
   c. Identify challenges and limitations
   d. Identify next steps
4. Assess results: What are the outcomes of the action items?
   a. Multi-agency collaboration
      i. Who was involved in the development of the CWPP?
      ii. Have partners involved in the development process remained involved in the implementation?
      iii. How has the planning process promoted implementation of the CWPP?
      iv. Have CWPP partnerships and collaboration had a beneficial impact on the community?
   b. Risk assessment
      i. How is the risk assessment utilized to make decisions about fuel treatment priorities?

ii. Have there been new wildfire-related regulations?

iii. Are at-risk communities involved in mitigating wildfire risk?

c. Hazardous fuels

i. How many acres have been treated?

ii. How many projects are cross-boundary?

iii. How many residents have participated in creating defensible space?

d. Structural ignitability

i. Have there been updates to fire codes and ordinances?

ii. How many structures have been lost to wildfire?

iii. Has the CWPP increased public awareness of structural ignitability and reduction strategies?

e. Public education and outreach

i. Has public awareness of wildfire and mitigation strategies increased?

ii. Have residents been involved in wildfire mitigation activities?

iii. Has there been public involvement?

iv. Have vulnerable populations been involved?

f. Emergency response

i. Has the CWPP been integrated into relevant plans (e.g., hazard mitigation or emergency operations)?

ii. Is the CWPP congruent with other hazard mitigation planning efforts?

iii. Has availability and capacity of local fire departments changed since the CWPP was developed?

IMPLEMENTATION

This CWPP makes recommendations for prioritized fuels reduction projects and measures to reduce structural ignitability, carry out public education and outreach and improve wildfire response capabilities. Implementation of fuels reduction projects need to be tailored to the specific project and will be unique to the location depending on available resources and regulations. On-the-ground implementation of the recommendations in the CWPP planning area will require development of an action plan and assessment strategy for completing each project. This step will identify the roles and responsibilities of the people and agencies involved, as well as funding needs and timetables for completing the highest-priority projects (SAF 2004). Information pertaining to funding is provided in Appendix F.

IDENTIFY TIMELINE FOR UPDATING THE CWPP

The HFRA allows for maximum flexibility in the CWPP planning process, permitting the Core Team to determine the time frame for updating the CWPP; it is suggested that a formal revision be made on the fifth anniversary of signing and every 5 years following. The Core Team members are encouraged to meet on an annual basis to review the project list, discuss project successes, and strategize regarding project implementation funding. If possible, the CWPP revision should coincide with the revision of the Borough HMP. Recommendations: 1) develop a cursory update and crosswalk of changes completed in 2023 to align with the ALAH Update and the borough HMP, and 2) complete the comprehensive revision in 2028 and every 5 years thereafter. A goal of the 2018 ALAH Plan is to maintain and implement the CWPP, including project recommendations.

ABBREVIATIONS AND ACRONYMS

°F	degrees Fahrenheit
ACCIMP	Alaska Climate Change Impact Mitigation Program
ADCCED	Alaska Department of Commerce, Community, and Economic Development
ADEC	Alaska Department of Environmental Conservation
ADFG	Alaska Department of Fish and Game
ADNR	Alaska Department of Natural Resources
AICC	Alaska Interagency Coordination Center
AIWFMP	Alaska Interagency Wildland Fire Management Plan, 2021
ALAH	All Lands/All Hands
ANILCA	1980 Alaska National Interest Lands Conservation Act
ANCSA	Alaska Native Claims Settlement Act of 1971
APC	Advisory Planning Commission
ARRA	Alaska Region Risk Assessment
ATV	all-terrain vehicle
AWFCG	Alaska Wildland Fire Coordinating Group
BAER	Burned Area Emergency Rehabilitation
BLM	Bureau of Land Management
BSM	battered sallow moth
BTU/ft/sec	British thermal units per foot per second
CAR	community at risk
ch/hr	chains per hour
CIG	Conservation Innovation Grants
CIRI	Cook Inlet Region, Inc.
Cohesive Strategy	National Cohesive Wildland Fire Management Strategy
CRS	Congressional Research Service
CWA	Clean Water Act
CWPP	community wildfire protection plan
DEM	digital elevation model
DHS	Department of Homeland Security
DHSEM	Alaska Division of Homeland Security & Emergency Management
EAS	Emergency Alert System
EBC	European bird cherry
ECP	Emergency Conservation Program

EFRP	Emergency Forest Restoration Program
EMPG	Emergency Management Performance Grant
EMS	Emergency Management System
eNVC	expected net value change
EPA	U.S. Environmental Protection Agency
EQIP	Environmental Quality Incentives Program
ESRI	Environmental Systems Research Institute
EWP	Emergency Watershed Protection
FAC	fire-adapted community
FEMA	Federal Emergency Management Agency
FLAME	Federal Land Assistance, Management and Enhancement Act
FMU	Fire Management Unit
FP&S	Fire Prevention and Safety
FRI	fire return interval
GAID	Geographic Area Interagency Division
GIS	geographic information system
GOPR	Governor's Office of Planning and Research
GPS	global positioning system
HFRA	Healthy Forest Restoration Act
HIZ	Home Ignition Zone
HMP	Hazard Mitigation Plan
HVRA	highly valued resource and asset
IARC	International Arctic Research Center
IBHS	Institute for Business and Home Safety
ICC	International Code Council
IFTDSS	Interagency Fuel Treatment Decision Support System
ISO	Insurance Services Office
JIS/C	Joint Information System/Center
JPA	Joint Powers Agreement
KFNP	Kenai Fjords National Park
LCNPP	Lake Clark National Park and Preserve
MA	Management Area
MFI	mean fire interval
MFRI	mean fire-return interval
NASF	National Association of State Foresters

NEPA	National Environmental Policy Act
NFF	National Forest Foundation
NFP	National Fire Plan
NFPA	National Fire Protection Association
NOAA	National Oceanic and Atmospheric Administration
NRCS	Natural Resources Conservation Service
NWCG	National Wildfire Coordinating Group
OEM	Office of Emergency Management
PDM	pre-disaster mitigation
PERI	Public Entity Risk Institute
PPE	personal protective equipment
QWRA	Quantitative Wildfire Risk Assessment
RAWS	remote automated weather station
RFA	Rural Fire Assistance
ROW	right-of-way
RSG	Ready, Set, Go!
SAF	Society of American Foresters
SAFER	Staffing for Adequate Fire and Emergency Response
SBB	spruce bark bSpruce Bark eetle
SFA	State Fire Assistance
SHPO	State Historic Preservation Office
SWCA	SWCA Environmental Consultants
TAC	Terry Anderson Consulting
UAA	University of Alaska Anchorage
UAF	University of Alaska Fairbanks
ULI	Urban Land Institute
USDA	U.S. Department of Agriculture
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
USGCRP	U.S. Global Change Research Program
VCC	Vegetation Condition Class
VDEP	Vegetation Departure
WBBI	Western Bark Beetle Initiative
WUI	wildland urban interface

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GLOSSARY OF TERMS

Aspect: Cardinal direction toward which a slope faces in relation to the sun (National Wildfire Coordinating Group [NWCG] 2021a).

Active Crown Fire: A crown fire in which the entire fuel complex is involved in flame, but the crowning phase remains dependent on heat released from surface fuel for continued spread. An active crown fire presents a solid wall of flame from the surface through the canopy fuel layers. Flames appear to emanate from the canopy as a whole rather than from individual trees within the canopy. Active crown fire is one of several types of crown fire and is contrasted with **passive crown fires**, which are less vigorous types of crown fire that do not emit continuous, solid flames from the canopy (SWCA).

Available Canopy Fuel: The mass of canopy fuel per unit area consumed in a crown fire. There is no post-frontal combustion in canopy fuels, so only fine canopy fuels are consumed. We assume that only the foliage and a small fraction of the branchwood is available (Twisp 2021).

Available Fuel: The total mass of ground, surface and canopy fuel per unit area available fuel consumed by a fire, including fuels consumed in postfrontal combustion of duff, organic soils, and large woody fuels (Twisp 2021).

Backfiring: Intentionally setting fire to fuels inside a control line to contain a fire (Twisp 2021).

Biomass: Organic material. Also refers to the weight of organic material (e.g., biomass roots, branches, needles, and leaves) within a given ecosystem (Twisp 2021).

Burn Severity: A qualitative assessment of the heat pulse directed toward the ground during a fire. Burn severity relates to soil heating, large fuel and duff consumption, consumption of the litter and organic layer beneath trees and isolated shrubs, and mortality of buried plant parts (SWCA).

Canopy: The more or less continuous cover of branches and foliage formed collectively by adjacent trees and other woody species in a forest stand. Where significant height differences occur between trees within a stand, formation of a multiple canopy (multi-layered) condition can result (SWCA).

Chain: Unit of measure in land survey, equal to 66 feet (20 M) (80 chains equal 1 mile). Commonly used to report fire perimeters and other fireline distances. Popular in fire management because of its convenience in calculating acreage (example: 10 square chains equal one acre) (New Mexico FFA 2021).

Climate Adaptation: Adaptation is an adjustment in natural or human systems to a new or changing environment. Adaptation to climate change refers to adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities (Governor's Office of Planning and Research [GOPR] 2020).

Climate Change: A change of climate that is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and that is in addition to natural climate variability observed over comparable time periods (GOPR 2020).

Community Assessment: An analysis designed to identify factors that increase the potential and/or severity of undesirable fire outcomes in wildland urban interface communities (SWCA).

Communities at Risk: Defined by the Healthy Forest Restoration Act of 2003 as "Wildland-Urban Interface Communities within the vicinity of federal lands that are at high risk from wildfire" (GOPR 2020).

Community Emergency Response Team (CERT): The CERT program educates volunteers about disaster preparedness for the hazards that may impact their area and trains them in basic disaster response skills, such as fire safety, light search and rescue, team organization, and disaster medical operations. CERT offers a consistent, nationwide approach to volunteer training and organization that professional responders can rely on during disaster situations, allowing them to focus on more complex tasks.

Community Wildfire Protection Plan (CWPP): A planning document that seeks to reduce the threat to life and property from wildfire by identifying and mitigating wildfire hazards to communities and infrastructure located in the WUI as developed from the Healthy Forest Restoration Act of 2003. Addresses issues such as wildfire response, hazard mitigation, community preparedness, or structure protection (SWCA).

Conditional Surface Fire: A potential type of fire in which conditions for sustained conditional surface fire active crown fire spread are met but conditions for crown fire initiation are not. If the fire begins as a surface fire, it is expected to remain so. If it begins as an active crown fire in an adjacent stand, it may continue to spread as an active crown fire (Twisp 2021).

Contain: A tactical point at which a fire's spread is stopped by and within specific contain features, constructed or natural; also, the result of stopping a fire's spread so that no further spread is expected under foreseeable conditions. For reporting purposes, the time and date of containment. This term no longer has a strategic meaning in Federal wildland fire policy (Twisp 2021).

Control: To construct fireline or use natural features to surround a fire and any control spot fires therefrom and reduce its burning potential to a point that it no longer threatens further spread or resource damage under foreseeable conditions. For reporting purposes, the time and date of control. This term no longer has a strategic meaning in Federal wildland fire policy (Twisp 2021).

Cover Type: The type of vegetation (or lack of it) growing on an area, based on cover type minimum and maximum percent cover of the dominant species, species group or non-living land cover (such as water, rock, etc.). The cover type defines both a qualitative aspect (the dominant cover type) as well as a quantitative aspect (the abundance of the predominant features of that cover type) (Twisp 2021).

Creeping Fire: A low intensity fire with a negligible rate of spread (Twisp 2021).

Crown Fire: A fire that advances at great speed from crown to crown in tree canopies, often well in advance of the fire on the ground (National Geographic Society 2021).

Defensible Space: An area around a structure where fuels and vegetation are modified, cleared, or reduced to slow the spread of wildfire toward or from a structure. The design and distance of the defensible space is based on fuels, topography, and the design/materials used in the construction of the structure (SWCA).

Duff: The layer of decomposing organic materials lying below the litter layer of freshly fallen twigs, needles, and leaves and immediately above the mineral soil (SWCA).

Ecosystem: An interacting natural system including all the component organisms together with the abiotic environment and processes affecting them (SWCA).

Environmental Conditions: That part of the fire environment that undergoes short-term changes: weather, which is most commonly manifest as windspeed, and dead fuel moisture content (Twisp 2021).

Escape Route: A preplanned and understood route firefighters take to move to a safety zone or other low-risk area. When escape routes deviate from a defined physical path, they should be clearly marked (flagged) (SWCA).

Evacuation: The temporary movement of people and their possessions from locations threatened by wildfire (SWCA).

Fire-Adapted Communities: A fire-adapted community collaborates to identify its wildfire risk and works collectively on actionable steps to reduce its risk of loss. This work protects property and increases the safety of firefighters and residents (USFA 2021a).

Fire Behavior: The manner in which fuel ignites, flame develops, and fire spread and exhibits other related phenomena as determined by the interaction of fuels, weather, and topography (Frames 2021).

Fire Break: Areas where vegetation and organic matter are removed down to mineral soil (SWCA).

Fire Environment: The characteristics of a site that influence fire behavior. In fire modeling the fire environment is described by surface and canopy fuel characteristics, windspeed and direction, relative humidity, and slope steepness (Twisp 2021).

Fire Frequency: A broad measure of the rate of fire occurrence in a particular area. For historical analyses, fire frequency is often expressed using the fire return interval calculation. For modern-era analyses, where data on timing and size of fires are recorded, fire frequency is often best expressed using fire rotation (SWCA)

Fire Hazard: Fire hazard is the potential fire behavior or fire intensity in an area, given the type(s) of fuel present – including both the natural and built environment – and their combustibility (GOPR 2020).

Fire Hazard Severity Zones: Fire hazard severity zones are defined based on vegetation, topography, and weather (temperature, humidity and wind), and represents the likelihood of an area burning over a 30- to 50-year time period without considering modifications such as fuel reduction efforts (GOPR 2020).

Fire History: The chronological record of the occurrence of fire in an ecosystem or at a specific site. The fire history of an area may inform planners and residents about the level of wildfire hazard in that area (SWCA).

Fire Intensity: A general term relating to the heat energy released in a fire (SWCA).

Fireline Intensity: Amount of heat release per unit time per unit length of fire front. Numerically, the product of the heat of combustion, quantity of fuel consumed per unit area in the fire front, and the rate of spread of a fire, expressed in kilowatts per minute (SWCA). This expression is commonly used to describe the power of wildland fires, but it does not necessarily follow that the severity, defined as the vegetation mortality, will be correspondingly high (Twisp 2021).

Fire Prevention: Activities such as public education, community outreach, planning, building code enforcement, engineering (construction standards), and reduction of fuel hazards that is intended to reduce the incidence of unwanted human-caused wildfires and the risks they pose to life, property or resources (GOPR 2020).

Fire Regime: A measure of the general pattern of fire frequency and severity typical to a particular area or type of landscape: The regime can include other metrics of the fire, including seasonality and typical fire size, as well as a measure of the pattern of variability in characteristics (SWCA).

Fire Regime Condition Class: Condition classes are a function of the degree of fire regime condition class departure from historical fire regimes resulting in alterations of key ecosystem components such as composition structural stage, stand age, and canopy closure (Twisp 2021).

Fire Return Interval: Number of years (interval) between two successive fires in a designated area (SWCA).

Fire Risk: "Risk" takes into account the intensity and likelihood of a fire event to occur as well as the chance, whether high or low, that a hazard such as a wildfire will cause harm. Fire risk can be determined by identifying the susceptibility of a value or asset to the potential direct or indirect impacts of wildfire hazard events (GOPR 2020).

Fire Severity: A qualitative measure of the immediate effects of fire on the fire severity ecosystem. It relates to the extent of mortality and survival of plant and animal life both aboveground and belowground and to loss of organic matter. It is determined by heat released aboveground and belowground. Fire Severity is dependent on intensity and residence time of the burn. For trees, severity is often measured as percentage of basal area removed. An intense fire may not necessarily be severe (Twisp 2021).

Flammability: The relative ease with which fuels ignite and burn regardless of the quantity of the fuels (SWCA).

Flame Length: The length of flames in the propagating fire front measured along the slant of the flame from the midpoint of its base to its tip. It is mathematically related to fireline intensity and tree crown scorch height (Twisp 2021).

Foliar Moisture content: Moisture content (dry weight basis) of live foliage, foliar moisture content expressed as a percent. Effective foliar moisture content incorporates the moisture content of other canopy fuels such as lichen, dead foliage, and live and dead branchwood (Twisp 2021).

Forest Fire: uncontrolled burning of a woodland area (National Geographic Society 2021).

Fuel Break: A natural or manmade change in fuel characteristics which affects fire behavior so that fires burning into them can be more readily controlled (NWCG 2021b).

Fuel Complex: The combination of ground, surface, and canopy fuel strata (Twisp 2021).

Fuel Condition: Relative flammability of fuel as determined by fuel type and environmental conditions (SWCA).

Fuel Continuity: A qualitative description of the distribution of fuel both horizontally and vertically. Continuous fuels readily support fire spread. The larger the fuel discontinuity, the greater the fire intensity required for fire spread (Twisp 2021).

Fuel Loading: The volume of fuel in a given area generally expressed in tons per acre (SWCA). Dead woody fuel loadings are commonly described for small material in diameter classes of 0 to 0.25, 0.25 to 1, and 1 to 3 inches and for large material greater than 3 inches (Twisp 2021).

Fuel Management/Fuel Reduction: Manipulation or removal of fuels to reduce the likelihood of ignition and to reduce potential damage in case of a wildfire. Fuel reduction methods include prescribed fire, mechanical treatments (mowing, chopping), herbicides, biomass removal (thinning or harvesting or trees, harvesting of pine straw), and grazing. Fuel management techniques may sometimes be combined for greater effect (SWCA).

Fuel Model: A set of surface fuel bed characteristics (load and surface-area-to- fuel model volume-ratio by size class, heat content, and depth) organized for input to a fire model (Twisp 2021).

Fuel Modification: The manipulation or removal of fuels (i.e., combustible biomass such as wood, leaves, grass, or other vegetation) to reduce the likelihood of igniting and to reduce fire intensity. Fuel modification activities may include lopping, chipping, crushing, piling and burning, including prescribed burning. These activities may be performed using mechanical treatments or by hand crews. Herbicides and prescribed herbivory (grazing) may also be used in some cases. Fuel modification may also sometimes be referred to as “vegetation treatment” (GOPR 2020).

Fuel Moisture Content: This is expressed as a percent or fraction of oven dry fuel moisture content weight of fuel. It is the most important fuel property controlling flammability. In living plants, it is physiologically bound. Its daily fluctuations vary considerably by species but are usually above 80 to 100 percent. As plants mature, moisture content decreases. When herbaceous plants cure, their moisture content responds as dead fuel moisture content, which fluctuates according to changes in temperature, humidity, and precipitation (Twisp 2021).

Fuel Treatment: The manipulation or removal of fuels to minimize the probability of ignition and/or to reduce potential damage and resistance to fire suppression activities (NWCG 2021g). Synonymous with fuel modification.

Grazing: There are two types of grazing: 1) traditional grazing, and 2) targeted grazing. Traditional grazing refers to cattle that are managed in extensive pastures to produce meat. Targeted grazing involves having livestock graze at a specific density for a given period of time for the purpose of managing vegetation. Even though both kinds of grazing manage fuel loading in range- and forested lands, targeted grazing is different in that its sole purpose is to manage fuels. Targeted grazing is done by a variety of livestock species such as sheep, goats, or cows (UC, Agriculture and Natural Resources 2019).

Ground Fire: Fire that burns organic matter in the soil, or humus; usually does not appear at the surface (National Geographic Society 2021).

Ground Fuels: Fuels that lie beneath surface fuels, such as organic soils, duff, decomposing litter, buried logs, roots, and the below-surface portion of stumps (Twisp 2021).

Hazard: A “hazard” can be defined generally as an event that could cause harm or damage to human health, safety, or property (GOPR 2020).

Hazardous Areas: Those wildland areas where the combination of vegetation, topography, weather, and the threat of fire to life and property create difficult and dangerous problems (SWCA).

Hazardous Fuels: A fuel complex defined by type, arrangement, volume, condition, and location that poses a threat of ignition and resistance to fire suppression (NWCG 2021h).

Hazardous Fuels Reduction: Any strategy that reduces the amount of flammable material in a fire-prone ecosystem. Two common strategies are mechanical thinning and controlled burning (Twisp 2021).

Hazard Reduction: Any treatment that reduces the threat of ignition and spread of fire (SWCA).

Highly Valued Resources and Assets (HVRAs): Landscape features that are influenced positively and/or negatively by fire. Resources are naturally occurring, while Assets are human-made (Interagency Fuel Treatment Decision Support System [IFTDSS] 2021).

Ignition: The action of setting something on fire or starting to burn.

Incident: An occurrence or event, either natural or person-caused, which requires an emergency response to prevent loss of life or damage to property or natural resources (Twisp 2021).

Influence Zone: An area that, with respect to wildland and urban fire, has a set of conditions that facilitate the opportunity for fire to burn from wildland fuels to the home and or structure ignition zone (NWCG 2021).

Initial Attack: The actions taken by the first resources to arrive at a wildfire to protect lives and property, and prevent further extension of the fire (SWCA).

Ladder Fuels: Fuels that provide vertical continuity allowing fire to carry from surface fuels into the crowns of trees or shrubs with relative ease (SWCA).

Litter: Recently fallen plant material that is only partially decomposed and is still discernible (SWCA).

Manual Treatments: Felling and piling of fuels done by hand. The volume of material generated from a manual fuel treatment is typically too small to warrant a biomass sale therefore collected material is disposed of by burning or chipping. The work can be performed by either a single individual or a large organized crew with powered equipment (UC, Agriculture and Natural Resources 2021a).

Mechanized Treatments: Mechanical treatments pulverize large continuous patches of fuel to reduce the volume and continuity of material. Mechanical treatments can be applied as either mastication or chipping treatments. Both treatments shred woody material, but mastication leaves residue on-site while chipping collects the particles for transportation off site. Similar to hand treatments, mechanical treatments can target specific areas and vegetation while excluding areas of concern. In addition, mechanical treatment is easily scalable to large areas (>30 acres) with little added cost. (UC, Agriculture and Natural Resources 2021b).

Mitigation: Action that moderates the severity of a fire hazard or risk (SWCA).

Mutual Aid: Assistance in firefighting or investigation by fire agencies, irrespective of jurisdictional boundaries (NWCG 2021j).

National Cohesive Strategy: The National Cohesive Wildland Fire Management Strategy is a strategic push to work collaboratively among all stakeholders and across all landscapes, using best science, to make meaningful progress towards the three goals:

- Resilient Landscapes
- Fire Adapted Communities
- Safe and Effective Wildfire Response

Vision: To safely and effectively extinguish fire when needed; use fire where allowable; manage our natural resources; and as a nation, to live with wildland fire (Forests and Rangelands 2021).

Native Revegetation: The process of replanting and rebuilding the soil of disturbed land (e.g., burned) with native plant species (USDA 2005).

Native Species: A species that evolved naturally in the habitat, ecosystem, or region as determined by climate, soil, and biotic factors (USDA 2005).

Overstory: That portion of the trees in a forest which forms the upper or uppermost layer (SWCA).

Passive Crown Fire: A type of crown fire in which the crowns of individual trees or small groups of trees burn, but solid flaming in the canopy cannot be maintained except for short periods. Passive crown fire encompasses a wide range of crown fire behavior, from occasional torching of isolated trees to nearly active crown fire. Passive crown fire is also called torching or candling. A fire in the crowns of the trees in which trees or groups of trees torch, ignited by the passing front of the fire. The torching trees reinforce the spread rate, but these fires are not basically different from surface (SWCA).

Prescribed Burning: Any fire ignited by management actions under specific, predetermined conditions to meet specific objectives related to hazardous fuels or habitat improvement. Usually, a written, approved prescribed fire plan must exist, and NEPA requirements must be met, prior to ignition (USFS 2021g).

Rate of Spread: The relative activity of a fire in extending its horizontal dimensions. It is expressed as rate of increase of the total perimeter of the fire, as rate of forward spread of the fire front, or as rate of increase in area, depending on the intended use of the information. Usually, it is expressed in chains or acres per hour for a specific period in the fire's history (NWCG 2021d).

Resilience: Resilience is the capacity of any entity – an individual, a community, an organization, or a natural system – to prepare for disruptions, to recover from shocks and stresses, and to adapt and grow from a disruptive experience (GOPR 2020).

Response: Movement of an individual firefighting resource from its assigned standby location to another location or to an incident in reaction to dispatch orders or to a reported alarm (SWCA).

Safety Element: One of the seven mandatory elements of a local general plan (a community plan that forms the foundation for future development), the safety element must identify hazards and hazard abatement provisions to guide local decisions related to zoning, subdivisions, and entitlement permits. The element should contain general hazard and risk reduction strategies and policies supporting hazard mitigation measures (GOPR 2020).

Slash: Debris left after logging, pruning, thinning, or brush cutting. Slash includes logs, chips, bark, branches, stumps, and broken trees or brush that may be fuel for a wildfire (SWCA).

Slope Percent: The ratio between the amount of vertical rise of a slope and horizontal distance as expressed in a percent. One hundred feet of rise to 100 feet of horizontal distance equals 100 percent (NWCG 2021e).

Suppression: The most aggressive fire protection strategy, it leads to the total extinguishment of a fire (SWCA).

Surface Fire: fire that typically burns only surface litter and undergrowth (National Geographic Society 2021).

Surface Fuel: Fuels lying on or near the surface of the ground, consisting of leaf and needle litter, dead branch material, downed logs, bark, tree cones, and low stature living plants (SWCA).

Structural Ignitability: The ability of structures (such as homes or fences) to catch fire (SWCA).

Topography: The arrangement of the natural and artificial physical features of an area.

Total Fuel Load: The mass of fuel per unit area that could possibly be consumed in a hypothetical fire of the highest intensity in the driest fuels (Twisp 2021).

Tree Crown: The primary and secondary branches growing out from the main stem, together with twigs and foliage (SWCA).

Understory: Low-growing vegetation (herbaceous, brush or reproduction) growing under a stand of trees. Also, that portion of trees in a forest stand below the overstory (SWCA).

Understory Fire: A fire burning in the understory, more intense than a surface fire with flame lengths of 1 to 3 m (Twisp 2021).

Values and Assets at Risk: The elements of a community or natural area considered valuable by an individual or community that could be negatively impacted by a wildfire or wildfire operations. These values can vary by community and can include public and private assets (natural and manmade), such as homes, specific structures, water supply, power grids, natural and cultural resources, and community infrastructure, as well as other economic, environmental, and social values (GOPR 2020).

Vulnerable Community: Vulnerable communities experience heightened risk and increased sensitivity to natural hazard and climate change impacts and have less capacity and fewer resources to cope with, adapt to, or recover from the impacts of natural hazards and increasingly severe hazard events because of climate change. These disproportionate effects are caused by physical (built and environmental), social, political, and/ or economic factor(s), which are exacerbated by climate impacts. These factors include, but are not limited to, race, class, sexual orientation and identification, national origin, and income inequality (GOPR 2020).

Wildfire: A “wildfire” can be generally defined as any unplanned fire in a “wildland” area or in the WUI (GOPR 2020).

Wildfire Exposure: During fire suppression activities, an exposure is any area/property that is threatened by the initial fire, but in National Fire Incident Reporting System a reportable exposure is any fire that is caused by another fire, i.e., a fire resulting from another fire outside that building, structure, or vehicle, or a fire that extends to an outside property from a building, structure, or vehicle (USFA 2020).

Wildfire Influence Zone: A wildland area with susceptible vegetation up to 1.5 miles from the interface or intermix WUI (GOPR 2020).

Wildland: Those unincorporated areas covered wholly or in part by trees, brush, grass, or other flammable vegetation (GOPR 2020).

Wildland Fire: Fire that occurs in the wildland as the result of an unplanned ignition (GOPR 2020).

Wildland Fuels (aka fuels): Fuel is the material that is burning. It can be any kind of combustible material, especially petroleum-based products, and wildland fuels. For wildland fire, it is usually live, or dead plant material, but can also include artificial materials such as houses, sheds, fences, pipelines, and trash piles. In terms of vegetation, there are 6 wildland fuel types (Fuel Type: An identifiable association of fuel elements of distinctive species, form, size, arrangement, or other characteristics that will cause a predictable rate of spread or resistance to control under specified weather conditions.) The 6 wildland fuel types are (NWCG 2021f):

4. Grass
5. Shrub
6. Grass-Shrub
7. Timber Litter
8. Timber-Understory
9. Slash-Blowdown

Wildland Urban Interface (WUI): The WUI is the zone of transition between unoccupied land and human development. It is the line, area or zone where structures and other human development meet or intermingle with undeveloped wildland or vegetative fuels (USFA 2021b). In the absence of a Community Wildfire Protection Plan, Section 101 (16) of the Healthy Foresters Restoration Act defines the wildland urban interface as “ (I) an area extending ½ mile from the boundary of an at-risk community; (II) an area within 1 ½ miles of the boundary of an at-risk community, including any land that (1) has a sustained steep slope that creates the potential for wildfire behavior endangering the at-risk community; (2) has a geographic feature that aids in creating an effective fire break, such as a road or ridge top; or (3) is in condition class 3, as documented by the Secretary in the project-specific environmental analysis; (III) an area that is adjacent to an evacuation route for an at-risk community that the Secretary determines, in cooperation with the at-risk community, requires hazardous fuels reduction to provide safer evacuation from the at-risk community.” A Community Wildfire Protection Plan offers the opportunity to establish a localized definition and boundary for the wildland urban interface (USFS 2021h)

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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

The text in the following sections is taken verbatim from the Alaska Wildland Fire Coordinating Group, 2021 Alaska Interagency Wildland Fire Management Plan.

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/)." (AWFCG 2021:5)

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 (AWFCG 2021). 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/) (AWFCG 2021:6).

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." (AWFCG 2021:6)

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." (AWFCG 2021:6 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 (AWFCG 2021:7):

- 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." (AWFCG 2021:7)

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.” (AWFCG 2021:7)

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.” (AWFCG 2021:8)

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." (AWFCG 2021:2)

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." (AWFCG 2021:3)

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." (AWFCG 2021:3)

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." (AWFCG 2021:3)

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.'" (AWFCG 2021:3

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." (AWFCG 2021:4)

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." (AWFCG 2021:4

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." (AWFCG 2021:4)

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." (AWFCG 2021:5)

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." (AWFCG 2021:5)

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 (AWFCG 2021). 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 (AWFCG 2021).

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.

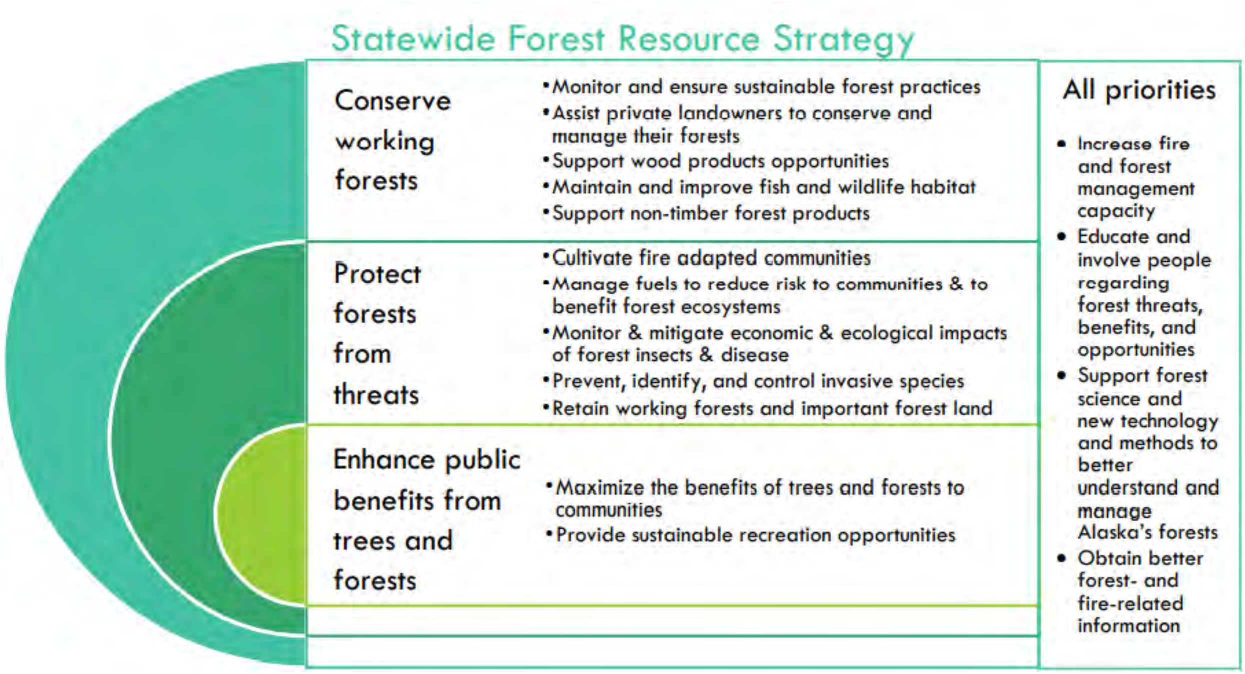

Figure A.1. Statewide forest resource priorities and accompanying strategies as delineated by the 2020 Alaska Forest Action Plan.

Source: Alaska DOF (2020)

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 (AWFCG 2021).

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 (AWFCG 2021).

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 (AIWFMP), 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 AIWFMP 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 Wildland Fire Coordinating Group, an organization composed of various state, federal, and native organizations, updated the Alaska Interagency Wildland Fire Management Plan for Alaska (AWFCG 2021). 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 (AWFCG 2021).

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 Land Owned within the Borough
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%

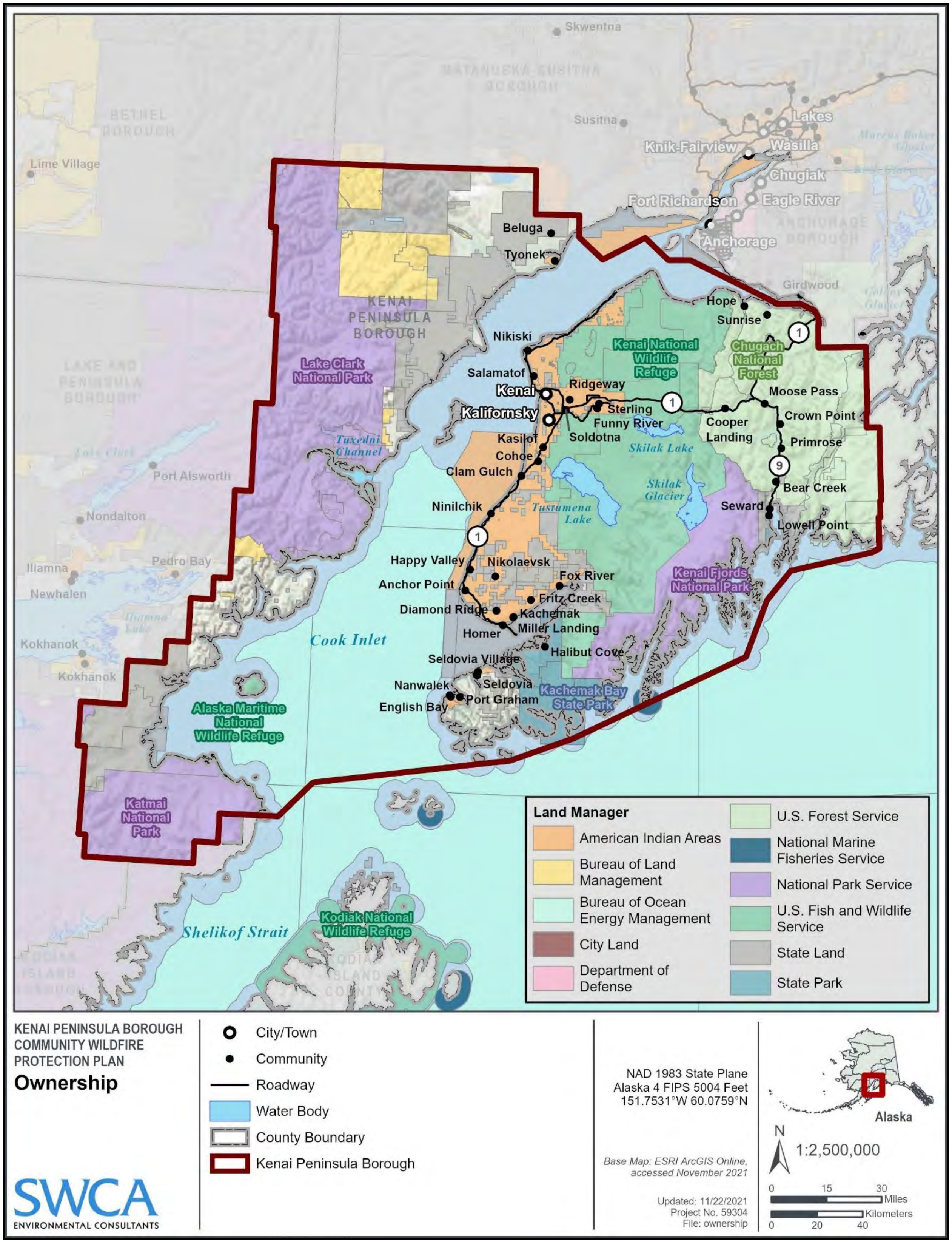

Figure A.2. Land ownership within the KPB.

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.

State Lands

Critical Habitat Areas

Seven critical habitat areas are managed by the ADFG on the Kenai Peninsula: Fox River Flats, Kachemak Bay, Anchor River/Fritz Creek, Homer Airport, Clam Gulch, Kalgin Island, and Redoubt Bay. These areas are managed to protect and preserve habitat regions important to the perpetuation of fish and wildlife, and to restrict other uses that are not compatible with the primary purpose (ADFG 2021f). These areas comprise many types of landscapes and environments: wetlands, riparian habitats, bays, estuaries, mud flats, marshlands, rivers, spruce forests, and subalpine meadows. These habitats support a wide range of wildlife and fish, including anadromous fish, shellfish, sea otters, porpoise, waterfowl, shorebirds, seabirds, whales, moose, black and brown bear, coyote, wolves, red fox, mink, and muskrat (ADFG 2021f).

Kachemak Bay State Park and Kachemak Bay State Wilderness Park

The Kachemak Bay State Park and Kachemak Bay State Wilderness Park are managed by the ADNR and 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 (ADNR 2021b).

The DOF has primary responsibility for wildland fire response in the parks. 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 seven tribes in the Chugach Region developed a cooperative agreement seven 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.

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.

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

			Mean Annual Temperature (°F)		
Station	**Period of Record**	**Mean Annual Precipitation (Inches)**	**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.9–A.12).

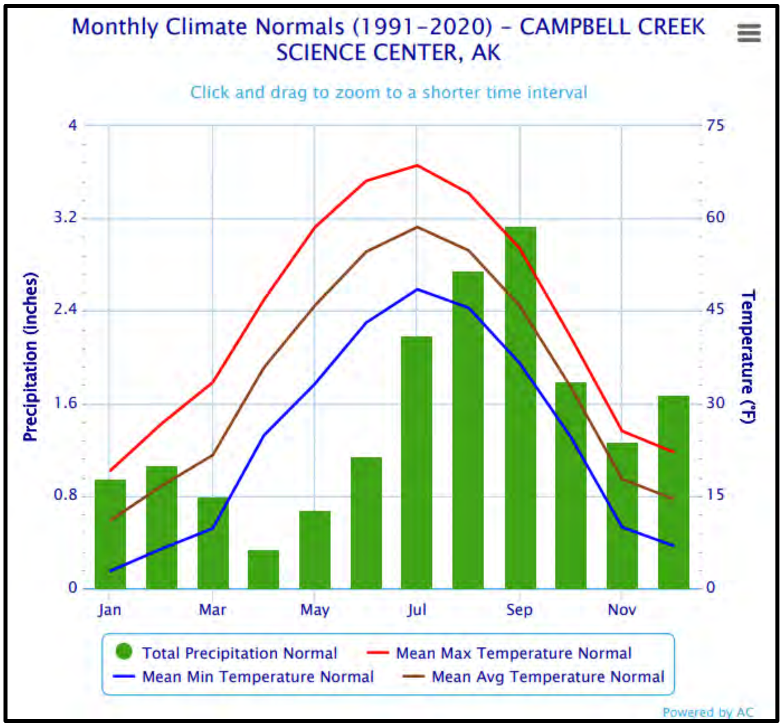

Figure A.9. Monthly climate normals for the Campbell Creek Science Center weather station for the period of record (1991–2021).
Source: NOAA (2021b)

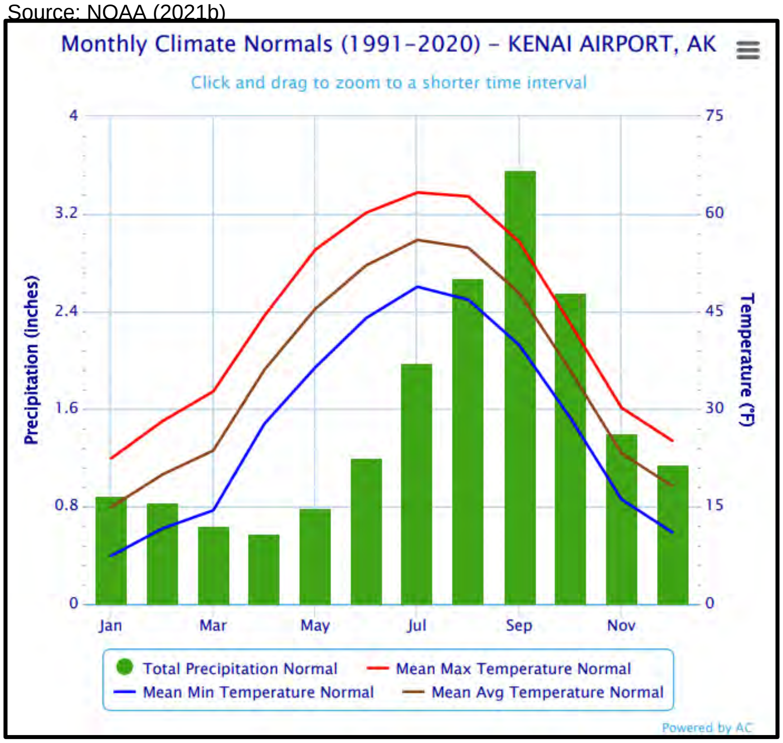

Figure A.10. Monthly climate normals for the Kenai Airport weather station for the period of record (1991–2021).
Source: NOAA (2021b)

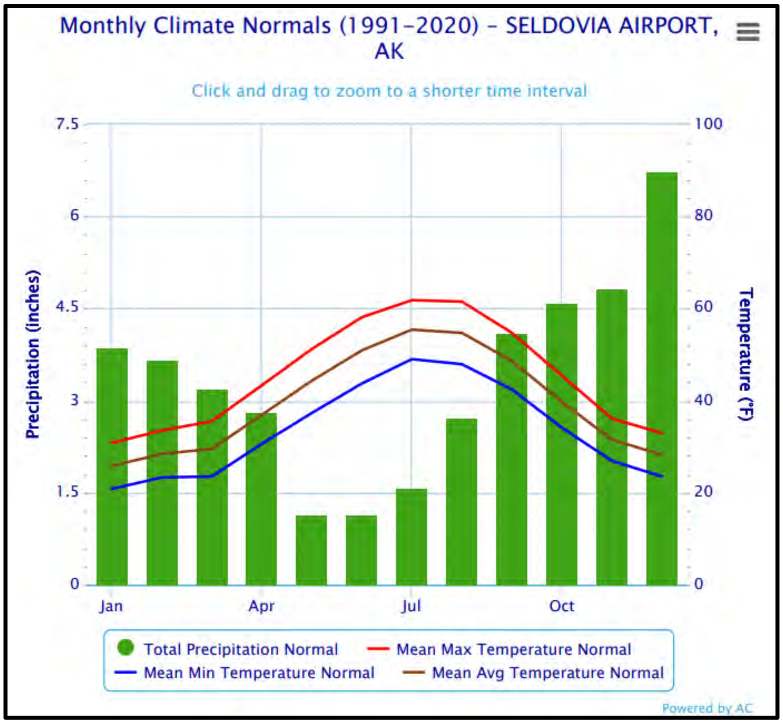

Figure A.11. Monthly climate normals for the Seldovia Airport weather station for the period of record (1991–2021).
Source: NOAA (2021b)

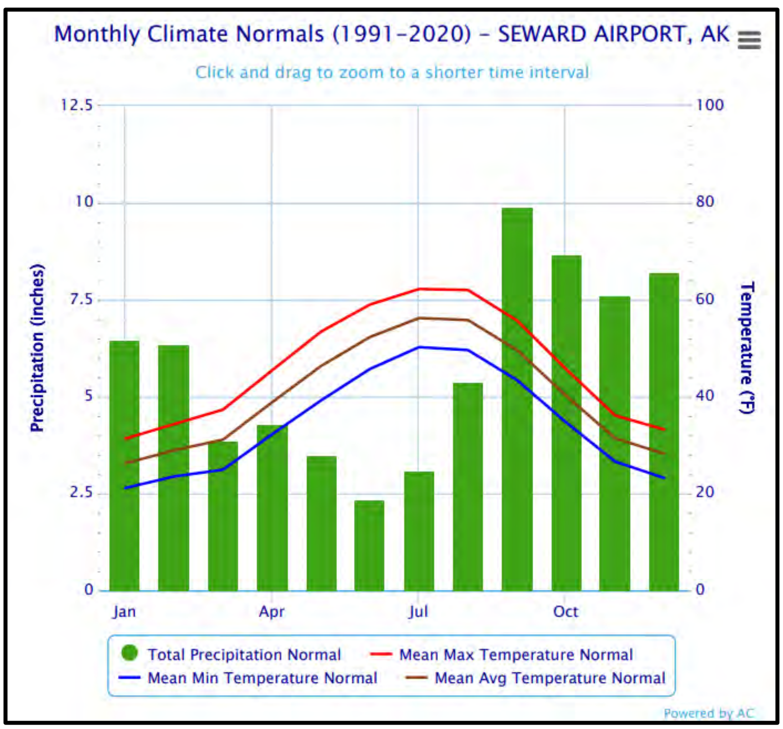

Figure A.12. Monthly climate normals for the Seward Airport weather station for the period of record (1991–2021).
Source: NOAA (2021b)

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 cm. 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 cm 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).

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APPENDIX B:

Chugach All-Lands Wildfire Risk Assessment (ARRA)

CHUGACH ALL-LANDS WILDFIRE RISK ASSESSMENT: METHODS AND RESULTS

PREPARED FOR:
USFS Alaska Region, R10

Chugach National Forest

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June 30, 2021

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1 OVERVIEW OF THE ASSESSMENT

1.1 PURPOSE OF THE ASSESSMENT

The purpose of the Chugach All-Lands Wildfire Risk Assessment (hereafter called ARRA[1]) is to provide foundational information about wildfire hazard and risk to highly valued resources and assets for the Chugach National Forest and surrounding areas in Southcentral Alaska. Such information supports wildfire response, fuel management planning, and revisions to land and resource management plans. A wildfire risk assessment is a quantitative analysis of the assets and resources across a specific landscape and how they are potentially impacted by wildfire. The ARRA analysis considers several different components, each resolved spatially across the region, including:

- likelihood of a fire burning,
- the intensity of a fire if one should occur,
- the exposure of assets and resources based on their locations, and
- the susceptibility of those assets and resources to wildfire.

Assets are human-made features, such as commercial structures, critical facilities, housing, etc., that have specific importance or value. Resources are natural features, such as wildlife habitat, vegetation type, or water, etc. These also have specific importance or value. Generally, the term "values at risk" has been used to describe both assets and resources. For the ARRA assessment, the term Highly Valued Resources and Assets (HVRA) is used to describe what has previously been labeled values at risk. There are two reasons for this change in terminology. First, resources and assets are not themselves "values" in any way that term is conventionally defined—they *have* value (importance). Second, while resources and assets may be exposed to wildfire, they are not necessarily "at-risk"—that is the purpose of the assessment.

To manage wildfire in Southcentral Alaska, accurate wildfire risk data are essential to inform land and fire management strategies. These risk outputs can be used to aid in the planning, prioritization, and implementation of prevention and mitigation activities. In addition, the risk data can be used to support fire operations in response to wildfire incidents by identifying those assets and resources most susceptible to fire.

1.2 QUANTITATIVE RISK MODELING FRAMEWORK

The basis for a quantitative framework for assessing wildfire risk to highly valued resources and assets (HVRAs) has been established for many years (Finney, 2005; Scott, 2006). The framework has been implemented across a range of scales, from an individual county (Ager, 2017), a portion of a national forest (Thompson et al., 2013b), individual states (Buckley et al., 2014), to the entire

[1] ARRA is an acronym for the original title of the project—Alaska Region Risk Assessment.

continental United States (Calkin et al., 2010). In this framework, wildfire risk is a function of two main factors: 1) wildfire hazard and 2) HVRA vulnerability (Figure 1).

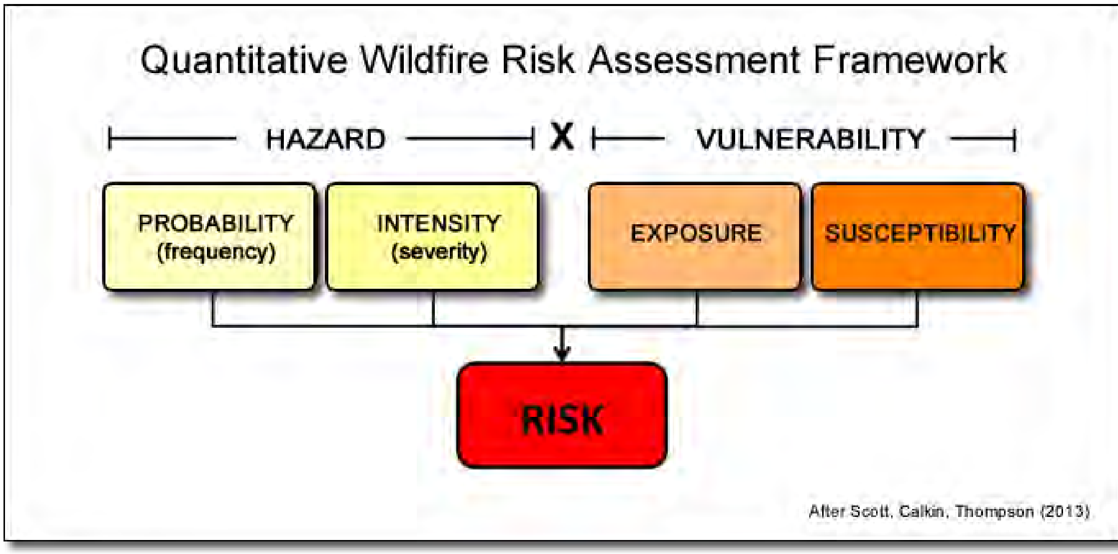

Figure 1. The components of the Quantitative Wildfire Risk Assessment Framework used for ARRA.

Wildfire hazard is a physical situation with the potential for causing damage to vulnerable resources or assets. Quantitatively, wildfire hazard is measured by two main factors: 1) burn probability (or likelihood of burning), and 2) fire intensity (measured as flame length, fireline intensity, or other similar measures).

HVRA vulnerability is also composed of two factors: 1) exposure and 2) susceptibility. Exposure is the placement (or coincidental location) of an HVRA in a hazardous environment—for example, building a home within a flammable landscape. Some HVRAs, like wildlife habitat or vegetation types, are not movable; they are not "placed" in hazardous locations. Still, their exposure to wildfire is the wildfire hazard where the habitat exists. Finally, the susceptibility of an HVRA to wildfire is how easily it is damaged by wildfire of different types and intensities. Some assets are fire-hardened and can withstand very intense fires without damage, whereas others are easily damaged by even low-intensity fire.

1.3 LANDSCAPE ZONES

1.3.1 ANALYSIS AREA

The Analysis Area is the area for which valid burn probability results are produced. The Analysis Area for the ARRA project was defined as the great Chugach National Forest area, including the Kenai Peninsula (ARRA).

1.3.2 FIRE OCCURRENCE AREAS

To prevent edge effects and ensure valid BP results, it is necessary to allow FSim fires to also start outside of the Analysis Area and burn inwards. This larger area where simulated fires are started is called the Fire Occurrence Area (FOA). We established the FOA extent as a 30 km buffer on the Analysis Area. The buffer provides sufficient area to ensure that all fires capable of reaching the Analysis Area are simulated. The Fire Occurrence Area covers roughly 36.2 million acres characterized by diverse topographic and vegetation conditions. Such a large and diverse area will have highly variable historical fire occurrence and fire weather. To model the area's diversity more accurately, the overall fire occurrence area was divided into two FOAs. Individual FOA boundaries were developed to group geographic areas that experience similar wildfire occurrence. These boundaries were generated using a variety of inputs, including larger fire occurrence boundaries developed for national-level work (Short, 2020), aggregated level IV EPA Ecoregions, and local fire staff input. For consistency with other FSim projects, we numbered these FOAs 101 and 102.

1.3.3 FUELSCAPE EXTENT

The available fuelscape extent was determined by adding a 30 km buffer to the FOA extent. This buffer allows fires starting within the FOA to grow unhindered by the edge of the fuelscape. Without such a buffer, fire growth would be artificially truncated and affect the fire-size distribution introducing errors in the calibration process. A map of the Analysis Area, FOA boundaries, and fuelscape extent are presented in Figure 2.

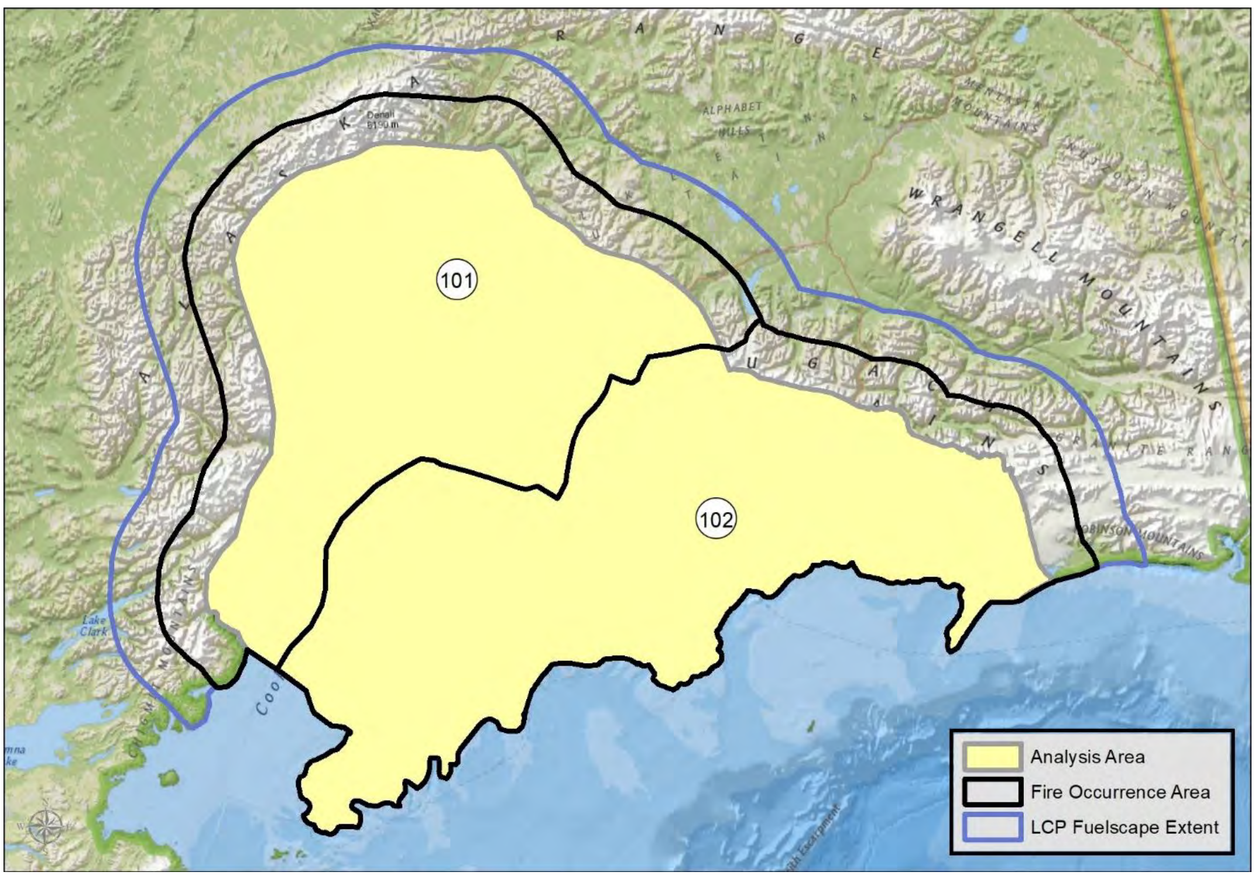

Figure 2. Overview of landscape zones for ARRA FSim project.

2 ANALYSIS METHODS AND INPUT DATA

The FSim large-fire simulator was used to quantify wildfire likelihood across the Analysis Area at a pixel size of 120 meters. FSim is a comprehensive fire occurrence, growth, behavior, and suppression simulation system that uses locally relevant fuel, weather, topography, and historical fire occurrence information to make a spatially resolved estimate of the contemporary likelihood and intensity of wildfire across the landscape (Finney et al., 2011).

FSim focuses on the relatively small fraction of wildfires that escape initial attack and become "large" (>100 acres). Since the occurrence of large fires is relatively rare, FSim generates many thousands of years of simulations to capture a sample size large enough to generate burn probabilities for the entire landscape. An FSim iteration spans one entire year. All FOAs within the ARRA project area were run with 100,000 iterations.

There is no temporal component to FSim beyond a single wildfire season, consisting of up to 365 days. FSim performs independent (and varying) iterations of one year, defined by the fuel, weather, topography, and wildfire occurrence inputs provided. FSim does not account for how a simulated wildfire might influence the likelihood or intensity of future wildfires (even within the same simulation year). Each year represents an independent realization of how fires might burn given the current fuelscape and historical weather conditions. FSim integrates all simulated iterations into a probabilistic result of wildfire likelihood.

2.1 FUELSCAPE

A fuelscape is a quantitative raster representation of the fuels and topography of a landscape. The fuelscape consists of geospatial datasets representing surface fuel model (FM40), canopy cover (CC), canopy height (CH), canopy bulk density (CBD), canopy base height (CBH), and topography characteristics (slope, aspect, elevation). These datasets can be combined into a single landscape (LCP) file and used as a fuelscape in fire modeling programs.

In the following sections, we discuss the process of generating and updating the fuelscape. After development, the fuelscape was resampled to 120 meters for wildfire simulation. Additional information on customizing a fuelscape can be found in the LANDFIRE data modification guide (Helmbrecht and Blankenship, 2016).

2.1.1 FUELSCAPE INPUTS

The vegetation and disturbance inputs for the ARRA Fuelscape were derived from a combination of LANDFIRE 2014 (LF2014) 30 m raster data[2] and the Kenai Vegetation Mapping Project[3]. Capitalizing on the new Kenai Peninsula data release, Pyrologix developed a custom fuelscape methodology. The approach is discussed in the following two sections. Although a custom approach

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[2] Additional information can be found on the LANDFIRE website at www.LANDFIRE.org.
[3] Additional information can be found on the Kenai Vegetation Mapping Project at https://www.arcgis.com/apps/MapSeries/index.html?appid=4e21c25d5eac421babaef3222004cccf

was used to integrate the Kenai Peninsula vegetation data, the LANDFIRE Total Fuel Change Toolbar (LFTFCT, Smail et al., 2011) was used to generate the surface fuel (FM40) dataset.

2.1.1.1 ARRA FUELSCAPE

The ARRA fuelscape was created using the LANDFIRE Total Fuel Change Toolbar (LFTFCT). LFTFCT allows users to input existing vegetation and disturbance data, define fuel rulesets, and generate fuel grids. See the LFTFCT Users Guide for more information (Smail et al., 2011). The resulting LFTFCT output fuel grids can then be combined into a single landscape (LCP) file and used as a fuelscape input in various fire modeling programs.

2.1.2 FUELSCAPE CALIBRATION

The LANDFIRE fuel mapping process assigns fuel model and canopy characteristics using two primary input layers: Existing Vegetation Type (EVT) and LANDFIRE map zone. Using these inputs (and information about the fuel disturbance(s), vegetation height and cover, and biophysical setting), a surface fuel model assignment is queried from the LANDFIRE ruleset database and, if applicable, canopy characteristics for the given EVT and map zone. When working with a large project extent, such as ARRA, numerous map zones are present. The challenge in fuelscape calibration is to produce a fuelscape without artificial and often arbitrary seamlines. To do so, the rules from multiple zones must be reconciled and filtered to one rule set per EVT. As an unbiased approach to reconciling rules from multiple map zones, we determined which zone holds the greatest share of each EVT on the landscape and applied those rules across the entire fuelscape. These rulesets were then unified to produce a preliminary Fuelscape. A Fuelscape calibration workshop was then conducted to further customize and calibrate rulesets to the project's area of interest.

Prior to the fuel calibration workshop, we produced an initial set of fire behavior results with gNexus[4] using the preliminary fuelscape. The gNexus results include maps of Rate of Spread (ROS), Heat Per Unit Area (HPUA), Flame Length (FL), Fireline Intensity (FIL), Crown Fraction Burned (CFRB), Torching Index (TI), and Crowning Index (CI). These maps were then summarized by rule in the LFTFCT database for landscape critique and evaluation by workshop participants.

From this analysis, a prioritized list of EVTs was determined to focus calibration efforts. The set of EVTs reviewed in the fuel calibration workshop were identified as being among the top ten most abundant EVTs, EVTs that encompass a large portion of the Analysis Area, and EVTs with inconsistencies in fire behavior across the range of vegetation cover and height values (i.e. passive crown fire is possible at all windspeeds for part of the rule while the remainder of the rule could only experience surface fire under all observable windspeeds).

The ARRA fuel calibration workshop was held on September 24-25, 2019 in Anchorage, AK. At the workshop, we solicited feedback from local fire and fuels staff from the Chugach National Forest as well as interagency partners across the Southcentral AK. The intent of the workshop was to review

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[4] gNexus is a custom spatial implementation of the fire behavior calculator software, NEXUS 2.1 (available at http://pyrologix.com/downloads/)

the preliminary gNexus fire modeling results and refine the rulesets to produce fire behavior results consistent with the experience of workshop participants.

In addition to calibrating fuel rulesets, both the surface and canopy inputs were updated to reflect fuel disturbances occurring between 2015 and 2019, inclusively. Pyrologix gathered fuel disturbances across the region and assigned appropriate disturbance codes. Fuel disturbances included events such as mechanical treatments, prescribed fire, wind events, insect mortality, and wildfires. Datasets were collected from a variety of sources but included sources such as the USFS Forest Service Activity Tracking System (FACTS) and the Department of Interior National Fire Plan Operations & Reporting System (NFPORS).

Pyrologix incorporated recent wildfire disturbances using three different sources: Monitoring Trends in Burn Severity (MTBS) data, Burned Area Reflectance Classification (BARC), and Alaska Interagency Coordination Center (AICC) perimeter data. We gathered severity data as available from MTBS and BARC, where severity data were unavailable, we relied on final perimeters from AICC. We cross-walked MTBS/BARC severity to the appropriate LANDFIRE disturbance code (112, 122, or 132) corresponding with fire disturbances of low, moderate, or high severity, occurring in the past one to five years. AICC perimeters were assigned a severity disturbance code of 122.

After disturbances were incorporated into the final calibrated fuelscape, we generated the ARRA fuel raster shown by the fuel-model group in Figure 3.

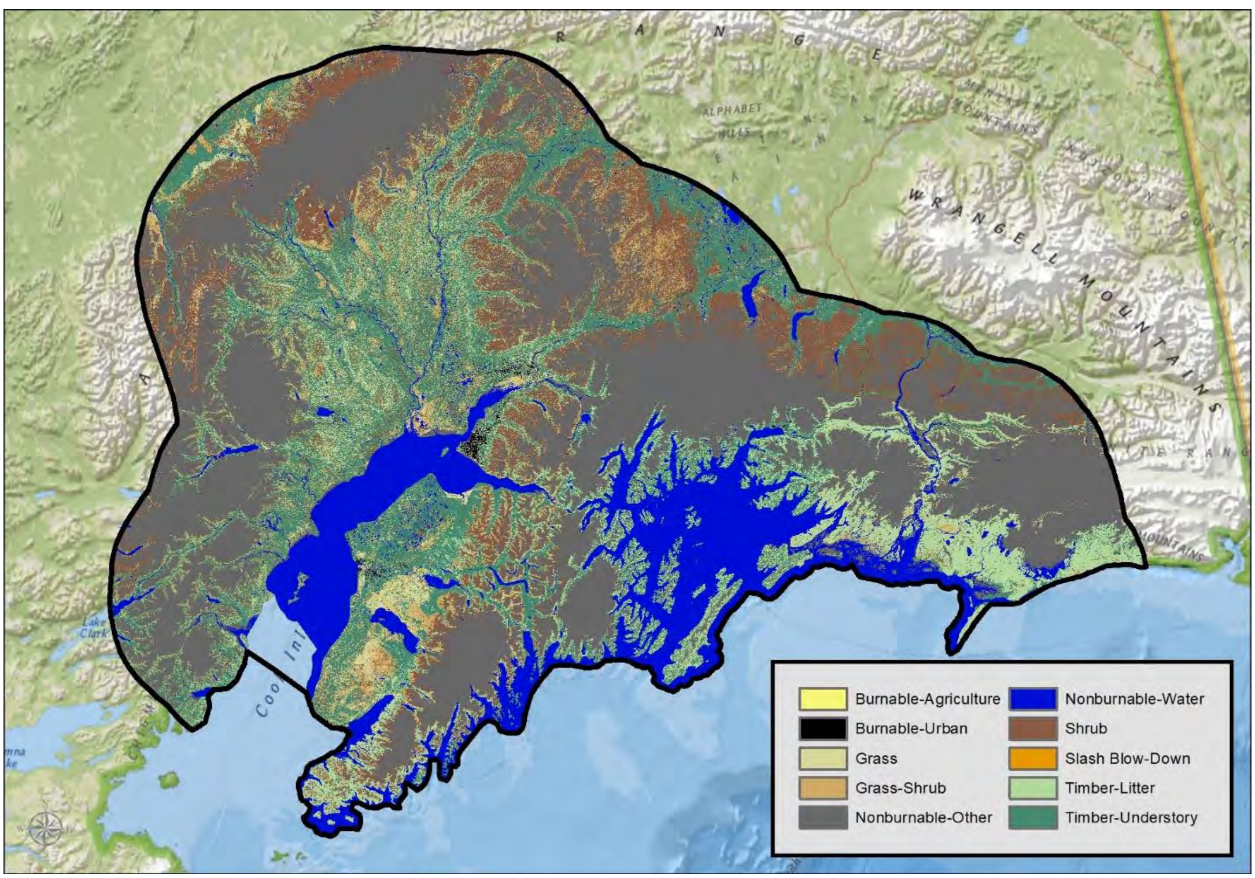

Figure 3. Map of fuel-model groups across the ARRA LCP extent.

An additional ARRA fuelscape edit warrants highlighting: the development of a “Ghost Canopy” for EVT 2604 (Western North American Boreal Mesic Black Spruce Forest). The edit involved a ‘Ghost Canopy’ adjustment for the Western North American Boreal Mesic Black Spruce Forest vegetation type, EVT 2604. This adjustment better captures fire behavior associated with the vegetation type through the use of the appropriate surface fuel model, but with canopy fuel parameters to allow for embers without the wind reduction influence on the rate of spread. To achieve this effect, specific surface and canopy fuel values were hardwired to mimic the desired wind reduction (FM40 = SH5/145, Set CC = 5%; CH = 17.5 m; CBH = 1.5 m; CBD = 0.01 kg/m3). These canopy adjustments allow the EVT loft embers but keep the rate of spread and fire intensity unchanged.

The complete set of calibrated EVTs are listed in the final ‘Fuel Boxes’ spreadsheet provided with the project deliverables[5].

2.1.3 CUSTOM FUEL MODELS

The 40 Scott and Burgan Fire Behavior Fuel Models (FBFM40) represent distinct distributions of fuel loading found among surface fuel components, size classes, and fuel types. The spatial representation of fuel model assignments serves as input into wildfire simulation modeling systems like FARSITE, FlamMap, and FSim. Such spatial wildfire simulation systems associate certain simulation inputs to a fuel model assignment. Although the FBFM40 fuel models cover a wide array of fuel bed scenarios, it is sometimes necessary to develop custom fuel model assignments to simulate fire behavior not reflected in the standard fuel models.

For example, FSim allows for adjustments to the rate of spread (adjustment factor) and live/dead fuel moisture content to vary by fuel model. The use of a custom fuel model in this instance allows for specified locations to be given different simulation inputs. For example, certain high-elevation locations may be characterized by a standard fuel model, but with different fuel moisture inputs. In that case, a custom fuel model can be made with the same parameters as the standard fuel model but a different fuel model number. Then, because the fuel model number is different, it can be given different fuel moisture inputs

The ARRA fuelscape applied such a custom fuel model assignment for a specific scenario related to burnable urban areas. By assigning these areas custom fuel models (using different fuel model numbers than the standard model FBFM40), we were able to control the weather scenarios during which simulated fire spread could take place.

Burnable urban areas were originally mapped by LANDFIRE as non-burnable, and therefore, do not allow simulated wildfire spread into urban areas as observed in past wildfire events. In this application of custom fuel models, the parameters are identical to standard FBFM40 fuel models but are labeled with custom numbers allowing for additional customization within FSim. The burnable urban custom fuel models were spatially identified using the LANDFIRE EVTs designated as low and moderate-intensity developed and represented with 251/BU1; identical to TL9. The addition of the custom burnable urban fuel models allows for the transmission of wildfire in simulation across these areas. To not overestimate the likelihood of wildfire in custom fuel models,

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[5] ChugachAllLands_FuelRuleBoxes_20190924.xlsx

fuel moisture inputs were edited to allow for wildfire only under 97th percentile ERC conditions. Fuel moisture inputs are further detailed in section 2.3.3.

2.1.4 KENAI PENINSULA FUELSCAPE ADJUSTMENTS

The ARRA fuelscape was initially developed using LANDFIRE 2014 (LF 2014 - LF 1.4.0) data products. In the Spring of 2020, Pyrologix updated the fuelscape with data from the Kenai Peninsula Vegetation Map and calibrated fuel model assignments from the ARRA Fuelscape. During the September 2019 ARRA calibration workshop, held at the Chugach National Forest Supervisor's Office, a Kenai dominant vegetation type-to-LF14 EVT crosswalk was developed by local experts. This document served as the foundation of the Kenai Peninsula fuelscape.

The Kenai Peninsula Vegetation Map provided data for tree cover, tall shrub cover, and vegetation height. To incorporate the data into the fuelscape, they were resampled from 5 m to 30 m and crosswalked to the LF14 vegetation codes for EVT, EVC, and EVH. A spatial review of the tree cover and tall shrub cover showed the two datasets to be mutually exclusive. They were subsequently merged and cross-referenced against EVT/dominant lifeform ensuring alignment with LANDFIRE'S 2-digit codes for water, snow/ice, barren, and developed.

A review of the merged cover and height data highlighted areas of tree or tall shrub cover lacking height assignments. The ESRI ArcGIS Focal Statistics tool was used to perform two filters at the 30 m resolution, calculating the mean height value, within a 3-pixel by 3-pixel moving window. This allowed us to "backfill" height pixels that were coincident with tree and shrub cover. A vegetation lifeform mask was used during processing to ensure cover and height vegetation type alignment. Any remaining areas mapped with herbaceous or other non-tree/shrub vegetation types (EVTs) were backfilled using LF14 cover and height.

The resulting vegetation type, cover, and height data layers were used as inputs to create a Kenai Peninsula fuelscape. The fuelscape used calibrated rules from the ARRA calibration workshop and was processed using the LANDFIRE Total Fuel Change Toolbar (LFTFCT). The resulting Kenai Peninsula fuelscape was mosaicked along the boundaries of ice, barren, water, or rock with the calibrated ARRA fuelscape to eliminate seamlines.

It is important to highlight two Kenai Peninsula fuelscape post-processing adjustments implemented before the final mosaic. A review of the ARRA and Kenai Peninsula fuelscapes revealed differences in the mapping of developed spaces. The LANDFIRE existing vegetation type for developed areas has more detailed classes, capturing developed areas of high intensity, moderate intensity, low intensity, and open space. Developed areas in the Kenai Peninsula were mapped into a single class, high intensity developed. While this difference does not seem hugely significant, only having a single developed classification does cause difficulties in representing burnable urban areas of a fuelscape. Due to this difference, develop areas (high intensity developed) within Kenai Peninsula were adjusted to reflect the LANDFIRE classes in areas overlap.

The second adjustment involved the use of a spatial 'wildcard' to differentiate the vegetation characteristics (and associated fuel model assignment) for EVT 2611 (Western North American Sub-boreal Mesic Bluejoint Meadow) within the Kenai Peninsula. Areas with this vegetation type outside of the Kenai Peninsula are assumed to have more of a shrub component and received a

GS2/122 fuel model assignment; while areas within the peninsula are assumed to have more of a grass component and were assigned a GR2/102 fuel model assignment.

The ARRA-Kenai Peninsula mosaicked fuelscape was then updated to include disturbances from treatment activities and past wildfire events occurring in 2015 through 2018, rendering this fuelscape capable for use in 2019. Because 2019 was an influential fire year on this landscape, we added 2019 wildfire perimeters and fuel disturbance information available through the Fall of 2019. In terms of timing, the landscape is 'dated' current to 2019 with a bonus year of disturbances from 2019 added in. Disturbances occurring in the time since disturbance block two (TSD2) of zero to five years include the years 2014 through 2019. All disturbances before 2014 are in TSD3 (2005-2013). The standard LANDFIRE approach is to keep only the past 10 years of disturbance information, but that would cause fire scars like the 2007-Caribou Hill fire to be mapped as non-disturbed fuel. To prevent the aging out of these fires' influence on fuel and fire behavior, we chose to keep the additional four years of disturbance history in TSD3.

2.2 HISTORICAL WILDFIRE OCCURRENCE

The Fire Occurrence Database (FOD) that spans the 26 years from 1992-2017 was used to quantify historical large-fire occurrence (Short, 2017). Historical wildfire occurrence data were used to develop model inputs (the fire-day distribution file [FDist] and ignition density grid [IDG]) as well as model calibration targets. Table 1 summarizes the annual number of large fires per million acres, mean large-fire size, and annual area burned by large fires per million acres for each FOA. For this analysis, we defined a large fire as one greater than 100 acres.

Table 1. Historical large-fire occurrence, 1992-2017, in the ARRA FSim project FOAs.

FOA	Mean annual number of large fires	FOA area (M ac)	Mean annual number of large fires per M ac	Mean large-fire size (ac)	Mean annual large-fire area burned (ac)	FOA-mean burn probability
101	0.9	18.07	0.05	2,899	2,564	0.0001
102	1.0	18.49	0.05	13,963	13,963	0.0008

Historical wildfire occurrence varied substantially by FOA (Table 1). While FOA 101 and 102 experienced a similar number of large fires per million acres per year the average size of those fires was 13,963 acres in FOA 102 and only 2,899 in FOA 101.

To account for the spatial variability in historical wildfire occurrence across the landscape, FSim uses a geospatial layer representing the relative, large-fire ignition density. FSim stochastically places wildfires according to this density grid during a simulation. The entire landscape is saturated with wildfire over the 100,000 simulated iterations, but more ignitions are simulated in areas that have previously allowed for large-fire development.

The Ignition Density Grid (IDG) was generated using a mixed-methods approach by averaging the two grids resulting from the Kernel Density and Point Density tools within ArcGIS, using a 120 m, output cell size, and a 75 km search radius. All fires equal to or larger than 100 acres reported in the

FOD were used as inputs to the IDG. The IDG was divided up for each FOA by setting to zero all areas outside of the fire occurrence boundary of that FOA. This allows for a natural blending of results across adjacent FOA boundaries by allowing fires to start only within a single FOA but burn onto adjacent FOAs. Additionally, all burnable urban, and small burnable areas less than 50 acres within other non-burnable or urban areas were masked out of the IDG layer. The IDG enables FSim to produce a spatial pattern of large-fire occurrence consistent with what was observed historically. Figure 4 shows the ignition density grid for the ARRA Fire Occurrence Area.

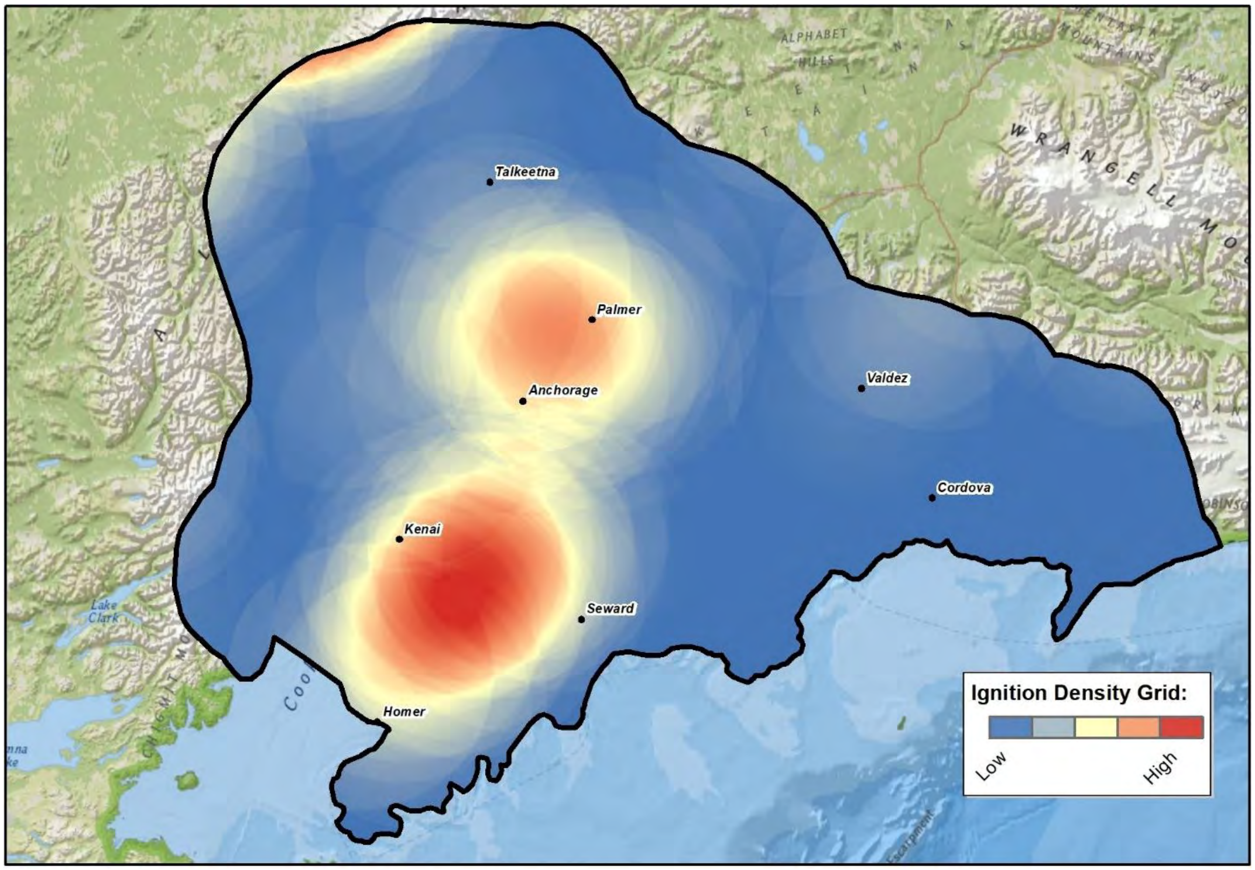

Figure 4. Ignition density grid used in FSim simulations.

2.2.1 TRENDS IN WILDFIRE OCCURRENCE

The FSim model was calibrated using the USFS Fire Occurrence Database (FOD; 1992-2017). Wildfire occurrence within the ARRA analysis area was observed to be non-stationary and therefore not accurately represented by the 26-year FOD mean. A linear model was fit to fire size and frequency with time as the dependent variable (Figure 5). FSim model results were then calibrated to the predicted 2020 mean fire size and frequency.

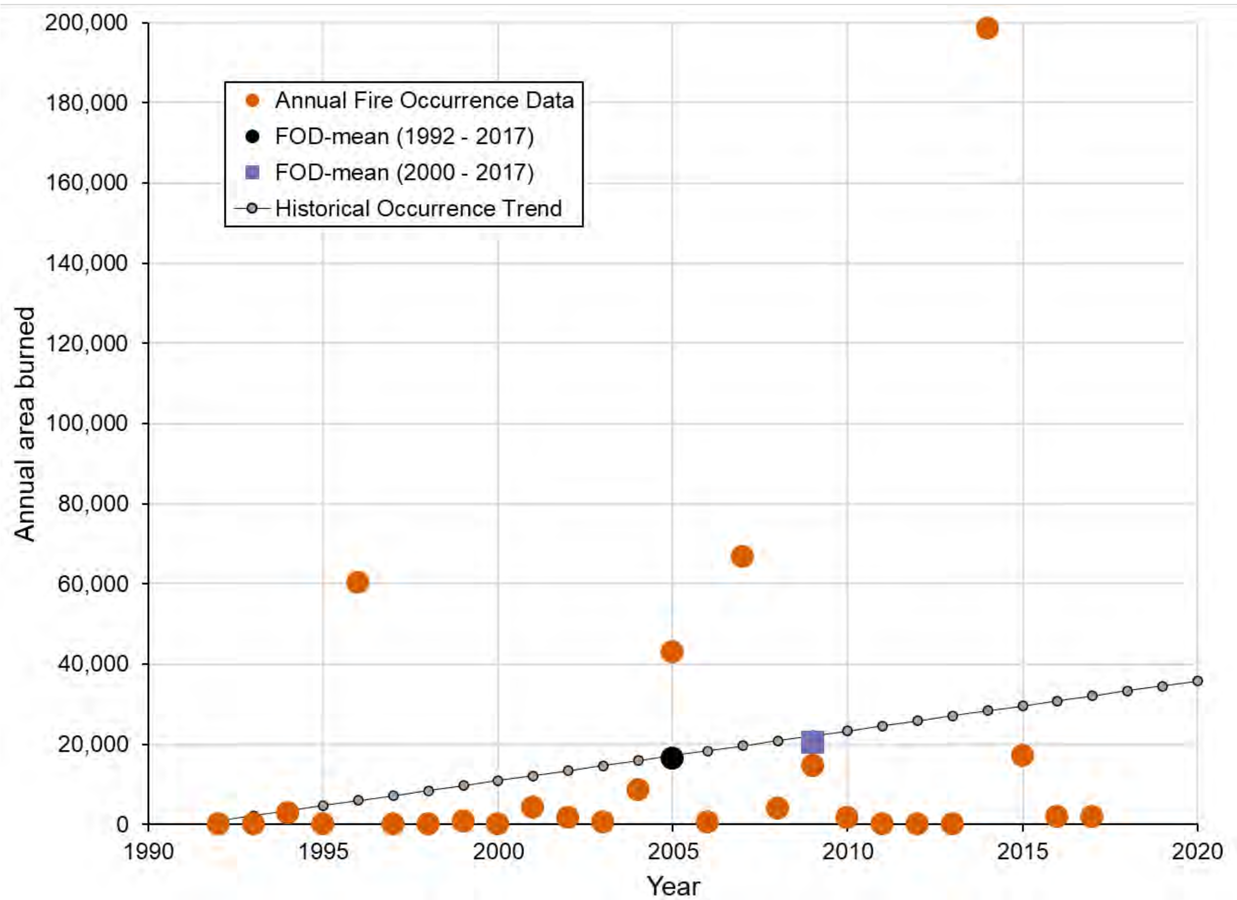

Figure 5. Graph of historical wildfire occurrence 1992 - 2017

Calibrating to the 2020 FOD trend resulted in an increase of 1.28X in the annual number of simulated fires and a 2.28X increase in mean large fire size. The FSim model was calibrated to the 2020 FOD trend to generate the most accurate estimate possible of wildfire likelihood.

2.3 HISTORICAL WEATHER

FSim requires three weather-related inputs: monthly distribution of wind speed and direction, live and dead fuel moisture content by year-round percentile of the Energy Release Component (ERC) variable of the National Fire Danger Rating System (NFDRS, 2002) for fuel model G (ERC-G) class, and seasonal trend (daily) in the mean and standard deviation of ERC-G. We used two data sources for these weather inputs. For the wind speed and direction distributions, we used the hourly (1200 to 2000 hours), 10-minute average values (2 mph calm wind), recorded at selected Remote Automatic Weather Stations (RAWS). Stations with relatively long and consistent records and moderate wind activity were preferentially selected to produce the most stable FSim results.

Energy Release Component (ERC) values were extracted from a Special Interest group (SIG) of four RAWS. Issues with downtime within the RAWS record required that multiple stations be used to have a sufficient sample of ERCs to cover all historical fire events. The RAWS stations selected for winds and ERC sample sites are shown in Figure 6 and discussed further in the following sections.

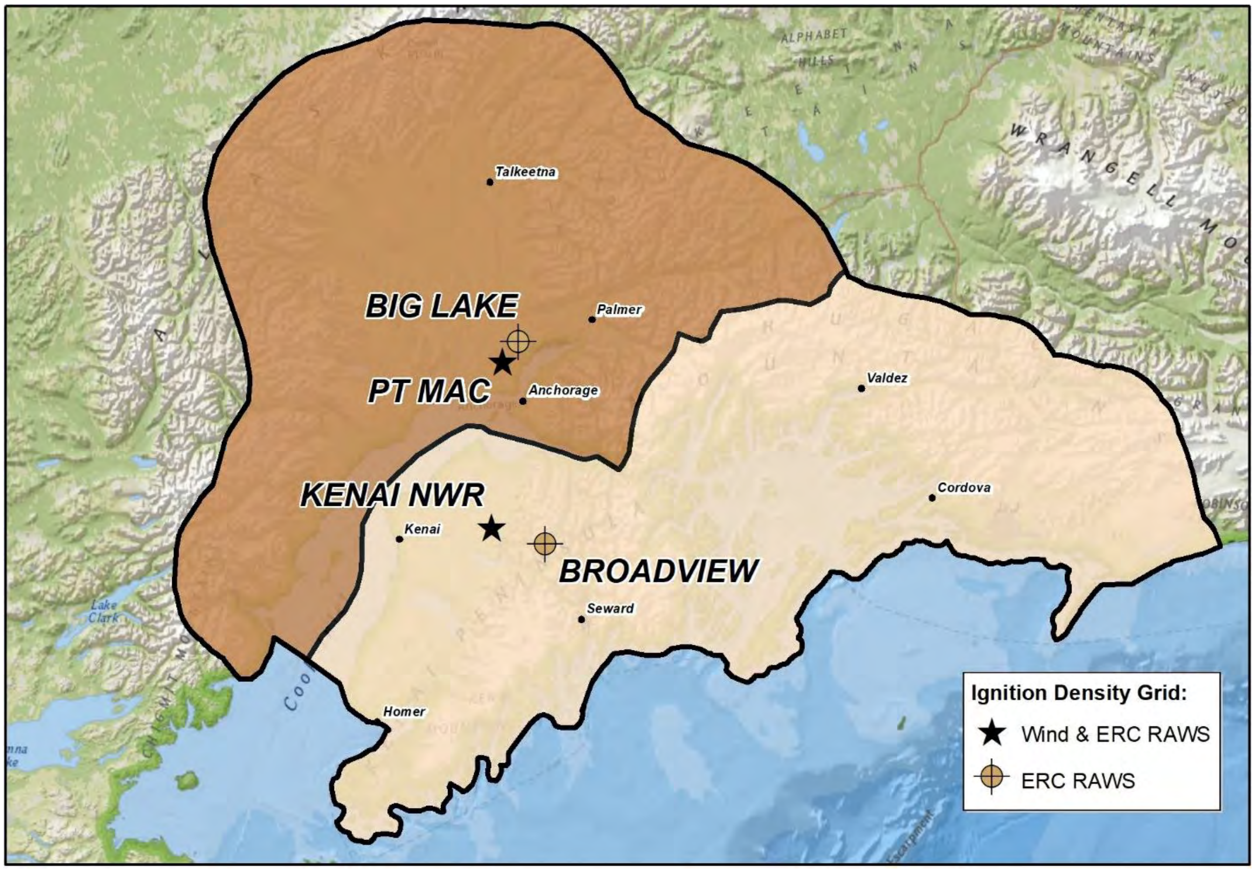

Figure 6. RAWS stations and ERC sample sites used for the ARRA FSim project. Selected RAWS data were used for hourly sustained wind speed and direction as well as ERCs.

2.3.1 FIRE-DAY DISTRIBUTION FILE (FDIST)

Fire-day Distribution files are used by FSim to generate stochastic fire ignitions as a function of ERC. The FDist files were generated using an R script that summarizes historical ERC and wildfire occurrence data, performs logistic regression, and then formats the results into the required FDist format.

The FDist file provides FSim with logistic regression coefficients that predict the likelihood of a large-fire occurrence based on the historical relationship between large fires and ERC and tabulates the distribution of large fires by large-fire day. A large fire day is a day when at least one large fire occurred historically. The logistic regression coefficients together describe large-fire day likelihood *P(LFD)* at a given ERC(G) as follows:

$$P(LFD) = \frac{1}{1 + e^{-B_a * - B_b * ERC(G)}}$$

Coefficient *a* describes the likelihood of a large fire at the lowest ERCs, and coefficient *b* determines the relative difference in the likelihood of a large fire at lower versus higher ERC values.

2.3.2 FIRE RISK FILE (FRISK)

Fire risk files were generated for each RAWS using FireFamilyPlus version 4.1 and updated to incorporate simulated ERC percentiles (as described in section 2.3.4). These files summarize the historical ERC stream for the FOA, along with wind speed and direction data for the selected RAWS.

2.3.3 Fuel Moisture File (FMS)

Modeled fire behavior is robust to minor changes in dead fuel moisture, so a standardized set of stylized FMS input files (representing the 80th, 90th, and 97th percentile conditions) for 1-,10-, 100-hour, live herbaceous, and live woody fuels was developed (Table 2).

Table 2. Fuel Moisture values used in wildfire simulation for the 80th/90th/97th percentile ERCs

Fuel Model Group	1-hr	10-hr	100-hr	Live-Herb	Live-Woody
Grass / Shrub	7 / 5 / 4	8 / 6 / 5	9 / 7 / 6	90 / 60 / 40	110 / 80 / 60
Timber / Slash	9 / 7 / 6	10 / 8 / 7	11 / 9 / 8	90 / 60 / 40	110 / 80 / 60
Burnable Urban	45 / 45 / 6	45 / 45 / 7	45 / 45 / 8	120 / 120 / 40	110 / 110 / 60

Fuel moistures in the custom, Burnable Urban (FM 251) fuel models were set above the moisture of extinction for the 80th and 90th percentile ERC bins. This was done to restrict simulated wildfires to burn within these fuel groups only under the most extreme weather conditions (97th percentile). This method maintains the potential for fire intensity while not vastly over-predicting burn probability. The custom fuel models are further described above in section 2.1.3.

2.3.4 Energy Release Component File (ERC)

We sampled historical ERC-G values from a Special Interest group (SIG) of four RAWS (Big Lake, PT Mac, Kenai NWR, and Broadview). A 1,000 iteration FSim was simulated to generate a sample of 365,000 days of ERCs. The generated ERC stream was used in both FOA 101 and FOA 102 to provide a “coordinated” ERC stream across the analysis area. The simulated ERC values are “coordinated” so a given year and day for one FOA corresponds to the same year and day in all FOAs. This coordination permits the analysis of fire-year information across all FOAs.

2.4 WILDFIRE SIMULATION

The FSim large-fire simulator was used to quantify wildfire hazard across the landscape at a pixel size of 120 m (4 acres per pixel). FSim is a comprehensive fire occurrence, growth, behavior, and suppression simulation system that uses locally relevant fuel, weather, topography, and historical fire occurrence information to make a spatially resolved estimate of the contemporary likelihood and intensity of wildfire across the landscape (Finney et al., 2011). Figure 7 diagrams the many components needed as inputs to FSim.

Due to the highly varied nature of weather and fire occurrence across the large landscape, we ran FSim for each of the two FOAs independently and then compiled the two runs into a single data product. For each FOA, we parameterized and calibrated FSim based on the location of historical fire ignitions within the FOA, which is consistent with how the historical record is compiled. We then used FSim to start fires only within each FOA but allowed those fires to spread outside of the FOA. This, too, is consistent with how the historical record is compiled.

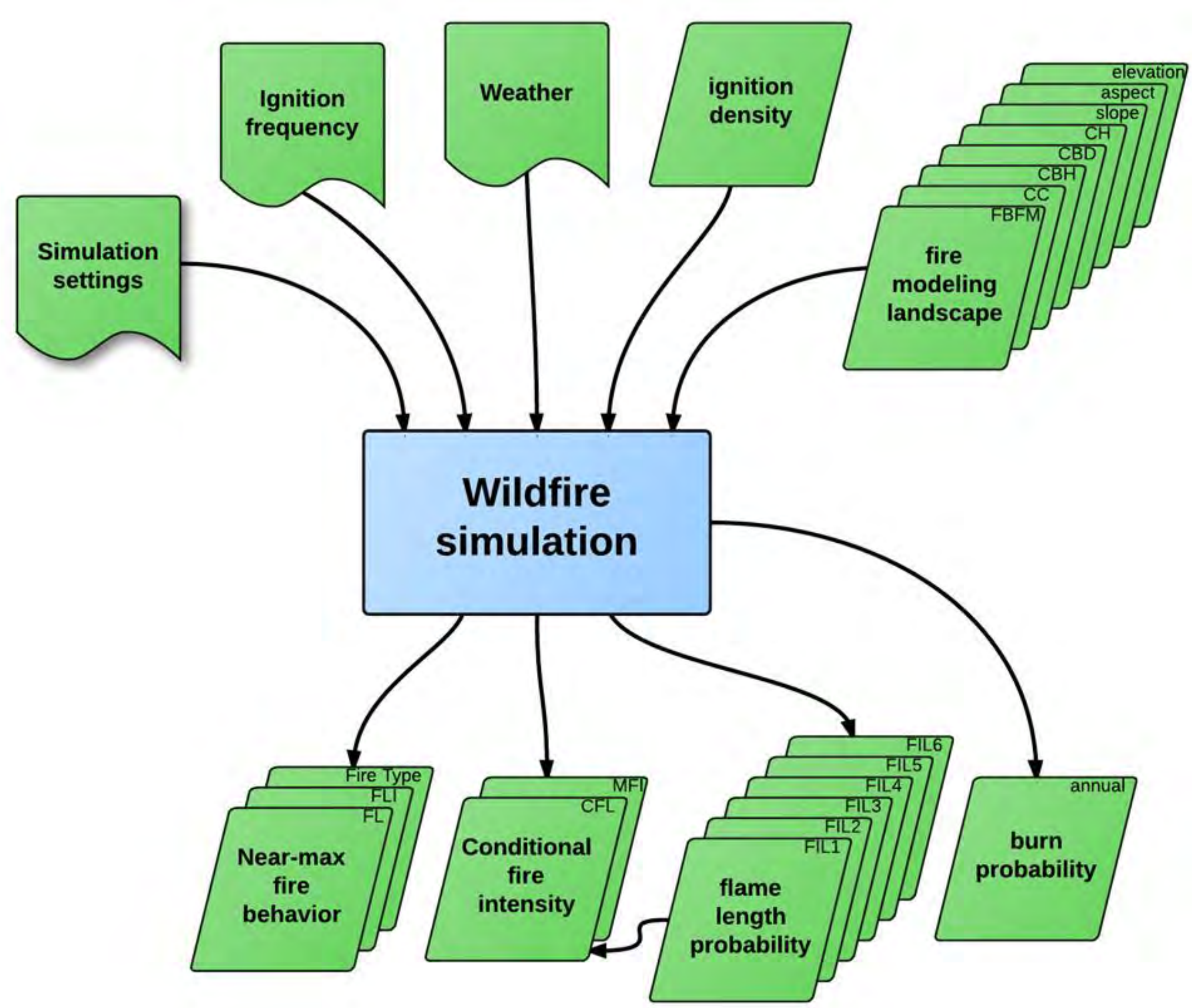

Figure 7. Diagram showing the primary elements used to derive burn probability.

2.4.1 MODEL CALIBRATION

FSim simulations for each FOA were calibrated to a 2020 trend analysis of historical large fire occurrence including mean historical large-fire size, and mean annual area burned per million acres. Calibration targets were adjusted upward from the mean values over the historical record based on methods outlined in section 2.2.1. Additionally, care was taken to match simulated wildfire size distributions to the historical record and allow for the occurrence of simulated fires larger than any observed historically. While only large-fire sizes (>100 acres) were considered in calibration, numerous small fires were also simulated. However, the impact of small fires on landscape-level burn probability is negligible.

To calibrate each FOA, we started with baseline inputs and a starting rate-of-spread adjustment (ADJ) factor file informed by experience on previous projects. The final model inputs can be seen below in Table 3. All runs were completed at 120 m resolution. Each FOA was calibrated separately, and final simulations were run with 100,000 iterations. The two FOAs were then integrated into an overall result for the analysis area.

Table 3. Summary of final-run inputs for each FOA

Final run	Number of Iterations	ADJ file	Trimming factor	Frisk	FDist file	LCP file
101r15	100,000	Foa101v8	2.5	Foa101v3	Foa101v4	FOA_101_120v6
102r15	100,000	Foa102v8	2.5	Foa102v3	Foa102v4	FOA_102_120v6

2.4.2 INTEGRATING FOAS

We used the natural-weighting method of integrating adjacent FOAs that we developed on an earlier project (Thompson et al., 2013a). With this method, well within the boundary of FOA (roughly 30 km from any boundary), the results are influenced only by that FOA. Near the border with another FOA, the results will be influenced by that adjacent FOA. The weighting of each FOA is in proportion to its contribution to the overall burn probability at each pixel.

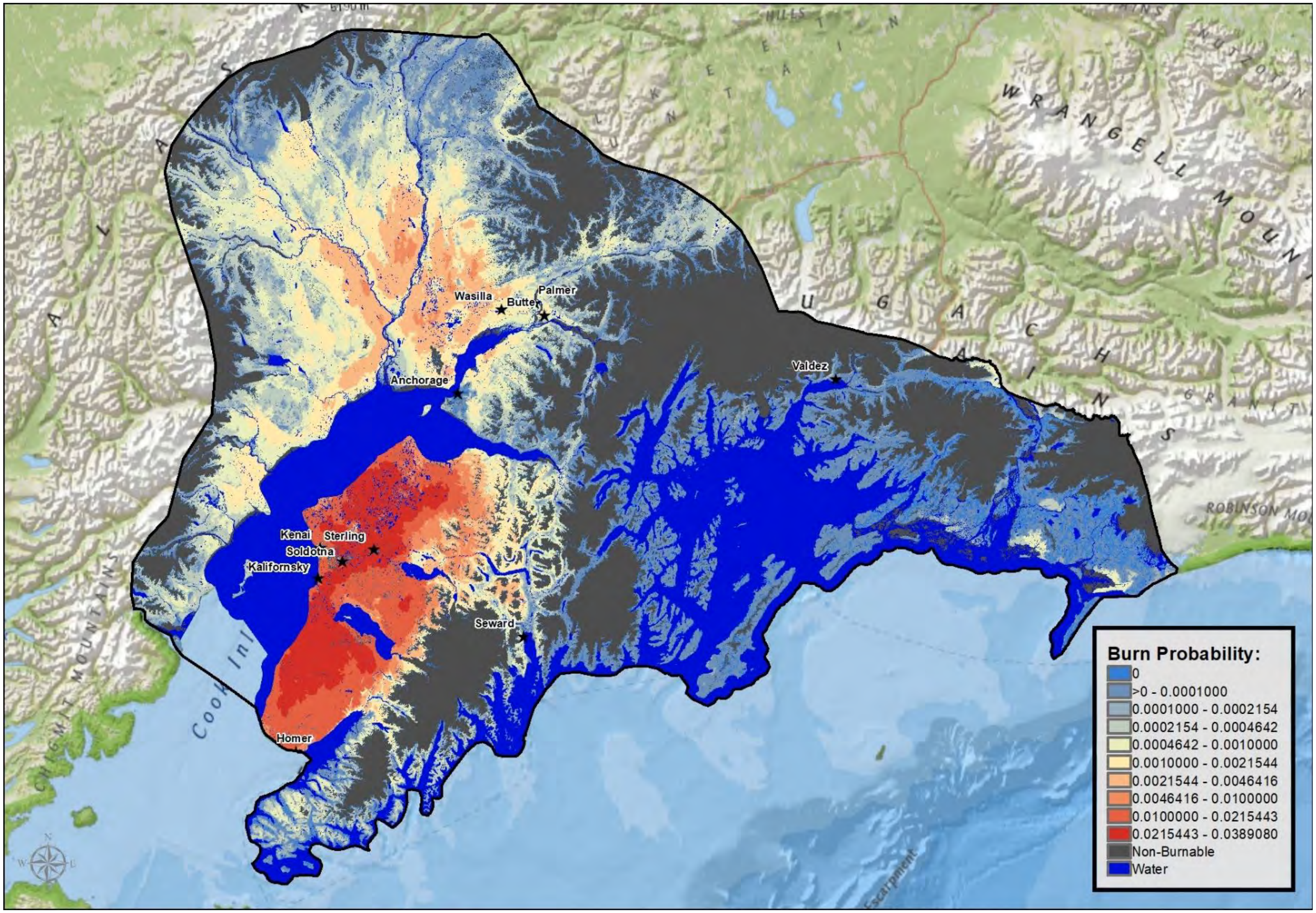

Figure 8. Map of integrated FSim burn probability results for the ARRA Analysis Area at 120 m resolution.

3 HVRA CHARACTERIZATION

Highly Valued Resources and Assets (HVRA) are the resources and assets on the landscape most likely to warrant protection if found to be at risk of wildfire. The key criteria for inclusion in the ARRA assessment is an HVRA must be of greatest importance to the region, the spatial data must be readily available, and the spatial extent of the identified HVRA must be complete.

There are three primary components to HVRA characterization: HVRAs must be identified and their spatial extent mapped, their response to fire (negative, or neutral) must be characterized, and their relative importance to each other must be determined.

3.1 HVRA IDENTIFICATION

A set of HVRA was identified through a workshop held in Anchorage, Alaska, on September 26, 2019. A group consisting of the Forest Service employees, Resource Specialists, Geospatial Analysts, and Interagency Partners from USFS Region 10 identified eleven HVRA in total: nine assets and two resources. The complete list of HVRA and their associated data sources are listed in Table 4.

Table 4. HVRA and sub-HVRA identified for the Chugach All-Lands Wildfire Risk Assessment and associated data sources.

HVRA & Sub-HVRA	Data Source
People and Property	
People and Property	Represents housing unity density data produced by Pyrologix using the building footprints and U.S. Census - Census Block population data. Data depicting building locations was provided by Chugach NF and adjusted by Pyrologix.
Native Allotments	The data was provided by the Bureau of Land Management, Alaska State Office, representing areas designated as 'Conveyed Native Allotments' within Alaska.
Infrastructure	
Electric transmission lines – high & low voltage	The provided linear features represent electric power transmission lines. Data was provided by Chugach NF and supplemented with data from the Homeland Infrastructure Foundation-Level Data (HIFLD) program.
Communication Sites	Data represents the location of communication sites. Data was provided by Chugach NF and supplemented with data from the Homeland Infrastructure Foundation-Level Data (HIFLD) program.
Power: Power Plants & Substations	The provided data represents the locations of power plants and substations. Data was provided by Chugach NF and supplemented with data from the Homeland Infrastructure Foundation-Level Data (HIFLD) program.
Oil & Gas Wells	The data contains the location of surface wells & structures. Well locations were limited to those designated as active wells; structures were limited to items designated as oil/gas buildings. Data was provided by Chugach NF.
Pipelines	The data depicts pipeline locations in Alaska as digitized from USGS maps. Ancillary source documentation was provided by the AK DNR and used as necessary for updates.
Fish Hatcheries	These sport subsistence sites represent the known locations of sport and commercial fish rearing facilities (commercial salmon fishery) located in Southcentral AK. Data was provided by Chugach NF.
Recreation & Administrative Sites	The data contains the locations of administrative buildings, offices, recreation sites, and service/utility structures on lands owned by Alaska State Parks, USDA (Forest Service) lands, and the National Park Service. Data was provided by Chugach NF.
Carbon	
Carbon Credits	Mapped areas represent forested land used in carbon trading markets and identify areas of biomass (forest) marketable as carbon credits. Data provided by Chugach NF.
Watershed	
Critical Watersheds	Surface drinking water protection areas (Zone C, G boundaries) were delineated from local topography and anticipated effects on the drinking water source intake. Data provided by Chugach NF and Alaska DEC Open Data.

To the degree possible, HVRA are mapped to the extent of the Analysis Area boundary (Figure 2). This is the boundary used to summarize the final risk results.

3.2 RESPONSE FUNCTIONS

Each HVRA selected for the assessment must also have an associated response to wildfire, whether neutral or negative. We relied on input from the Forest Service and interagency representatives, and additional fire and resource staff at a virtual Fire Effects workshop held on January 27, 2021. In the workshop, the group discussed each resource or asset's response to fires of different intensity levels and characterized the HVRA response using values ranging from -100 to 100. The flame-length values corresponding to the fire intensity levels reported by FSim are shown in Table 5. The response functions (RFs) used in the risk results are shown in Table 6 thru Table 16 below.

Table 5. Flame-length values corresponding to Fire Intensity Levels used in assigning response functions.

Fire Intensity Level (FIL)	**1**	**2**	**3**	**4**	**5**	**6**
Flame Length Range (feet)	0-2	2-4	4-6	6-8	8-12	12+

3.3 RELATIVE IMPORTANCE

The relative importance (RI) assignments are needed to integrate results across all HVRA. Without this input from leadership to prioritize among HVRA, the default is to assume equal-weighting among HVRA – a result that is never a desired outcome. The virtual RI workshop was held on March 2, 2021, and was attended by the Line Officers, Area Fire Management Officers, and interagency representatives. The focus of this workshop was to establish the importance and ranking of the primary HVRAs relative to each other. The People and Property HVRA received the greatest share of RI at 69 percent, followed by the Infrastructure (14%) and Water (11%) HVRA. The remaining share of RI is composed of the Carbon (6%) HVRA (Figure 9). These importance percentages reflect the overall importance of the primary HVRA relative to each other.

Sub-HVRA relative importance was also determined at the RI workshop. Sub-RIs consider both the relative importance per unit area and the mapped extent of the Sub-HVRA layers within the primary HVRA category. These calculations need to account for the relative extent of each HVRA to avoid overemphasizing HVRA covering many acres. This was accomplished by normalizing the calculations by the relative extent of each HVRA in the assessment area. Here, relative extent refers to the number of 30 pixels mapped in each HVRA. In using this method, the relative importance of each HVRA is spread out over the HVRA's extent. An HVRA with few pixels can have a high importance per pixel; an HVRA with a great many pixels can have a low importance per pixel. A weighting factor (called Relative Importance Per Pixel [RIPP]) representing both the relative importance per unit area and overall importance was calculated for each HVRA.

In Table 6 thru Table 16, we provide the share of HVRA relative importance within each primary HVRA.

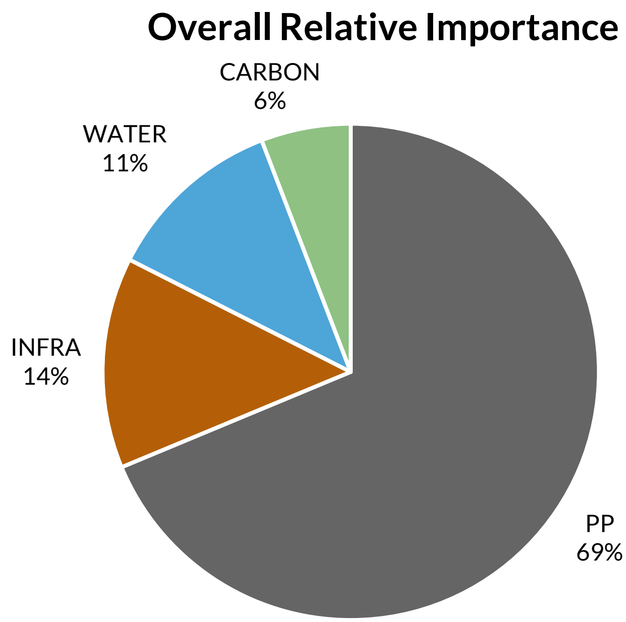

Figure 9. Overall HVRA Relative Importance for the primary HVRAs included in ARRA.

3.4 HVRA CHARACTERIZATION RESULTS

Each HVRA was characterized by one or more data layers of sub-HVRA and, where necessary, further categorized by an appropriate covariate. Covariates separate HVRA by their response to wildfire, such as different response functions for transmission lines by voltage classes and different response functions for people and property by vegetation lifeform. The main HVRA in ARRA are mapped below along with a table containing the assigned response functions, the within-HVRA share of relative importance, and total acres for each sub-HVRA. These components are used along with fire behavior results from FSim in the wildfire risk calculations described in section 3.5.1.

3.4.1 PEOPLE AND PROPERTY

3.4.1.1 HOUSING UNIT DENSITY (HUDEN)

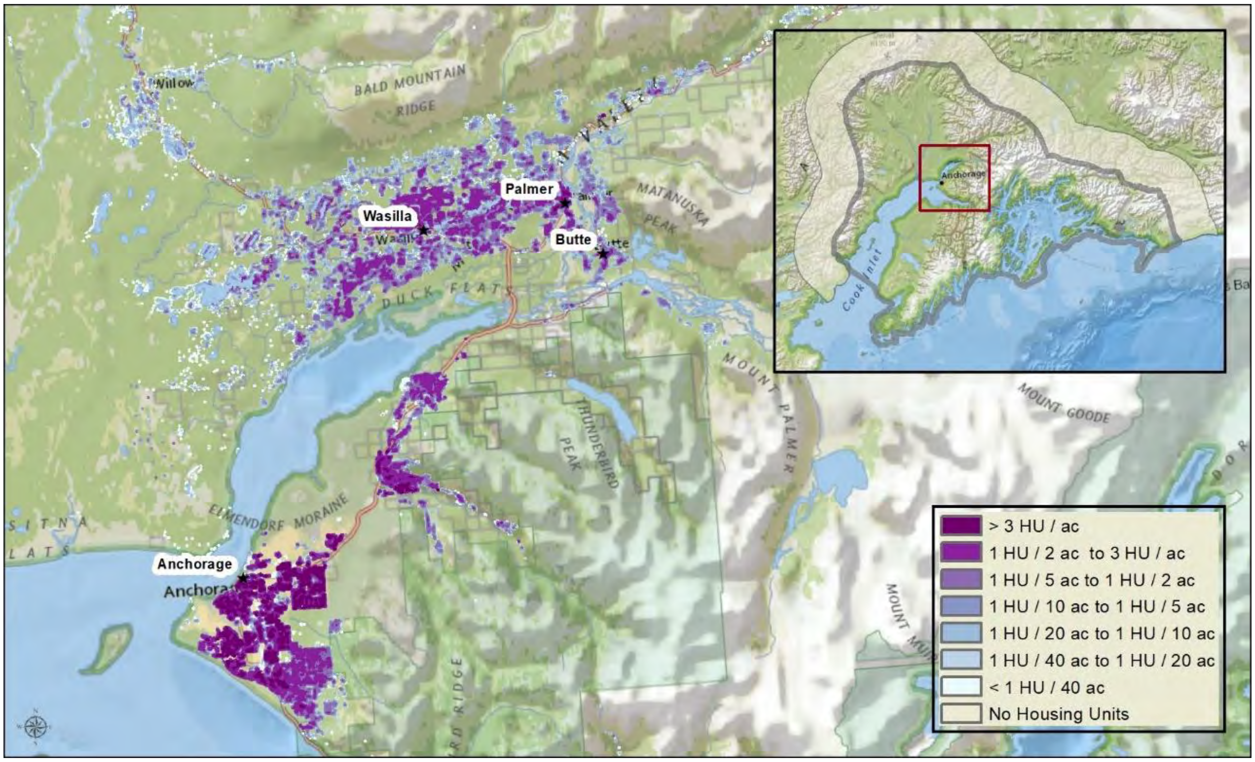

Figure 10. Map of Housing Unit Density within the ARRA Analysis Area

The HUDen raster was produced by Pyrologix using data depicting building locations provided by Chugach National Forest and U.S. Census - Census Block population data. Population estimates were brought forward to 2018 county population estimates. Our approach estimates housing-unit count for a census block then allocates that count to the portions of the block likely to contain those housing units, identified where the buildings are located within the block. This methodology was developed for the Wildfire Risk to Communities project (Scott et. al, 2020) and refined in this project by removing false positives and duplicates from the provided data.

Response Functions were applied in conjunction with burnable vegetation types derived from the LANDFIRE Existing Vegetation Type (EVT). A value of ‘1’ was assigned to sites associated with deciduous tree or shrub lifeforms, a value of ‘2’ for sites designated as grass, and a value of ‘3’ for Spruce/Mixed-wood sites. The same set of response functions was applied to all HU density classes within each vegetation classification.

The People and Property (HUDEN) HVRA received negative response functions for all vegetation types and fire intensity levels (Table 6). People and Property HVRA located in spruce and mixed-wood lifeforms were assigned a stronger negative response due to the likelihood of ember-cast from these fuel types and the suppression difficulty presented with such fire behavior. Conversely, People and Property HVRA located in grass pixels may present fewer challenges to fire suppression efforts—resulting in less loss overall.

Table 6. Response functions for the People and Property HVRA to highlight HUDEN.

Sub-HVRA	FIL1	FIL2	FIL3	FIL4	FIL5	FIL6	Share of RI[1]	Acres
P&P - HUDEN Tree/Shrub	-5	-15	-30	-50	-80	-95	16.1%	128,537
P&P - HUDEN Grass	-10	-30	-40	-60	-70	-80	5.8%	50,236
P&P - HUDEN Spruce/Mixed	-20	-40	-50	-80	-90	-95	70.9%	309,352

[1] Within-HVRA relative importance.

3.4.1.2 NATIVE ALLOTMENTS

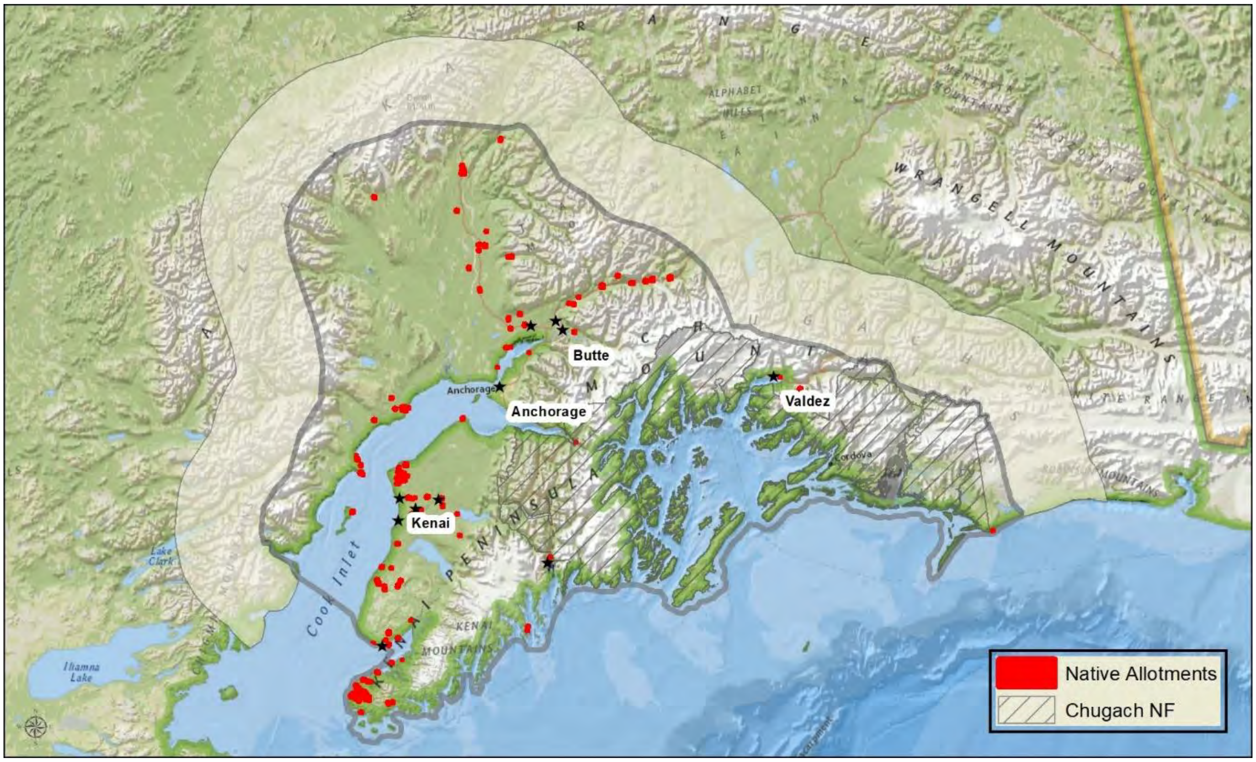

Figure 11. Map of Native Allotments within the ARRA analysis area.

Native allotment delineations for the analysis area (Figure 11) were provided by Chugach National Forest. The provided data represents mapped areas within the PLSS native allotment network. Data were extracted from the *Conveyed Native Allotments within the Alaska*[6] data set and converted to a 30 m raster. Due to the sensitive/protected nature of Native Allotments and a variety of land-uses applications, the response function assignments for Native Allotments demonstrate a negative response to fire (Table 7). At low flame lengths, Native Allotments demonstrate moderate loss that quickly increases as fire intensity increases, reaching total loss by FIL5. Native Allotment delineations were allocated 7 percent of the share of the People and Property HVRA. The share of HVRA importance is based on relative importance per unit area and mapped extent.

Table 7. Response functions for the People and Property HVRA to highlight Native Allotments.

Sub-HVRA	FIL1	FIL2	FIL3	FIL4	FIL5	FIL6	Share of RI[1]	Acres
Native Allotments	-30	-60	-70	-80	-100	-100	7.1%	20,715

[1] Within-HVRA relative importance.

6 https://navigator.blm.gov/data?keyword=allotments&fs_publicRegion=Alaska

3.4.2 INFRASTRUCTURE

3.4.2.1 COMMUNICATION SITES

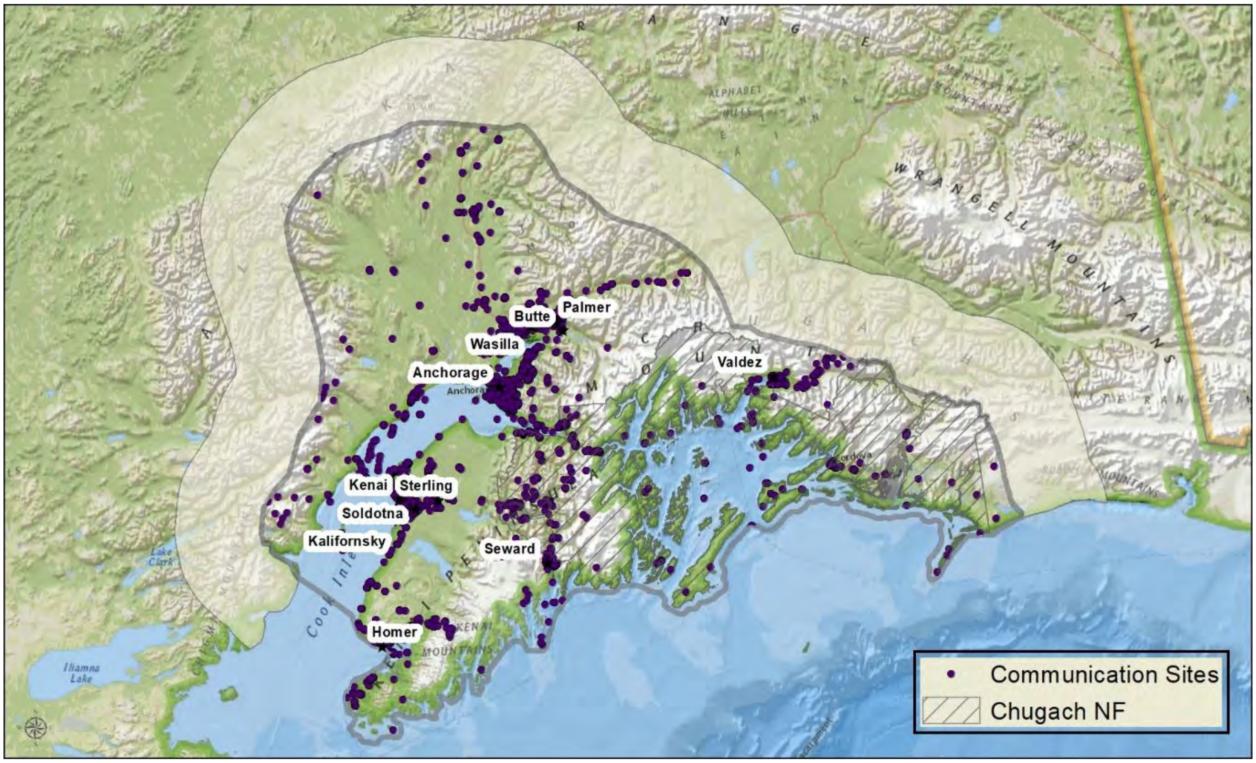

Figure 12. Map of Communication Sites within the ARRA analysis area.

Communication sites for the analysis area (Figure 12) were provided by Chugach National Forest (covering Forest Service and non-Forest Service lands) and supplemented using data acquired from the Homeland Infrastructure Foundation-Level Data (HIFLD)[7]. The types of communication sites compiled for the assessment include cellular towers, FS repeaters, aviation navigation aids, web cameras, RAWs, seismic stations, land mobile towers, FM/AM transmission towers, microwave service towers, paging transmission towers, antenna structure, TV analog/digital transmitters, broadband radio transmitters, internet service providers, and internet exchange points. All communication sites were merged into a single feature class and converted to 30 m pixels using the ArcGIS Focal Statistics tool. Focal statistics were calculated using the sum of an annulus neighborhood with an inner radius of zero and an outer radius of two, resulting in a point feature being represented by thirteen, 30 m pixels.

The response functions for communication sites demonstrate a pattern indicative of their hardened structures and defensible space, showing a neutral response at lower flame lengths, with increasing negativity to fires of increasing intensity (Table 8). Each communication site was also assigned a type classification (high value or other), giving those sites designated as 'high' more importance per pixel (cell towers, radio transmission, and navigational aids) relative to the 'other' sites (general

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[7] HIFLD data on communication sites was downloaded from https://hifld-geoplatform.opendata.arcgis.com/ on 5/12/2020

communication equipment, scientific instruments, and microwave service towers) due to the nature of their use.

Communication sites were allocated 43 percent of the share of the Infrastructure HVRA importance. The share of HVRA importance is based on relative importance per unit area and mapped extent.

Table 8. Response functions for the Infrastructure HVRA to highlight Communication Sites.

Sub-HVRA	FIL1	FIL2	FIL3	FIL4	FIL5	FIL6	Share of RI[1]	Acres
Communication Sites - High	0	0	-20	-30	-40	-50	40.6%	2,503
Communication Sites	0	0	-20	-30	-40	-50	2.7%	1,994

[1] Within-HVRA relative importance.

3.4.2.2 TRANSMISSION LINES

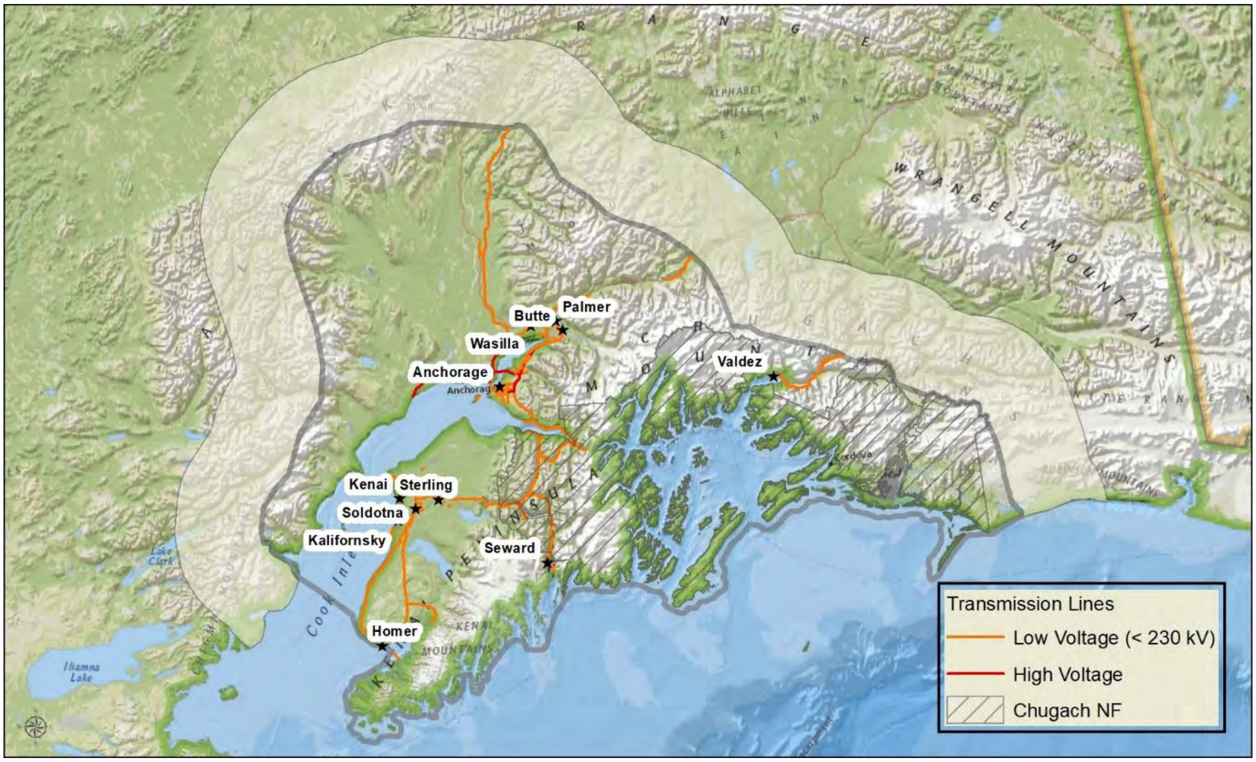

Figure 13. Map of Transmission Lines within the ARRA analysis area.

Transmission Lines within the analysis area (Figure 13) were acquired from the Homeland Infrastructure Foundation-Level Data (HIFLD)[7]. Ancillary data were provided by Copper Valley Electric to supplement the data and capture missing features. The lines were classified using a voltage break of 230 volts (transmission lines carrying less than 230 volts classified as '1', and those greater than 230, classified as '2'). The data were converted to a 30 m raster and expanded out one additional pixel (per side) using the ArcGIS *Expand* tool to capture more of the area impacted by wildfire.

Low voltage lines (<230 kV) are mostly wooden poles, and therefore, respond with a strongly negative response to all fire intensities. Total loss was expected for fires greater than FIL4 (Table 9). High voltage transmission lines (≥230 kV) are expected to be constructed of largely non-burnable materials that can withstand exposure to lower fire intensities and experience less loss at the higher intensity classes. Therefore, high voltage transmission lines have an initial neutral response at lower intensities and transition to moderate loss as intensity increases due to the associated heat damage to lines (Table 9).

Due to the number of acres mapped on the landscape and their importance to infrastructure, electric transmission lines received 32 percent of the share of the Infrastructure HVRA importance. The share of HVRA importance is based on relative importance per unit area and mapped extent.

Table 9. Response functions for the Infrastructure HVRA to highlight Transmission Lines.

Sub-HVRA	FIL1	FIL2	FIL3	FIL4	FIL5	FIL6	Share of RI[1]	Acres
High Volt (> 230)	0	0	-20	-30	-50	-60	3.3%	4,041
Low Volt (wooden poles)	-40	-50	-70	-90	-100	-100	28.7%	35,280

[1] Within-HVRA relative importance.

3.4.2.3 POWER: POWER PLANTS & SUBSTATIONS

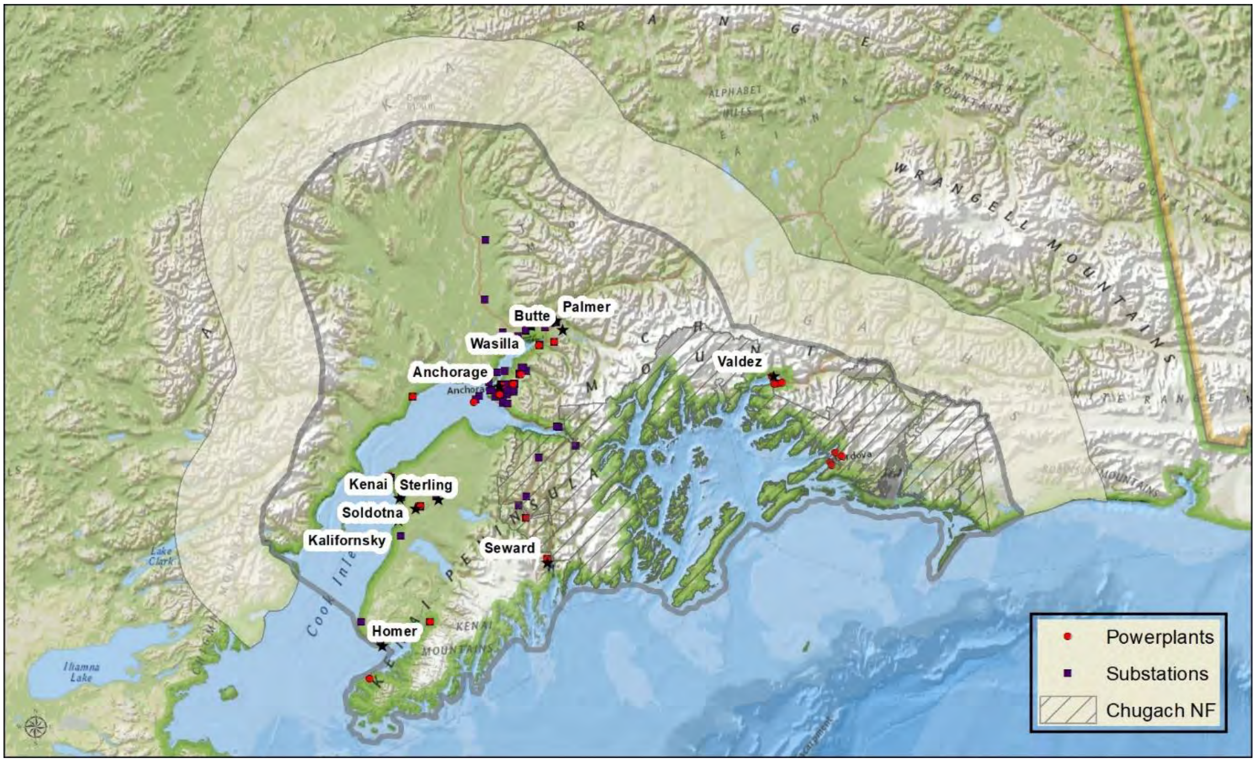

Figure 14. Map of Power Plants and Substations within the ARRA analysis area.

The location of power plants and substations within the analysis area (Figure 14) was derived from a combination of data provided by Chugach National Forest (covering Forest Service and non-forest service lands) and Homeland Infrastructure Foundation-Level Data (HIFLD)[7]. The acquired data was converted to 30 m pixels using the ArcGIS Focal Statistics tool. Focal statistics were calculated using the sum of an annulus neighborhood with an inner radius of zero and an outer radius of two, resulting in a point feature being represented by thirteen, 30 m pixels. Due to the hardened nature of the structures and defensible space, the response function assignments for power plants and substations demonstrate a neutral response to nearly all fire intensities. They only demonstrate a response to fires of higher intensity and will show minimal loss (Table 10).

Power plants and substations were allocated six percent of the share of the Infrastructure HVRA importance. The share of HVRA importance is based on relative importance per unit area and mapped extent.

Table 10. Response functions for the Infrastructure HVRA to highlight Power Plants and Substations.

Sub-HVRA	FIL1	FIL2	FIL3	FIL4	FIL5	FIL6	Share of RI[1]	Acres
Power Plants	0	0	0	-10	-20	-30	1.7%	62
Substations	0	0	0	-10	-20	-30	4.3%	197

[1] Within-HVRA relative importance.

3.4.2.4 OIL & GAS WELLS

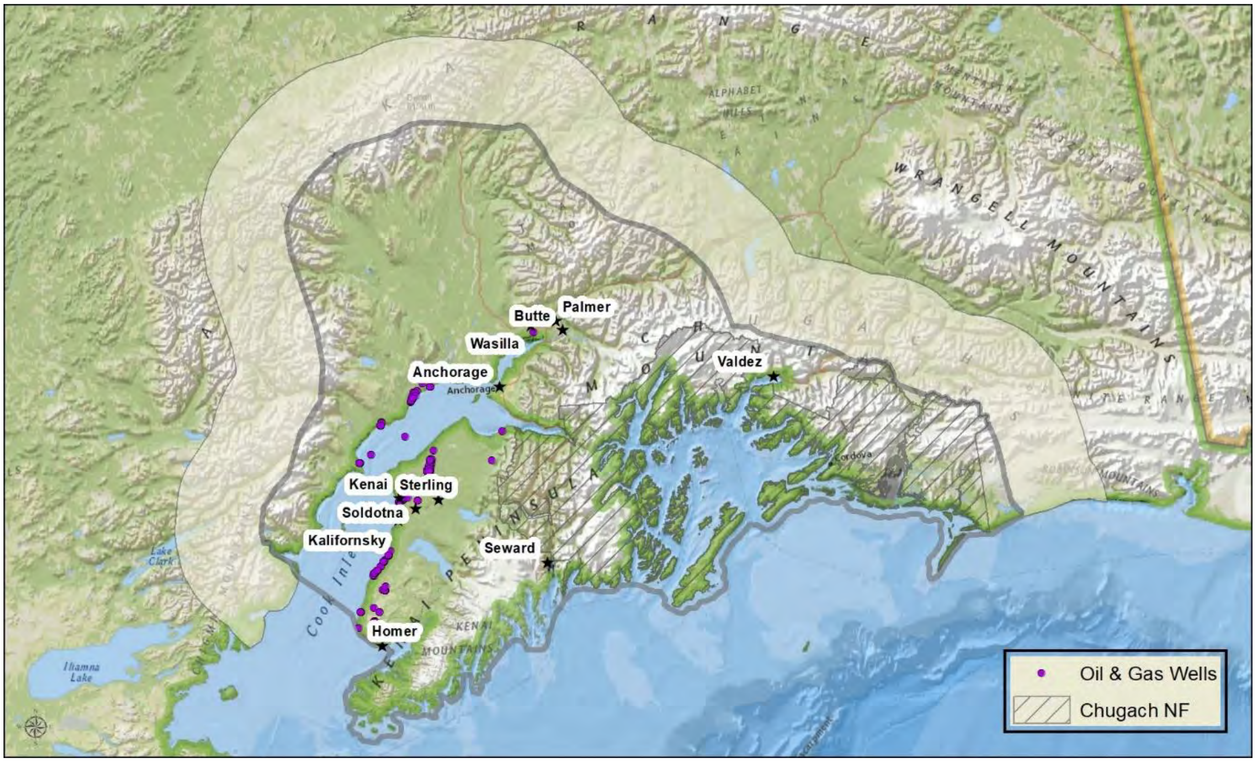

Figure 15. Map of Oil and Wells within the ARRA analysis area.

Oil and gas wells for the analysis area (Figure 15) were provided by Chugach National Forest. The provided data contains the location of surface wells designated as 'active' (extracted from Alaska Oil and Gas Conservation Commission) and structures limited to those designated as 'oil/gas buildings' within the Known Sites database. The acquired data was converted to 30 m pixels using the ArcGIS Focal Statistics tool. Focal statistics were calculated using the sum of an annulus neighborhood with an inner radius of zero and an outer radius of two, resulting in a point feature being represented by thirteen, 30 m pixels. Due to the established, defensible space surrounding well pads, the response functions are similar to that of power plants and substations. Fires of low intensity will have little to no effect and not until FIL3 will they demonstrate a very low negative response to fire (Table 11). This negative trend continues as fire intensity increases but never surpasses mild loss. Oil and gas wells were allocated 4 percent of the share of the Infrastructure HVRA importance. The share of HVRA importance is based on relative importance per unit area and mapped extent.

Table 11. Response functions for the Infrastructure HVRA to highlight Oil and Gas Wells.

Sub-HVRA	FIL1	FIL2	FIL3	FIL4	FIL5	FIL6	Share of RI[1]	Acres
Oil & Gas Wells	0	0	-10	-20	-30	-30	4.0%	493

[1] Within-HVRA relative importance.

3.4.2.5 PIPELINES

Figure 16. Map of Pipelines within the ARRA analysis area.

Pipelines for the analysis area (Figure 16) were provided by Chugach National Forest. The provided data depicts pipeline locations in Alaska as digitized from USGS maps and updated using ancillary source documentation from the Alaska DNR. The pipelines were converted to a 30 m raster and expanded out one additional pixel (per side) using the ArcGIS *Expand* tool to capture more of the area impacted by wildfire.

The response function assignments for pipelines show a neutral response for nearly all fire intensities. Not until 8-12-foot flame lengths (FIL3) is there a transition to a negative response. As fire intensity increases, the response functions show an increasingly negative response but remain relatively low (Table 12).

Pipelines were allocated 9 percent of the share of the Infrastructure HVRA importance. The share of HVRA importance is based on relative importance per unit area and mapped extent.

Table 12. Response functions for the Infrastructure HVRA to highlight Pipelines.

Sub-HVRA	FIL1	FIL2	FIL3	FIL4	FIL5	FIL6	Share of RI[1]	Acres
Pipelines	0	0	0	0	-10	-30	9.3%	1,716

[1] Within-HVRA relative importance.

3.4.2.6 FISH HATCHERIES

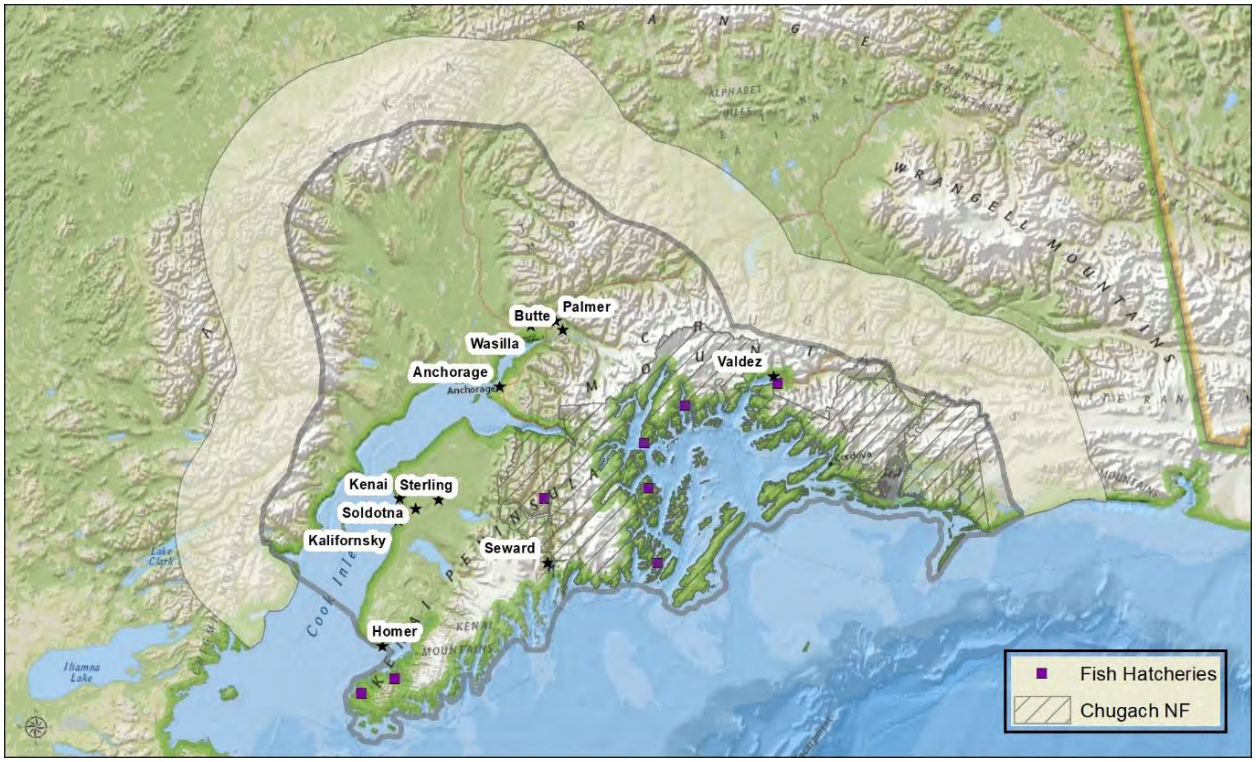

Figure 17. Map of Fish Hatcheries within the ARRA analysis area.

The location of fish hatcheries within the analysis area (Figure 17) was provided by Chugach National Forest via the Alaska Department of Fish & Game. The provided data represents the known locations of sport and commercial fish rearing facilities (commercial salmon fisheries) located in Southcentral Alaska. For use in this analysis, the data were converted to 30 m pixels using the ArcGIS Focal Statistics tool. Focal statistics were calculated using the sum of an annulus neighborhood with an inner radius of zero and an outer radius of two, resulting in a point feature being represented by thirteen, 30 m pixels.

In this assessment, sites designated as hatcheries were associated with commercial locations. Due to the established, developed, and defensible space associated with these hatcheries, the response function assignments demonstrate neutral response at lower fire intensities. Although remaining moderate, the response functions do show increasingly negative responses as fire intensity increases (Table 13).

Fish hatcheries were allocated less than one percent of the share of the Infrastructure HVRA importance. The share of HVRA importance is based on relative importance per unit area and mapped extent.

Table 13. Response functions for the Infrastructure HVRA to highlight Fish Hatcheries.

Sub-HVRA	FIL1	FIL2	FIL3	FIL4	FIL5	FIL6	Share of RI[1]	Acres
Fish Hatcheries	0	0	0	-10	-20	-30	0.2%	14

[1] Within-HVRA relative importance.

3.4.2.7 RECREATION & ADMINISTRATIVE SITES

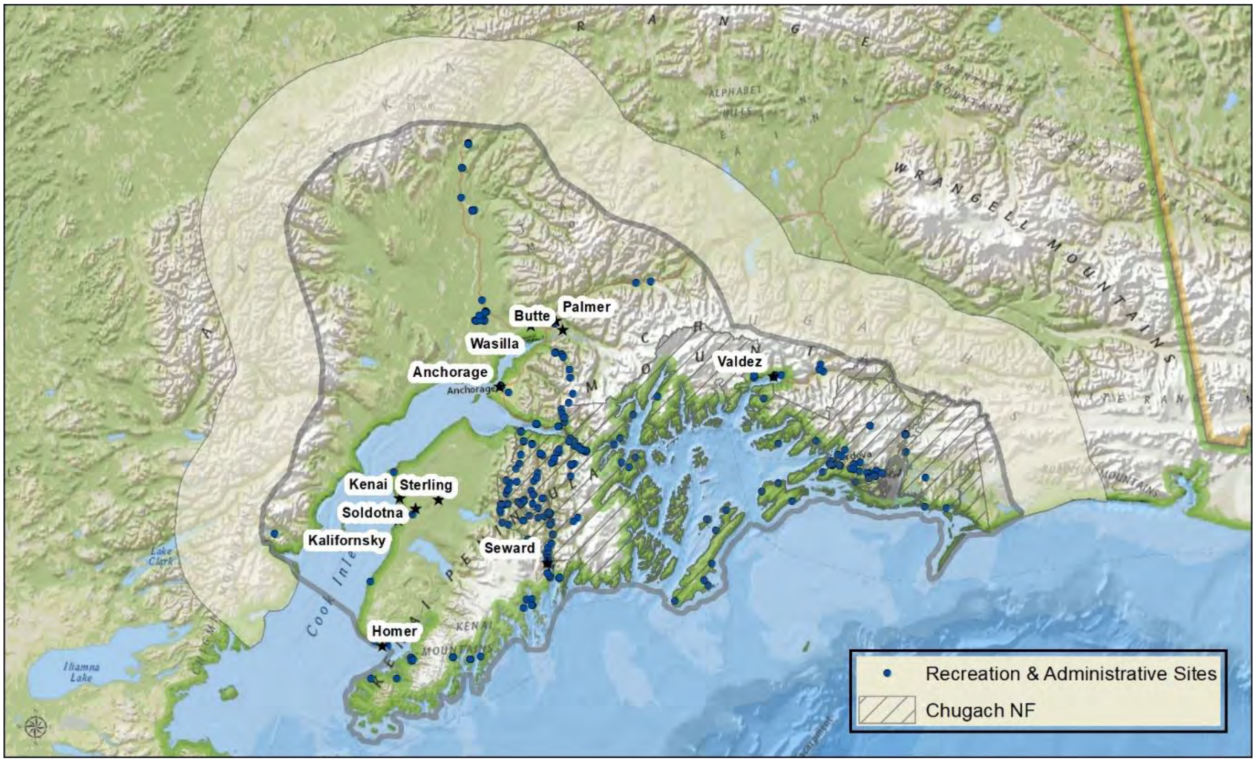

Figure 18. Map of Recreation and Administrative Sites within the ARRA analysis area.

Recreation and administrative sites for the analysis area (Figure 18) were provided by Chugach National Forest and the National Park Service (Alaska Region GIS Team). The provided data contains the locations of administrative buildings, offices, recreation sites, and service/utility structures on lands owned by Alaska State Parks, USDA (Forest Service) lands, and the National Park Service. For use in this analysis, the data were extracted to the analysis area, assigned a rank (high or low) based on the locations associated importance level (all sites are assumed to have the same wildfire susceptibility), and converted to 30 m pixels using the ArcGIS Focal Statistics tool. Focal statistics were calculated using the sum of an annulus neighborhood with an inner radius of zero and an outer radius of two, resulting in a point feature being represented by thirteen, 30 m pixels.

Due to their susceptibility to fire, the response function assignments for all recreation and administrative sites demonstrate a pattern of increasing loss as fire intensity increases (Table 14). Those sites designated as high importance show a greater loss across all fire intensities due to their associated investment level. For instance, sites such as regional headquarters or district offices show greater losses relative to campgrounds or day-use areas.

Recreation and administrative sites were allocated 5 percent of the share of the Infrastructure HVRA importance. The share of HVRA importance is based on relative importance per unit area and mapped extent.

Table 14. Response functions for the Infrastructure HVRA to highlight Recreation and Administrative Sites.

Sub-HVRA	FIL1	FIL2	FIL3	FIL4	FIL5	FIL6	Share of RI[1]	Acres
Rec Admin Sites - High	-20	-40	-50	-80	-90	-95	4.2%	310
Rec Admin Sites - Low	-10	-30	-40	-60	-70	-80	1.0%	378

[1] Within-HVRA relative importance.

3.4.3 CARBON

3.4.3.1 CARBON CREDITS

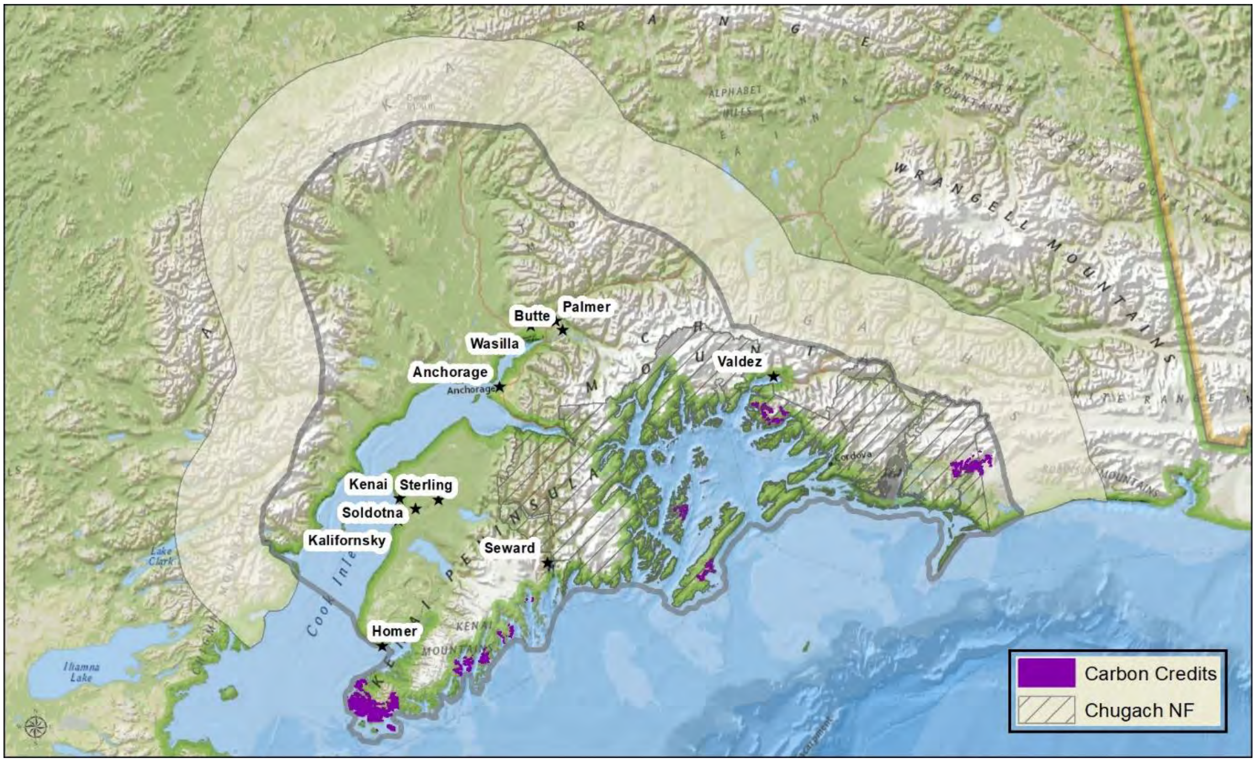

Figure 19. Map of Carbon Credit delineations within the ARRA analysis area.

Carbon credit delineations within the analysis area (Figure 19) were provided by Chugach National Forest and the Chugachmiut Native Corporation. The mapped areas represent forested land used in carbon trading markets, identifying forested areas of biomass marketable as carbon credits. The provided data was converted to a 30 m raster for use in the analysis.

Due to the susceptible and sensitive nature of forested carbon sequestration areas, the response function assignments for carbon credit delineations demonstrate an initial strong negative response to fire. This trend continues as fire intensity increases, reaching total loss by 8-foot flame lengths (Table 15).

Table 15. Response functions for the Carbon HVRA to highlight Carbon Credit delineations.

Sub-HVRA	FIL1	FIL2	FIL3	FIL4	FIL5	FIL6	Share of RI[1]	Acres
Carbon Credits	-30	-50	-70	-80	-100	-100	100.0%	94,663

[1] Within-HVRA relative importance.

3.4.4 CRITICAL WATERSHEDS

3.4.4.1 DRINKING-WATER PROTECTION AREAS

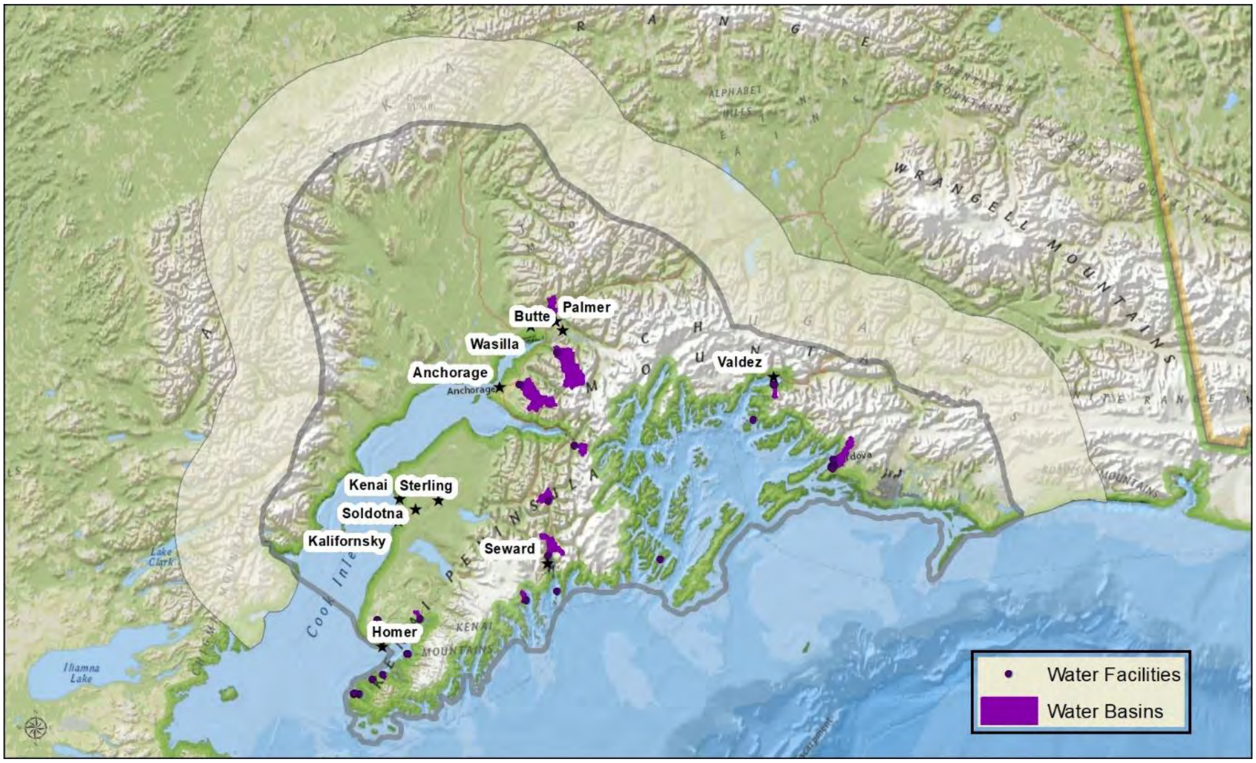

Figure 20. Map of Drinking Water Protection Areas within the ARRA analysis area.

Drinking water protection areas were mapped using Alaska DEC Open Data[8] (Zone C and G), provided by Chugach National Forest. The dataset included drinking water protection areas (critical water basins) and their associated water facilities. The selected water basins were reviewed by a Forest Service hydrologist and water facilities were limited to those associated with surface water and/or groundwater under the influence of surface water. The resulting critical watershed map is shown (Figure 20).

For the QWRA, watershed resources were analyzed using a custom approach to determine the importance of each pixel within a basin, based on population served and distance to intake. We calculated the Euclidean distance to the drinking water intake for each pixel within its associated watershed. We then divided the result by the Euclidean distance to create a proportion of importance based on the distance to the intake, and to prevent the values from decaying as rapidly we divided distance by 1/3. We then multiplied by the intake's population served. The sum of the importance for each watershed was then normalized to the total population served to prevent overweighting the largest watersheds. A single pixel can belong to one or more overlapping watersheds; therefore values are cumulative across any overlapping watersheds.

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[8] https://hub.arcgis.com/datasets/ADEC::zone-c-surface-water-watershed-boundary?geometry=44.708%2C42.010%2C19.219%2C72.703

Table 16. Response functions for the Critical Watersheds HVRA.

Sub-HVRA	FIL1	FIL2	FIL3	FIL4	FIL5	FIL6	Share of RI[1]	Acres
Drinking Water	-10	-30	-50	-70	-80	-95	100.0%	215,696

[1] Within-HVRA relative importance.

3.5 EFFECTS ANALYSIS METHODS

An effects analysis quantifies wildfire risk as to the expected value of net response (Finney, 2005; Scott *et al.*, 2013) also known as expected net value change (eNVC). Effects analysis relies on input from resource specialists to produce a tabular response function for each HVRA occurring in the analysis area. A response function is a tabulation of the relative change in the value of an HVRA if it were to burn in each of six flame-length classes. A positive value in a response function indicates a benefit or increase in value; a negative value indicates a loss or decrease in value. Response function values for the ARRA ranged from -100 (greatest possible loss of value) to 0 (no change in value).

3.5.1 EFFECTS ANALYSIS CALCULATIONS

Integrating HVRAs with differing units of measure (for example, habitat vs. homes) requires relative importance (RI) values for each HVRA/sub-HVRA. These values were identified in the RI workshop, as discussed in Section 3.3. The final importance weight used in the risk calculations is a function of overall HVRA importance, sub-HVRA importance, and relative extent (pixel count) of each sub-HVRA. This value is therefore called relative importance per pixel (RIPP).

The RF and RIPP values were combined with estimates of the flame-length probability (FLP) in each of the six flame-length classes to estimate conditional NVC (cNVC) as the sum-product of flame-length probability (FLP) and response function value (RF) over all the six flame-length classes, with a weighting factor adjustment for the relative importance per unit area of each HVRA, as follows:

$$cNVC_j = \sum_{i}^{n} FLP_i * RF_{ij} * RIPP_j$$

where *i* refers to flame length class (n = 6), *j* refers to each HVRA, and RIPP is the weighting factor based on the relative importance and relative extent (number of pixels) of each HVRA. The cNVC calculation shown above places each pixel of each resource on a common scale (relative importance), allowing them to be summed across all resources to produce the total cNVC at a given pixel:

$$cNVC = \sum_{j}^{m} cNVC_j$$

where cNVC is calculated for each pixel in the analysis area. Finally, eNVC for each pixel is calculated as the product of cNVC and annual BP:

$$eNVC = cNVC * BP$$

3.5.2 UPSAMPLING FSIM RESULTS FOR EFFECTS ANALYSIS

FSim's stochastic simulation approach can be computationally intensive and time constraining on large landscapes. The challenge is to determine a resolution sufficiently fine to retain detail in fuel and terrain features while producing calibrated results in a reasonable timeframe. Moreover, HVRA are often mapped at the same resolution as the final BP produced by FSim. To enable greater resolution on HVRA mapping, we chose to upsample the FSim burn probability (BP) and flame-length probability (FLP) rasters to 30 m, consistent with HVRA mapping at 30 m.

As discussed in the Fuelscape section (Section 2.1) above, the fire behavior modeling in ARRA included the custom, burnable-urban fuel model. Without accounting for any potential burnability in developed areas, simulated wildfires would stop at the edge of burnable fuel. To address this issue, we allowed fires to spread through burnable-urban pixels which produced simulated fire perimeters that spread through developed areas. However, because of the many unknowns and challenges in modeling the potential for home-to-home spread in landscape-scale fire modeling, we ultimately minimized the influence of burn probability values associated with burnable-urban pixels and spread probabilities from adjacent wildlands with a series of focal window smoothing steps as described below.

We upsampled the FSim BP raster using a multi-step process. First, we used the ESRI ArcGIS Focal Statistics tool to perform two, rectangular, low-pass filters at the 120 m resolution, calculating the mean value of burnable pixels only (including burn probability values on burnable-urban pixels), within a 3-pixel by 3-pixel moving window. These steps allowed us to "backfill" burnable pixels at 30 m that were coincident with non-burnable fuel at 120 m. We subsequently resampled the 120 m FSim BP raster to 30 m using bilinear resampling. If, after running two low-pass filters, burnable pixels had BP values of zero, we set a threshold value of 1-in-10,000 to avoid assigning zero values on burnable pixels with some likelihood of burning.

As discussed above, we chose to smooth burn probability values from nearby burnable fuel onto adjacent non-burnable pixels to capture the low likelihood, but high-consequence event of wildfire spreading onto developed pixels. Before running the smoothing steps, we masked the 30 m resampled raster to burnable pixels only, removing BP values from burnable-urban pixels. Additionally, we removed BP values from small, burnable islands less than 500 ha. The purpose of removing burnable urban, non-burnable fuel, and small burnable islands is to prevent smoothing from these pixels, and in particular, to prevent golf courses and urban parks from spreading wildfires to nearby homes.

The resulting resampled raster was then smoothed again using the ESRI ArcGIS Focal Statistics tool to perform three low-pass filters at a 300 m resolution, allowing for spread from burnable pixels to nearby non-burnable pixels. Each focal smoothing operation incrementally reduces burn probability by including zero values on non-burnable pixels (other than water and ice) in the focal mean calculation. This reduces burn probability on non-burnable fuel relative to the burnable areas nearby. The 900 m smoothing distance is consistent with work by Caggiano et al. (2020) showing that all home losses to wildfire from 2000 to 2018 were within 850 m of wildland vegetation. Further, by removing burnable-urban and instead of smoothing burn probability onto those pixels, we reduce wildfire likelihood and control the distance those values are spread. As a final step, if small burnable islands were not populated through BP smoothing, they were assigned a threshold value of 1-in-100,000 (0.00001).

FSim flame-length probability (FLP) rasters were upsampled like the burn probability layer for use in effects analysis calculations. We used the ESRI ArcGIS Focal Statistics tool to perform two low-pass filters at the 120 m resolution, calculating the mean value of burnable pixels only, within a 3-pixel by 3-pixel moving window. This allowed us to "backfill" burnable pixels at 30 m that were coincident with non-burnable fuel at 120 m. We then resampled the 120 m FSim FLP rasters to 30 m using bilinear resampling and masked the result to burnable pixels at 30 m (removing FLP values from burnable-urban pixels). To match the extent of the smoothed BP raster, we performed three, 300 m focal windows. Instead of allowing intensity values to decay with each pass, we kept only non-zero probabilities with each smoothing pass. Final values were then rescaled or normalized so the sum of all FLPs equals one.

3.5.3 WILDFIRE TRANSMISSION (RISK-SOURCE)

The potential for wildfires to transmit risk is a function of the spatial variation in fire occurrence and fire growth potential, in conjunction with spatial variation in HVRA location. To evaluate this potential, the total cNVC – the sum of all HVRA (People and Property, Infrastructure, Recreation, Range, Culture, Critical Watersheds, Aquatic Species, Wildland Species, Timber and Limited & Rare Vegetation) – was determined for each simulated FSim fire perimeter. The sum of total cNVC within each fire perimeter was then attributed to its associated ignition point. Summaries were limited to "large" fire perimeters, defined here as having at least five, 3.6-acre pixels per fire. Below this perimeter size, simulated fire-size distributions do not match historical distributions.

The final raster dataset created from the perimeter overlay exercise (risk-source) represents the expected annual risk per km^2 (or total wildfire transmission risk) for all HVRA from ignitions across the landscape. We refer to this raster as Expected Impact (eImpact).

The eImpact raster was generated using a multi-stage process. The ARRA analysis area includes two Fire Occurrence Areas (FOAs) that were each simulated with 100,000 iterations. The number of iterations used in the simulation was added to the attribute table for each fire and a new attribute representing cNVC per iteration was generated. Including the number of iterations in the calculation provides the “expected” or likelihood component of risk-source. Using the ArcGIS Point Statistics tool, the sum of cNVC per iteration within a 5-km moving window radius was calculated for a 30 m output cell size. The second step involved calculating the sum of the ignitable[9] land area using the same tool and parameters on a point feature class differentiating ignitable and nonignitable fuel models. Finally, the sum of cNVC per iteration was divided by the sum of ignitable land area per km^2 to get the expected risk-source per km^2 of source-area. These results can be used to look at the relative likelihood and consequence of ignitions occurring across the landscape.

The mean consequence of an ignition, given a fire starts, is called Conditional Impact (cImpact). The cImpact raster is calculated by dividing the sum of cNVC per iteration by the sum of “1/iterations” to remove the annual estimate of the number of fire-starts from the calculation. cImpact characterizes the mean impact of ignition in different parts of the landscape, without consideration of how likely they are to occur.

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[9] Ignitable fuel includes burnable fuel, but not the custom burnable-urban fuel model.

3.5.4 TABULATED WILDFIRE RISK SUMMARIES

Summarizing wildfire risk and hazard products to a coarser summary unit facilitates comparison of risk and hazard across the landscape and between HVRA – quickly highlighting areas of concentrated risk that warrant further investigation at a more detailed, 30 m resolution. Additionally, tabulating the results in spreadsheet form facilitates sorting among and between attributes and ranking of high-risk areas.

For the ARRA QWRA, we summarized a set of Effects Analysis results for ARRA using 6th-level watershed polygons. Within each polygon zone we summarized exposed acres, burn probability, total eNVC (sum of all pixels) for each HVRA individually and for all HVRA combined, mean eNVC (calculated as the sum of eNVC divided by exposed acres/100 acres) for each HVRA individually and all HVRA combined, and mean cNVC (calculated as the sum of eNVC divided by the sum of burn probability) for each HVRA individually and all HVRA combined. An example of the NVC summary results for ARRA 6th-Level Watersheds is shown in Table 17.

4 RESULTS

4.1 EFFECTS ANALYSIS RESULTS

The cumulative results of the wildfire risk calculations described in section 3.5.1 are the spatial grids of cNVC and eNVC, representing both the conditional and expected change in value from wildfire disturbance to all HVRAs included in the analysis. Results are limited to those pixels that have at least one HVRA and a non-zero burn probability. Both cNVC and eNVC reflect an HVRA's response to fire and their relative importance within the context of the assessment, while eNVC additionally captures the relative likelihood of wildfire disturbance. Cumulative effects of wildfire across the landscape vary by HVRA (Figure 21) with a net negative eNVC for all the HVRA. Results are scaled to cumulative eNVC values for the People and Property HVRA in the ARRA analysis area. People and Property show the greatest cumulative wildfire losses (eNVC) result followed by Infrastructure, Drinking Water, and Carbon as the HVRA with the greatest cumulative risk.

Figure 22 shows cNVC results at a 30 m resolution across the analysis area. The most adverse effects are shown in dark red and are largely concentrated around ARRA communities. Adjusting cNVC by fire likelihood (i.e., burn probability) narrows the range of values for negative outcomes and highlights areas more likely to be visited by wildfire as seen in the eNVC map in Figure 23.

Figure 24 and Figure 25 show the upsampled BP and FLEPs results, as discussed in Section 3.5.2. Figure 26 shows the wildfire transmission results, as discussed in Section 3.5.3.

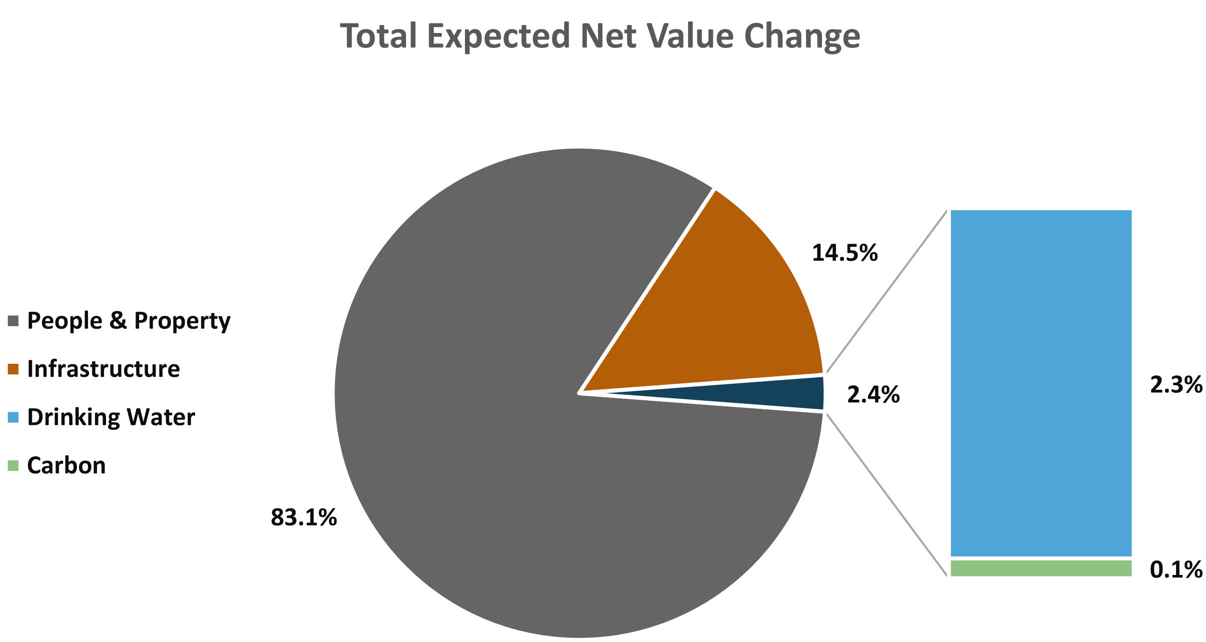

Figure 21. Weighted net response overall highly valued resources and assets (HVRAs) in the assessment. The HVRAs are listed in order of net value change and scaled to eNVC values for the People and Property HVRA.

4.1.1 CONSEQUENCE – CONDITIONAL NET VALUE CHANGE (CNVC)

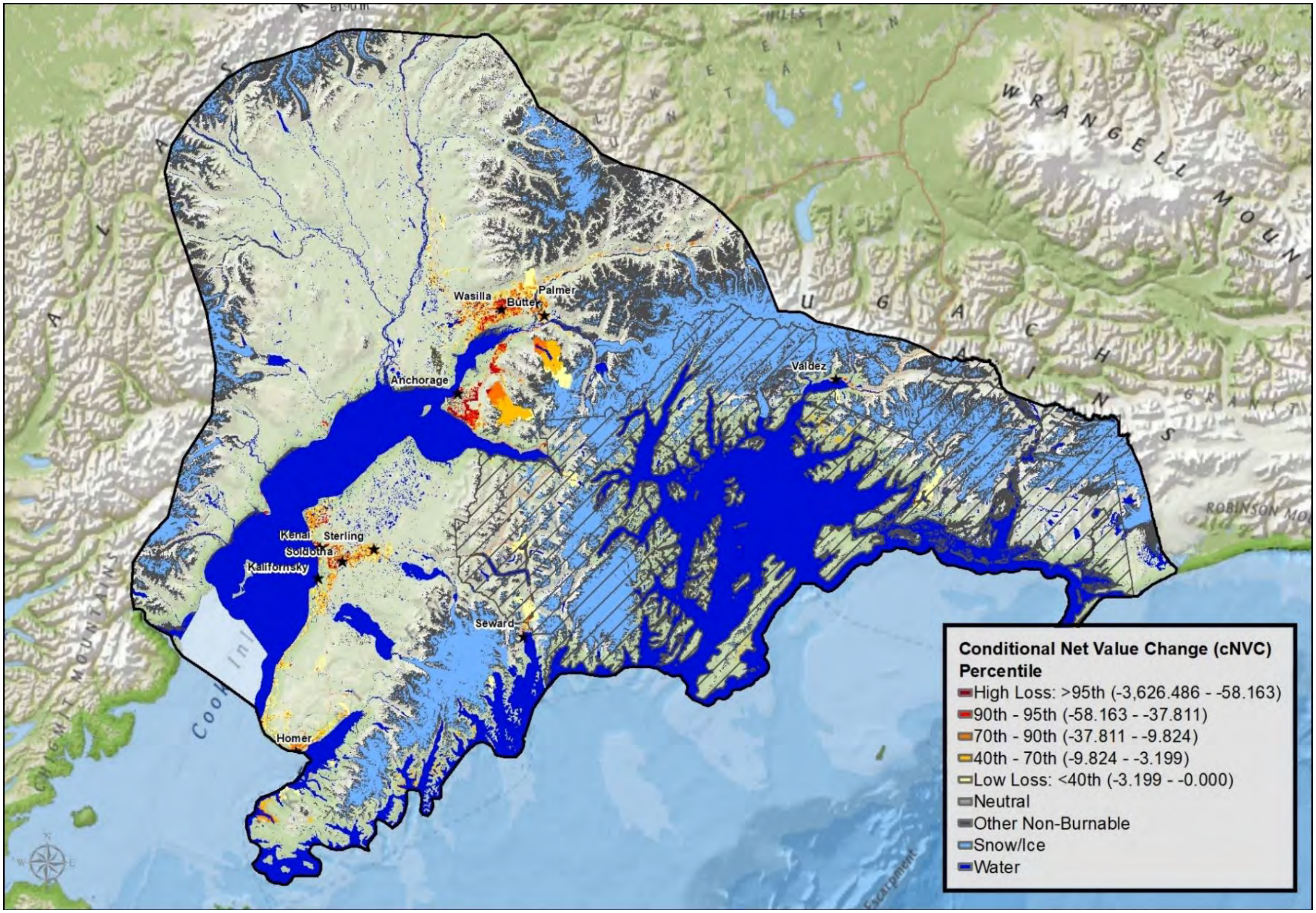

Figure 22. Map of Conditional Net Value Change (cNVC) at 30 m for the ARRA analysis area.

4.1.2 RISK – EXPECTED NET VALUE CHANGE (ENVC) - TOTAL

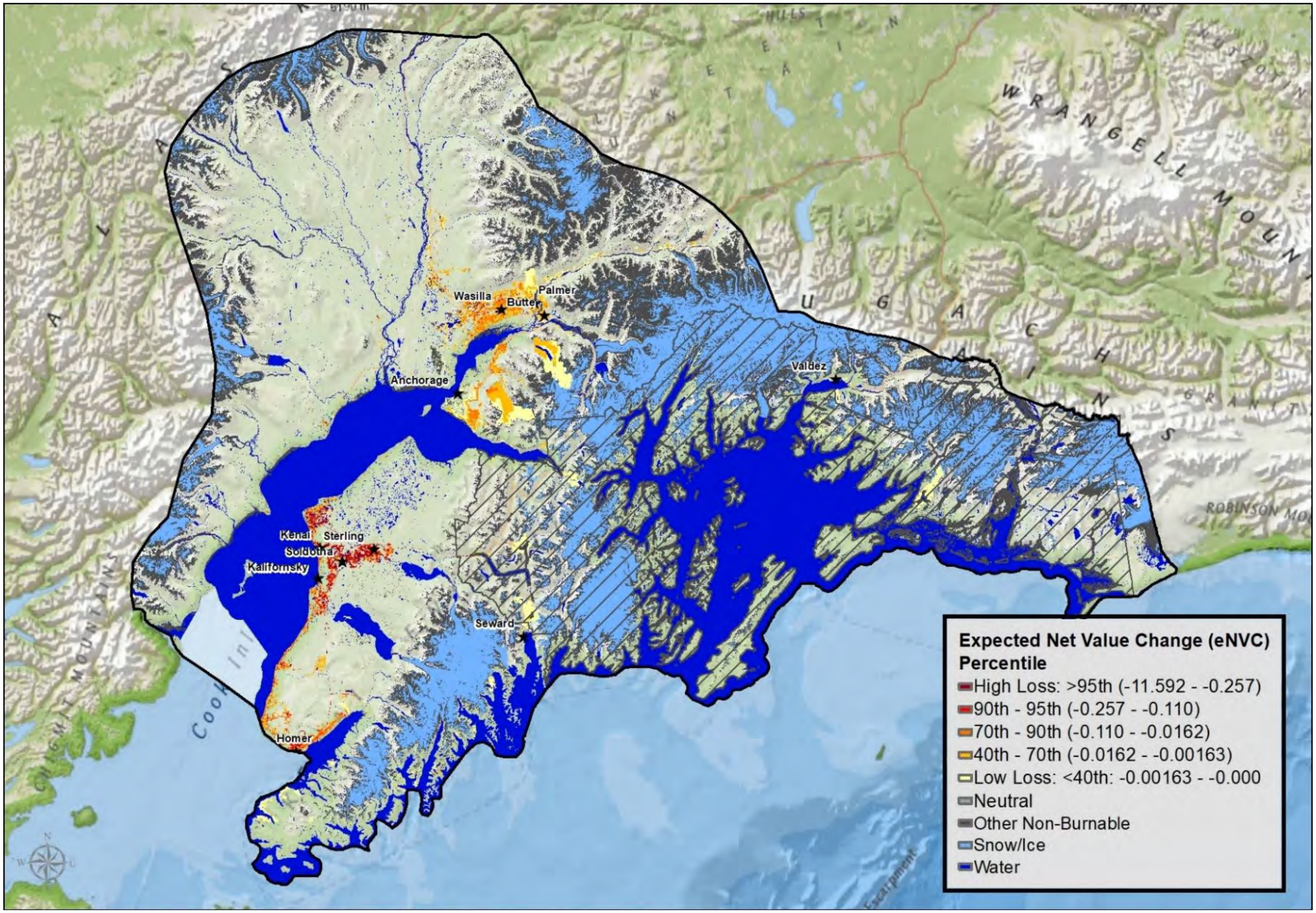

Figure 23. Map of Expected Net Value Change (eNVC) at 30 m for the ARRA analysis area.

4.1.3 LIKELIHOOD – ANNUAL BURN PROBABILITY (BP)

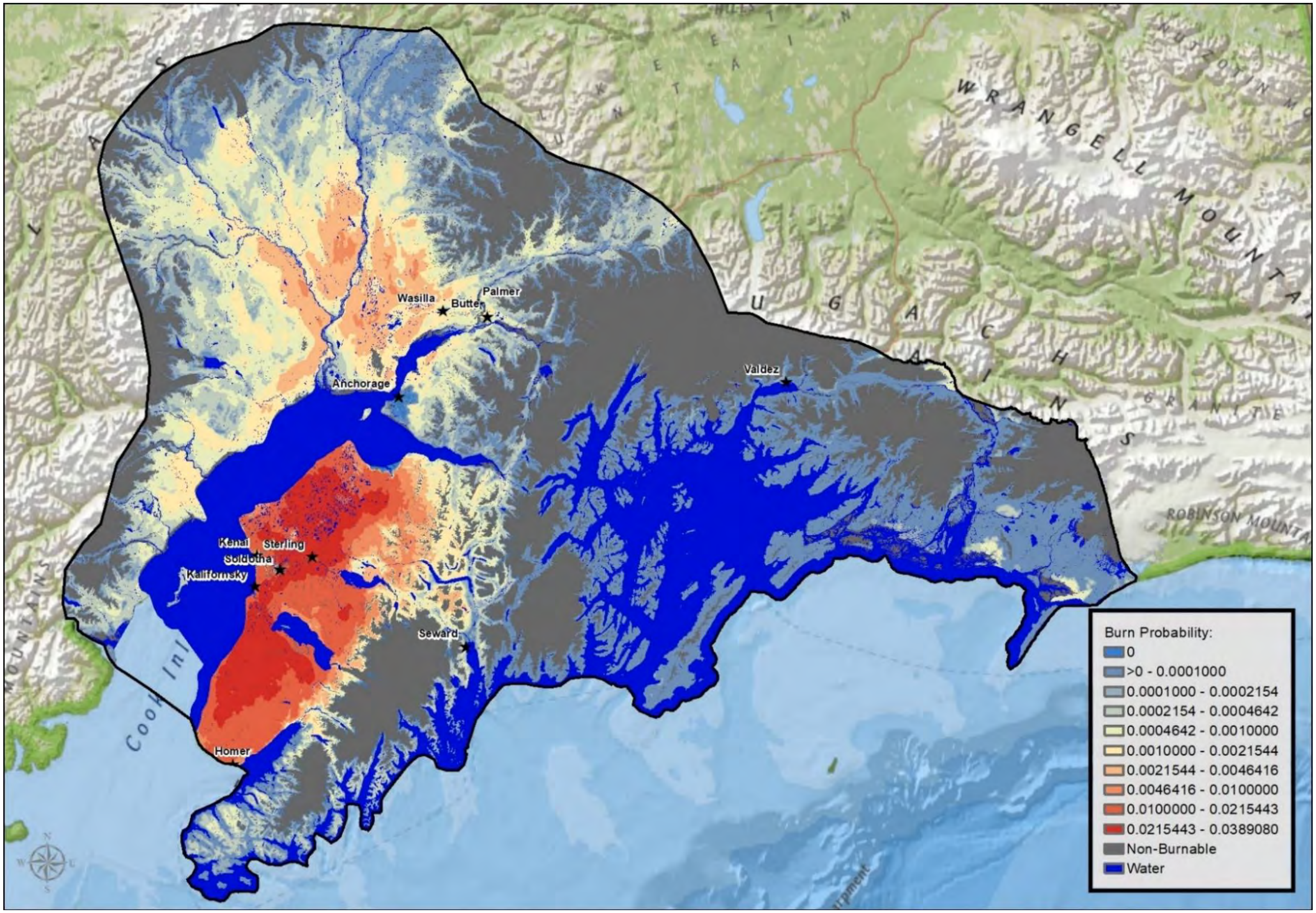

Figure 24. Map of integrated FSim burn probability results upsampled to 30 m resolution for the ARRA analysis area.

4.1.4 FLAME-LENGTH EXCEEDANCE PROBABILITIES

Flame-length exceedance probabilities (FLEP) represent the conditional probability of exceeding a nominal flame-length value. A FLEP of six is the conditional probability of a wildfire exceeding a six-foot flame length. FLEPs are a useful way to visualize individual FSim flame-length probabilities (FLPs). The FLEPs shown in Figure 23 were derived from the same FLPs used in the effects analysis calculations and upsampled to 30 m from the native 120 m using the methods outlined in section 3.5.2.

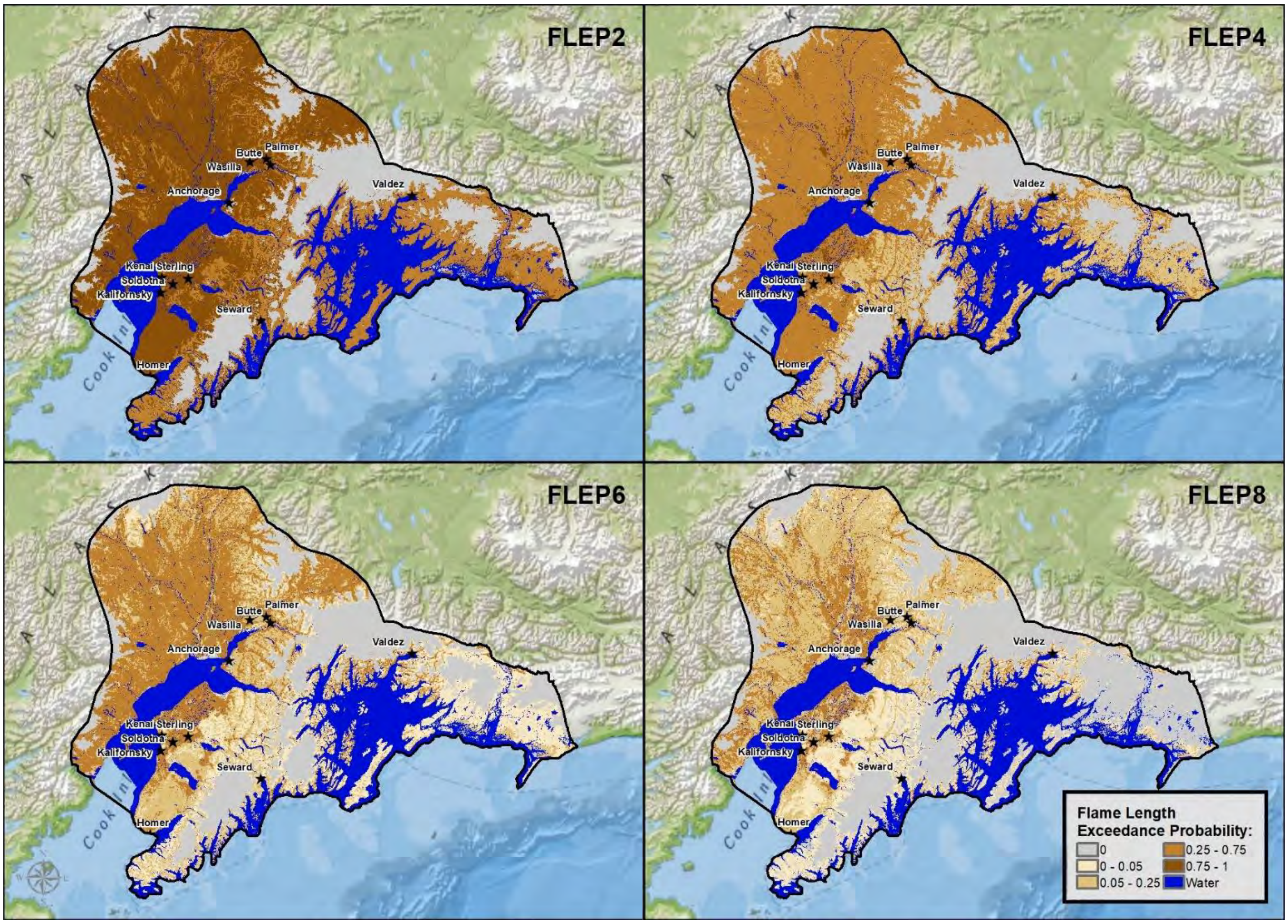

Figure 25. Map of 2, 4, 6, & 8-foot Flame-length Exceedance Probabilities (FLEPs)

4.1.5 WILDFIRE TRANSMISSION (RISK-SOURCE ANALYSIS)

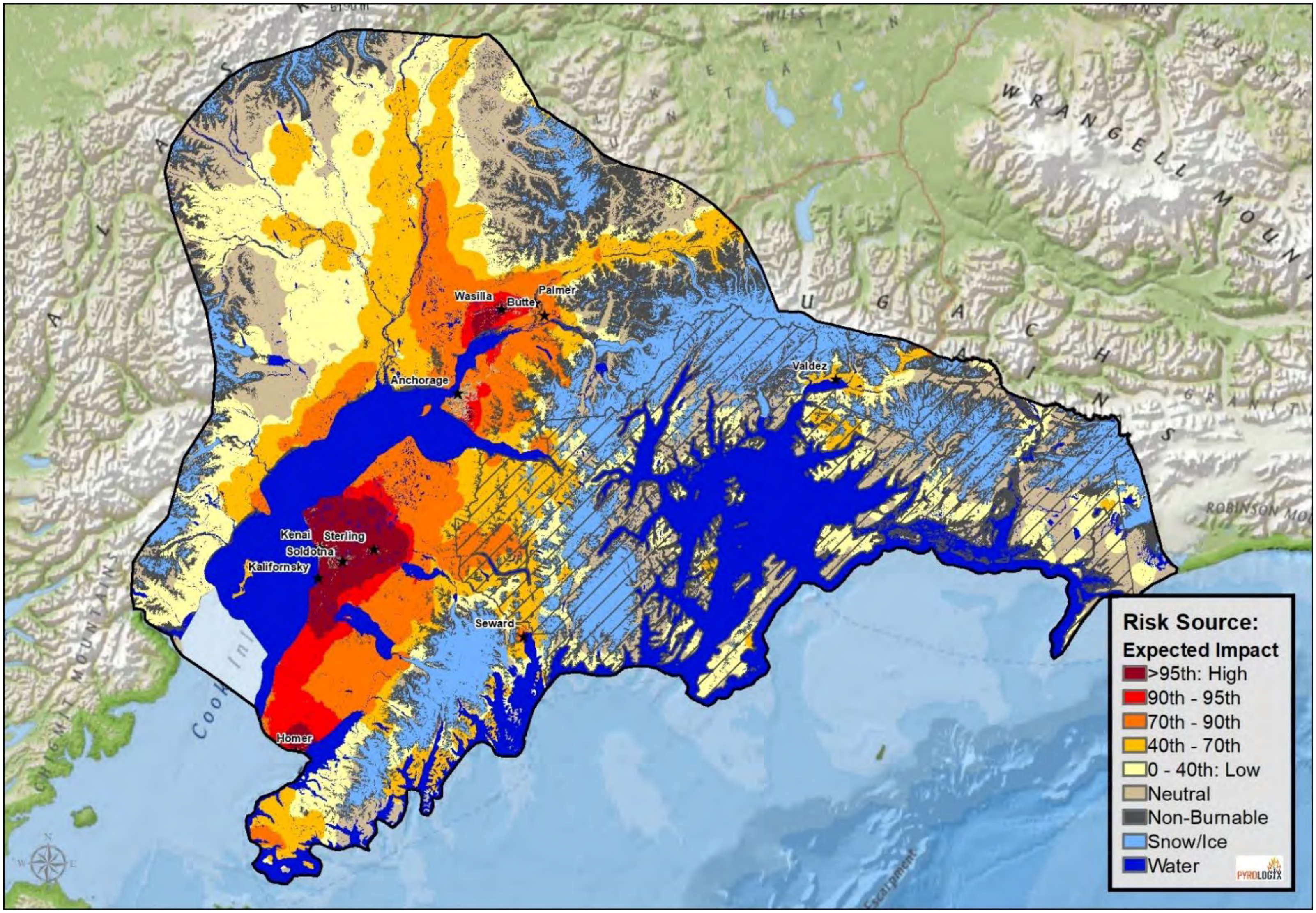

Figure 26. Map of the annual wildfire transmission risk (eImpact) to all HVRA from ignitions across the landscape.

4.1.6 TABULATED SUMMARIES FOR ARRA 6TH-LEVEL WATERSHEDS

The summary of mean wildfire risk (mean eNVC) for all HVRA by 6th-level HUCs is provided in Table 17. The table highlights a sample of the risk attributes summarized for each watershed polygon outlined in Section 3.5.4. The tabular summaries provided with the complete set of project deliverables include the full list of risk attributes[10], but Table 17displays a limited set of attributes to compare between mean eNVC and total eNVC for all HUCs.

The total eNVC metric highlights which HUCs have the greatest cumulative risk, but because watershed sizes are variable, it is useful to also examine risk concentration, or mean eNVC. Ranking by mean eNVC is most useful to examine which watersheds, on average, have the greatest wildfire risk. The mean eNVC by HVRA shows which HVRA are most at risk in each watershed and which contribute to the overall mean eNVC. Mean eNVC can help identify which watersheds might be prioritized for potential wildfire risk mitigation efforts, but the level of funding and mitigation efforts must be informed by the total eNVC.

Mean eNVC is a useful metric for larger summary zones, however, for smaller HUC polygons with very few burnable acres, the mean can be arbitrarily inflated by the small number of burnable acres in the denominator. Caution must be used when interpreting these results and establishing a minimum threshold for burnable acres may be needed to accurately rank mean eNVC values.

For the ARRA QWRA, we summarized a set of Effects Analysis results for ARRA using 6th-level watershed polygons (Figure 20. Map of Drinking Water Protection Areas within the ARRA analysis area.Figure 27).

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[10] For the full summaries by 6th-level watersheds please see: ARRA_6th_Level_Watershed_NVC_results.xls

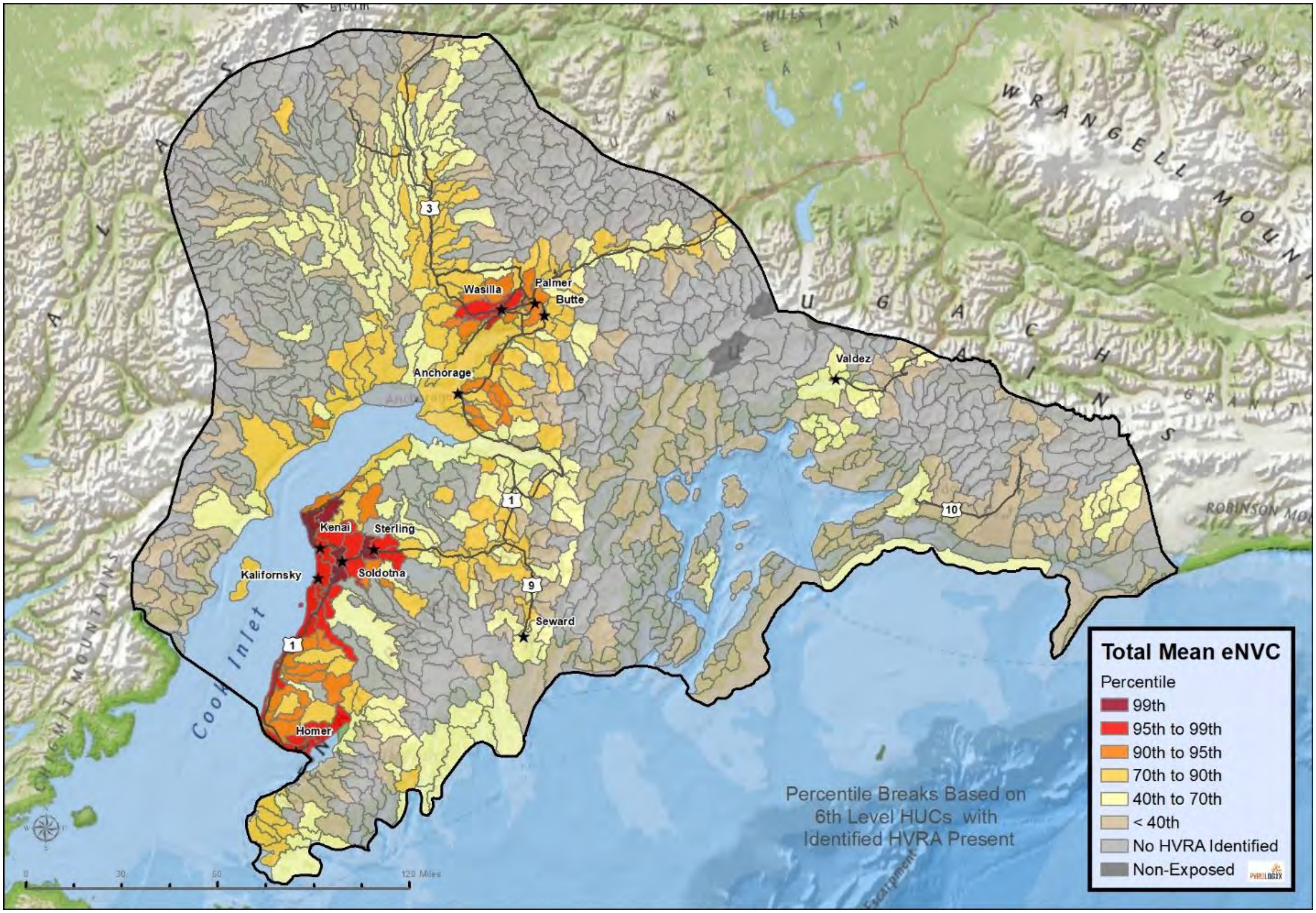

Figure 27. Total Mean eNVC for ARRA 6th-Level Watersheds

Table 17. Tabular summary of Mean and Total Wildfire Risk (eNVC) for ARRA 6th-Level Watersheds (Top 25).

Watershed	Exposed Acres/ 100 Acres	Total (All HVRA) Sum eNVC	Total (All HVRA) Mean eNVC	People & Property Mean eNVC	Drinking Water Mean eNVC	Infrastructure Mean eNVC	Carbon Mean eNVC	Rank by Mean eNVC
Scout Lake-Kenai River	178	-12,480.607	-70.117	-67.007	0.000	-3.110	0.000	1
Sports Lake-Kenai River	120	-7,913.985	-65.815	-57.096	0.000	-8.718	0.000	2
Salamatof Creek-Frontal Cook Inlet	201	-10,701.659	-53.149	-49.220	0.000	-3.930	0.000	3
Slikok Creek	160	-6,995.063	-43.698	-37.130	0.000	-6.568	0.000	4
Bishop Creek	216	-9,085.223	-41.976	-39.961	0.000	-2.016	0.000	5
Soldotna Creek	270	-11,255.707	-41.643	-37.972	0.000	-3.672	0.000	6
Outlet Kenai River	177	-7,213.909	-40.648	-38.857	0.000	-1.791	0.000	7
Longmere Lake-Kenai River	262	-8,159.540	-31.088	-29.533	0.000	-1.555	0.000	8
Twitter Creek	103	-2,714.650	-26.452	-6.664	-17.143	-2.645	0.000	9
Reflection Lake-Frontal Cook Inlet	208	-5,052.861	-24.321	-23.739	0.000	-0.582	0.000	10
Star Lake-Kasilof River	166	-3,874.768	-23.350	-18.603	0.000	-4.748	0.000	11
Diamond Creek-Frontal Cook Inlet	212	-3,986.292	-18.774	-17.710	-0.055	-1.009	0.000	12
Coal Creek	132	-2,356.189	-17.818	-12.343	0.000	-5.474	0.000	13
Torpedo Lake-Kenai River	268	-4,676.165	-17.442	-15.508	0.000	-1.934	0.000	14
Lower Moose River	200	-3,480.986	-17.374	-12.918	0.000	-4.457	0.000	15
Beaver Creek	374	-5,893.116	-15.755	-11.557	0.000	-4.197	0.000	16
Corea Creek-Frontal Cook Inlet	365	-5,236.486	-14.363	-9.193	0.000	-5.170	0.000	17
Fritz Creek	91	-1,277.240	-14.024	-11.808	0.000	-2.216	0.000	18
Swift Creek-Frontal Kachemak Bay	246	-2,492.971	-10.129	-9.818	-0.001	-0.310	0.000	19
Crooked Creek	378	-3,779.792	-9.994	-6.884	0.000	-3.110	0.000	20
Happy Creek-Frontal Cook Inlet	149	-1,413.705	-9.473	-5.920	0.000	-3.553	0.000	21
Meadow Creek	320	-2,847.970	-8.889	-8.759	0.000	-0.130	0.000	22
Lucile Creek	126	-1,069.752	-8.502	-8.360	0.000	-0.142	0.000	23
Cottonwood Creek	239	-1,828.825	-7.637	-7.439	-0.001	-0.197	0.000	24
Beaver Creek	128	-976.689	-7.630	-5.882	0.000	-1.748	0.000	25

5 ANALYSIS SUMMARY

The Chugach All-Lands (ARRA) Wildfire Risk Assessment provides foundational information about wildfire hazard and risk for Southcentral Alaska. The results represent the best available science across a range of disciplines. While this report was generated by Pyrologix LLC, the overall analysis was developed as a collaborative effort with numerous agencies, across a range of disciplines. This analysis can provide great utility in a range of applications including resource planning, prioritization and implementation of prevention and mitigation activities, and wildfire incident response planning. Lastly, this analysis should be viewed as a living document. While the effort to parameterize and calibrate model inputs should remain static, the landscape file should be periodically revisited and updated to account for future forest disturbances.

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APPENDIX A - WILDFIRE RISK TO COMMUNITIES

In addition to the wildfire risk assessment analysis, we completed an assessment of hazard and risk to communities in Southcentral AK. Much of the data used in this assessment is leveraged from the assessment but includes some slight modifications which warrant explanation in the sections below.

6.1 DATASETS USED

6.1.1 HOUSING-UNIT DENSITY

The housing-unit density (HUDen) map used here is the same source dataset as was introduced in Section 3.4.1.1 above. Here, housing-unit density was converted to a count of homes by multiplying by the area in square kilometers of a 30m pixel (0.0009). We use continuous values of housing units rather than grouping by a density class as was done for the HUDen HVRA used in the risk assessment analysis.

6.1.2 RISK TO POTENTIAL STRUCTURES (RPS)

For this assessment, we use an integrated hazard dataset that uses burn probability, flame-length probabilities, and a response function (RF) to generally characterize loss to homes. This raster dataset is called Risk to Potential Structures (RPS) is created by calculating “loss to homes” for every pixel on the landscape, regardless of whether a home is present there. The RF used here does not vary by home and different building materials, nor does it consider nuances of each the immediate vegetation characteristics around each home.

Table 18. Response function used in Risk to Potential Structures (RPS).

Fire Intensity Level	Response Function value
0<FL<2	25
2<FL<4	40
4<FL<6	55
6<FL<8	70
8<FL<12	85
12<FL	100

6.1.3 HOUSING-UNIT RISK (HURISK)

The product of housing-unit count and RPS is called housing-unit risk (HURisk). This raster layer incorporates all of the risk elements including burn probability and intensity information, susceptibility characterized by the response function in Table 18, and exposure by identifying where homes are along with an estimated count in each pixel. It takes *both* the presence of non-zero burn probability and intensity and the presence of housing units to have a value of HURisk greater than zero.

6.1.4 COMMUNITIES

For this assessment, a community "core" was defined as a Populated Place Area (PPA) as identified by the U.S. Census Bureau. PPAs include incorporated cities and towns as well as Census Designated Places (CDPs). A CDP is an unincorporated concentration of population—a statistical counterpart to incorporated cities and towns.

We refer to the U.S. Census PPA delineation as the community "core", but the summary unit of interest to us is the "Expanded Community" which includes the populated area and structures surrounding the PPAs. Ager and others (2019) used a travel-time analysis to delineate the land areas closest by drive-time to each PPA core, up to a maximum of 45 minutes travel time.

Approximately 99.7 percent of the housing units identified by HUDen within the project's LCP extent can be found within these Expanded Community areas (Figure 28). Less than 1 percent of the total housing units are not within 45-minutes travel time of any expanded community (hereafter, "community") identified in southcentral AK.

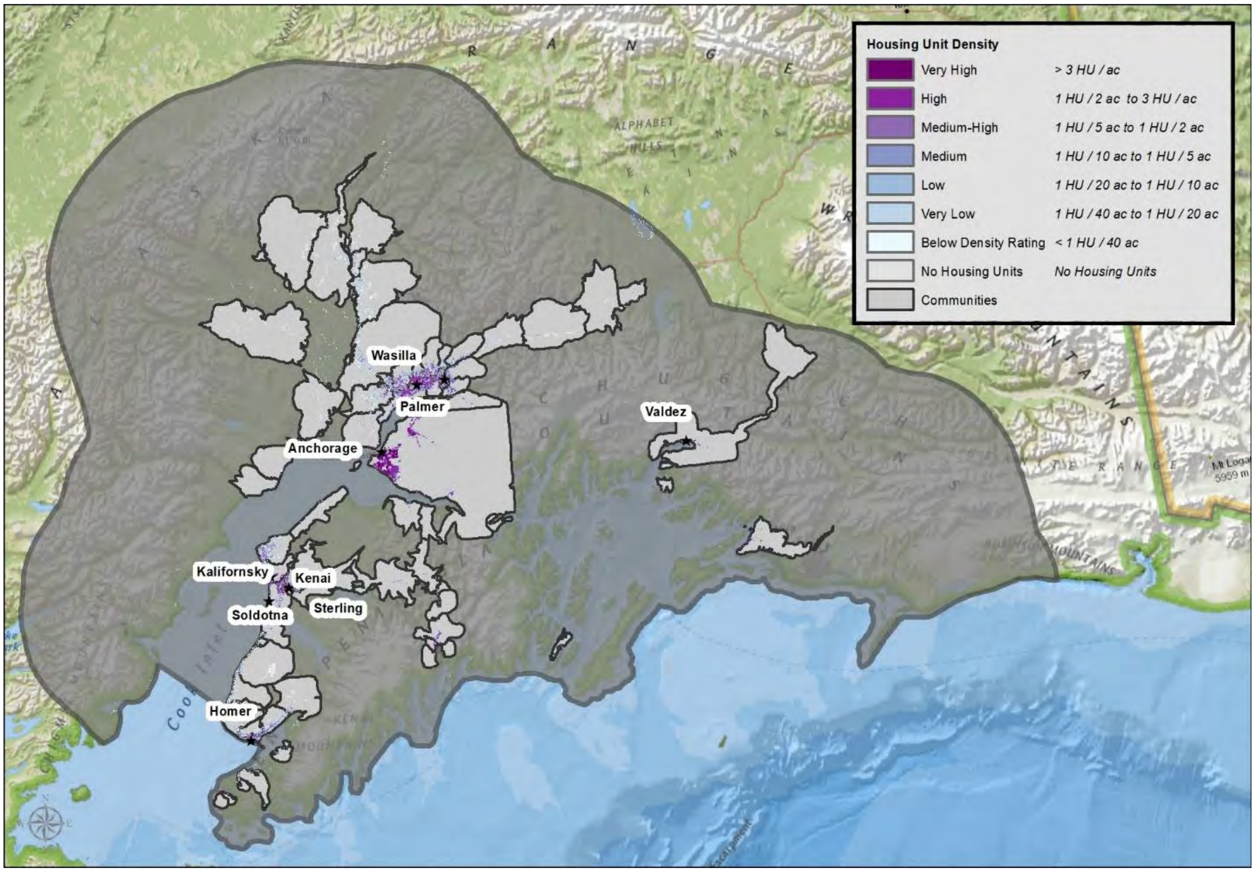

Figure 28. Housing units mapped in ARRA and the community boundaries with which they are associated. Note that very few housing units are located beyond a community boundary.

6.2 RESULTS

6.2.1 SUMMARIZING BY COMMUNITIES

We summarize numerous population, housing-unit, hazard, and risk attributes to produce the assessment we call Wildfire Risk to Communities. The results of this analysis are spreadsheet tables of attributes by community name and associated GEOID and a feature class of Community "zones" with these attributes joined back to each feature. The feature class can be used to make maps of the top at-risk communities, overlaying wildfire hazard or risk maps, or to make thematic maps of mean hazard or risk by community. These attributes provide a wealth of information to sort and rank communities by the various metrics. Table 19 provides a subset of attributes to highlight the top communities at risk.

6.2.2 MEAN RISK TO POTENTIAL STRUCTURES

We calculated the mean RPS where housing units are located within each community. This measure represents the mean likelihood that a given housing unit in a community will experience loss to wildfire in one year. The higher this value, the more likely it is that an individual housing unit within the community will experience a wildfire. Mean RPS is not a cumulative measure for a community, so it does not necessarily increase as the number of housing units increases. Instead, this measure is sensitive to the general location of a community relative to the mapped wildfire hazard and the specific locations of housing units with each community.

Ranking communities by RPS highlights the communities with the greatest potential for wildfire losses but does not consider the population or number of housing units residing in the community. The hazard rating provides information useful in prioritizing mitigation efforts, i.e. this community is most likely to experience losses, but without the magnitude of wildfire impacts, the scope of needed mitigation is unknown.

Figure 29 displays a scatterplot showing the relationship between mean burn probability and mean Conditional Risk to Structures (CRPS) – the components of mean Risk to Potential Structures.

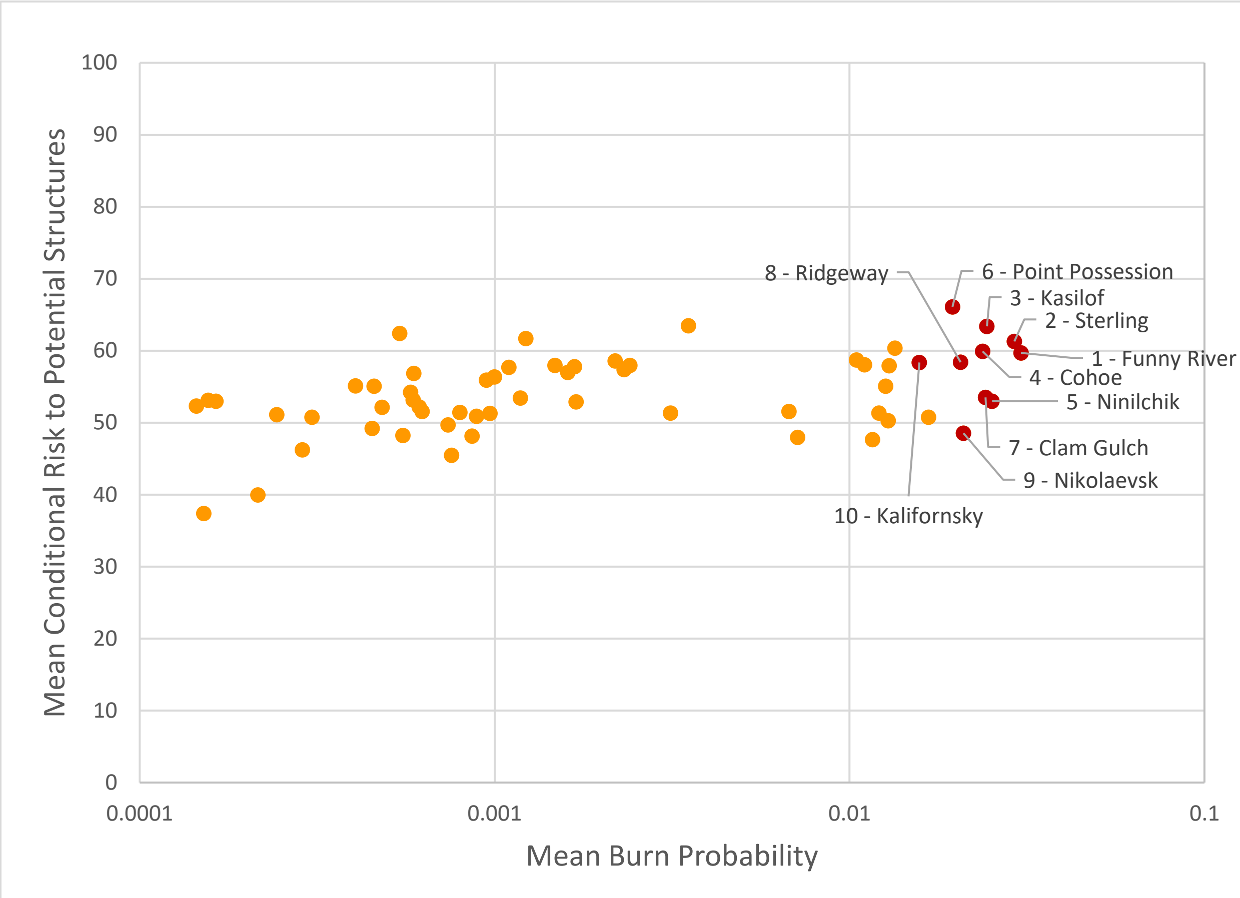

Figure 29. Scatterplot of Mean Burn Probability and Mean Conditional Risk to Potential Structures - the product of which is Risk to Potential Structures (RPS).

Table 19. The top 25 communities as ranked by greatest mean Risk to Potential Structures (RPS) near where structures are found in the community.

Community Name	HU count	Fraction HUcount directly exposed	Fraction HUcount indirectly exposed	Fraction HUcount not exposed	Exposed HU count	Mean RPS all exposed	Rank Mean RPS (of 73)	Percentile Mean RPS	Expected annual HU risk	Rank Expected annual HU risk	Fraction direct expected annual HU risk	Fraction indirect expected annual HU risk
Funny River	662	90%	10%	0%	662	1.82	1	99.6%	1,160	6	91%	9%
Sterling	3,141	82%	18%	0%	3,141	1.80	2	97.6%	5,272	1	85%	15%
Kasilof	308	92%	8%	0%	308	1.55	3	97.4%	473	15	93%	7%
Cohoe	760	86%	14%	0%	760	1.42	4	96.9%	1,074	7	87%	13%
Ninilchik	487	86%	14%	0%	487	1.33	5	96.9%	528	13	89%	11%
Point Possession	2	98%	2%	0%	2	1.29	6	96.6%	2	49	99%	1%
Clam Gulch	94	90%	10%	0%	94	1.29	7	96.5%	119	28	91%	9%
Ridgeway	1,446	72%	27%	1%	1,435	1.22	8	96.5%	1,310	5	87%	13%
Nikolaevsk	182	91%	9%	0%	182	1.01	9	95.6%	177	21	92%	8%
Kalifornsky	4,526	72%	28%	0%	4,521	0.93	10	95.5%	3,253	2	80%	20%
Happy Valley	333	89%	11%	0%	333	0.84	11	92.4%	276	20	90%	10%
Nikiski	2,637	85%	15%	0%	2,637	0.83	12	90.7%	2,161	3	89%	11%
Salamatof	607	72%	28%	0%	607	0.75	13	90.3%	418	17	76%	24%
Diamond Ridge	718	96%	4%	0%	718	0.70	14	90.3%	480	14	97%	3%
Kenai	4,285	51%	48%	1%	4,235	0.65	15	87.1%	1,902	4	64%	36%
Anchor Point	1,123	86%	14%	0%	1,123	0.65	16	86.4%	612	11	90%	10%
Soldotna	2,436	42%	36%	21%	1,919	0.63	17	86.4%	366	18	70%	30%
Fritz Creek	1,103	95%	5%	0%	1,103	0.62	18	85.2%	656	10	95%	5%
Fox River	381	86%	14%	0%	381	0.56	19	84.5%	138	26	93%	7%
Homer	2,920	65%	35%	0%	2,910	0.35	20	84.3%	709	9	84%	16%
Kachemak	270	86%	14%	0%	270	0.34	21	82.4%	90	31	86%	14%
Susitna	9	95%	5%	0%	9	0.23	22	82.2%	2	51	97%	3%
Cooper Landing	208	90%	10%	0%	208	0.17	23	82.2%	32	34	92%	8%
Willow	1,009	93%	7%	0%	1,009	0.14	24	82.1%	136	27	94%	6%
Meadow Lakes	3,721	86%	14%	0%	3,721	0.13	25	81.4%	452	16	89%	11%

6.2.3 TOTAL HOUSING-UNIT RISK

As a measure of cumulative wildfire risk to housing units, we calculated the product of housing units per pixel and RPS and sum that value for all pixels in a community. This measure is useful in resource allocation and can address the question: "In which communities are the total consequence of wildfire the greatest?" Unlike the previous measure, the total number of housing units strongly influences the Total Housing-Unit Risk (HURisk). Some communities, like Anchorage, have relatively low mean RPS, but rank high in total HURisk because of the very high number of housing units. Figure 30 displays a scatterplot showing the relationship between mean Risk to Potential Structures and total exposed housing units – the components of total HURisk.

Housing-unit risk is the secondary variable by which the summary communities are ranked (Table 20).

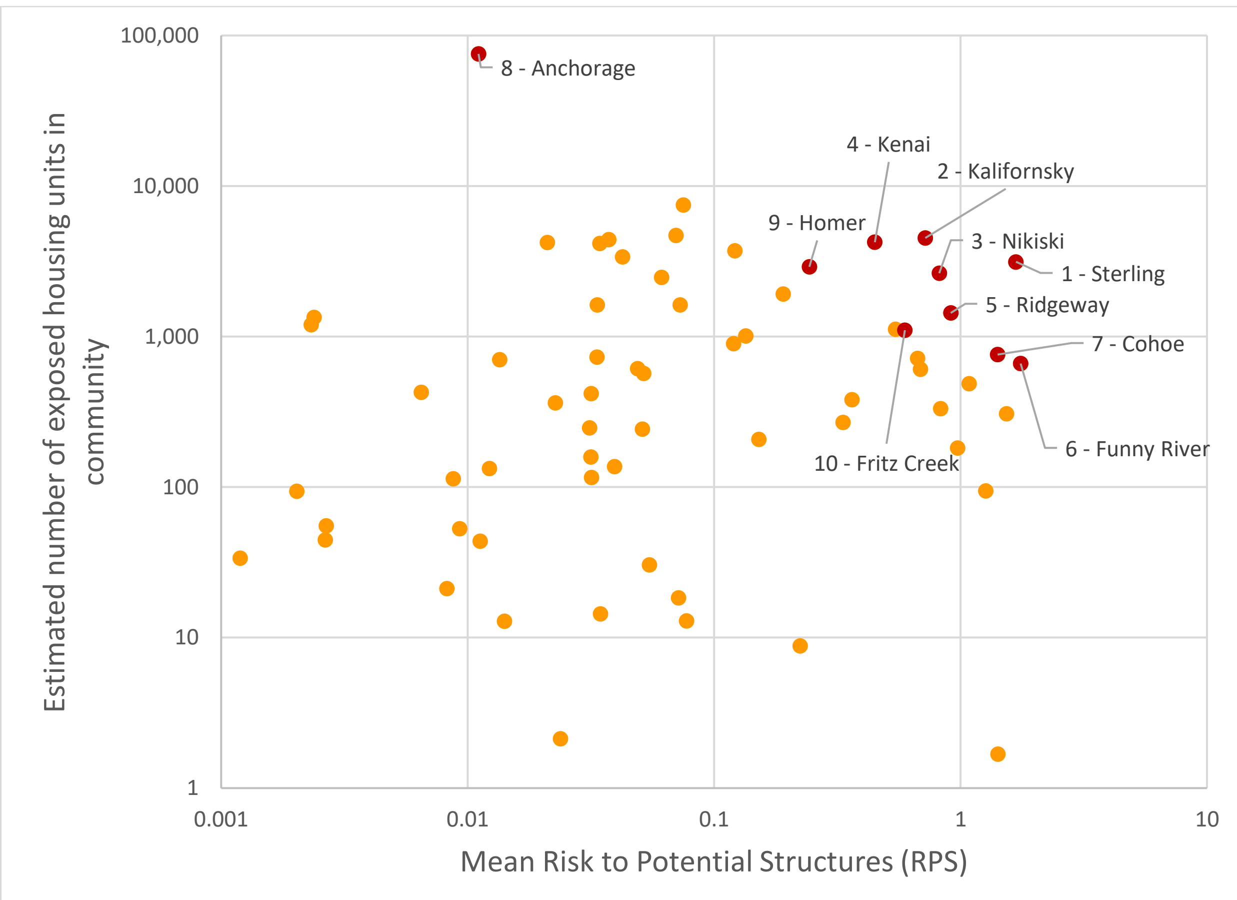

Figure 30. Scatterplot of Mean Risk to Potential Structures (RPS) and estimated number of exposed housing units per community - the product of which is the total housing unit risk (HURisk).

Table 20. The top 25 most at-risk communities as ranked by expected annual housing-unit risk.

Community Name	HU count	Fraction HUcount directly exposed	Fraction HUcount indirectly exposed	Fraction HUcount not exposed	Exposed HU count	Mean RPS all exposed	Rank Mean RPS (of 73)	Percentile Mean RPS	Expected annual HU risk	Rank Expected annual HU risk	Fraction direct expected annual HU risk	Fraction indirect expected annual HU risk
Sterling	3,141	82%	18%	0%	3,141	1.80	2	97.6%	5,272	1	85%	15%
Kalifornsky	4,526	72%	28%	0%	4,521	0.93	10	95.5%	3,253	2	80%	20%
Nikiski	2,637	85%	15%	0%	2,637	0.83	12	90.7%	2,161	3	89%	11%
Kenai	4,285	51%	48%	1%	4,235	0.65	15	87.1%	1,902	4	64%	36%
Ridgeway	1,446	72%	27%	1%	1,435	1.22	8	96.5%	1,310	5	87%	13%
Funny River	662	90%	10%	0%	662	1.82	1	99.6%	1,160	6	91%	9%
Cohoe	760	86%	14%	0%	760	1.42	4	96.9%	1,074	7	87%	13%
Anchorage	123,613	32%	29%	39%	75,510	0.02	52	54.3%	836	8	72%	28%
Homer	2,920	65%	35%	0%	2,910	0.35	20	84.3%	709	9	84%	16%
Fritz Creek	1,103	95%	5%	0%	1,103	0.62	18	85.2%	656	10	95%	5%
Anchor Point	1,123	86%	14%	0%	1,123	0.65	16	86.4%	612	11	90%	10%
Knik-Fairview	7,488	90%	10%	0%	7,488	0.09	28	77.5%	562	12	92%	8%
Ninilchik	487	86%	14%	0%	487	1.33	5	96.9%	528	13	89%	11%
Diamond Ridge	718	96%	4%	0%	718	0.70	14	90.3%	480	14	97%	3%
Kasilof	308	92%	8%	0%	308	1.55	3	97.4%	473	15	93%	7%
Meadow Lakes	3,721	86%	14%	0%	3,721	0.13	25	81.4%	452	16	89%	11%
Salamatof	607	72%	28%	0%	607	0.75	13	90.3%	418	17	76%	24%
Soldotna	2,436	42%	36%	21%	1,919	0.63	17	86.4%	366	18	70%	30%
Tanaina	4,715	83%	17%	0%	4,715	0.09	29	72.7%	330	19	87%	13%
Happy Valley	333	89%	11%	0%	333	0.84	11	92.4%	276	20	90%	10%
Nikolaevsk	182	91%	9%	0%	182	1.01	9	95.6%	177	21	92%	8%
Lakes	4,421	79%	21%	0%	4,421	0.04	40	62.2%	165	22	80%	20%
Fishhook	2,483	94%	6%	0%	2,483	0.06	32	69.5%	152	23	95%	5%
Gateway	3,393	74%	26%	0%	3,393	0.05	37	67.1%	144	24	79%	21%
Wasilla	4,165	67%	33%	0%	4,165	0.04	38	65.0%	143	25	78%	22%

APPENDIX C:

Core Team List

Name	Organization
Miles Spathelf	Alaska Dept of Fish and Game / Division of Wildlife Conservation
Sue Rodman	Alaska Dept of Fish and Game/ Division of Wildlife Conservation
Jon Marsh	Anchor Point Fire (now called Western Emergency Services)
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
Riley Shurtleff	Cooper Landing Emergency Services
Hans Rinke	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 Association
Jeff Jaworski	Homer Electric Association
Steven Cannon	Homer Electric Association
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
Roy Browning	Kenai Peninsula Borough Central Emergency Services

Name	Organization
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
Francisco 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

APPENDIX D:

Community Risk Assessments for

Wildland Urban Interface Communities

CONTENTS

KENAI PENINSULA BOROUGH COMMUNITY RISK ASSESSMENTS

WILDLAND URBAN INTERFACE COMMUNITIES

SWCA conducted on-the-ground community risk assessment surveys between July 20 and 27, 2021, using the National Fire Protection Association (NFPA) 1144 standard for assessing structure ignitability in the Wildland Urban Interface (WUI). The 1144 form (Appendix E) provides a process for assessing wildland fire hazards around existing structures to determine the potential for structure ignition from wildland fire ignitions. The following summaries provide a total score of risk and hazard based on various parameters observed during the surveys. Conditions are averaged across each polygon to provide an overarching risk rating for each WUI area and are identified in the community descriptions below. The surveys highlight the percentage of land classified as WUI, amount of land impacted by modeled wildfire related loss, dominant fuel types, potential fire behavior, fire response capacity, current fire and fuel management programs and plans, positive and negative attributes associated with structural hazards in each community polygon, and suggested mitigation focus areas. The information in the suggested mitigation focus sections was compiled collaboratively through Core Team input, public meetings, existing community CWPPs, and public feedback.

This updated CWPP provides an assessment of risk to wildfire throughout the entire peninsula. However, the Community Risk Assessments provide information about risk for each community in the Kenai Peninsula. This finer scale assessment is intended to allow communities are to identify and prepare for risk locally.

These assessments also provide information about fire response capabilities, so that those data can be found in once place in the document. Within each community, there is a local protocol for fire response. Additionally, there is a larger-scale fire response agreement between the State of Alaska and land management agencies. The State of Alaska, Department of Natural Resources (DNR), operates under the Master Cooperative Wildland Fire Management and Stafford Act Agreement (the Agreement), which documents the coordination and exchange of personnel, equipment, supplies, services, and funds between land management agencies. The Agreement details wildland fire management activities such as prevention, preparedness, communication and education, fuels treatment and hazard mitigation, fire planning, response strategies, tactics and alternatives, suppression and post-fire rehabilitation and restoration. This Agreement does not supersede individual agency policies and requirements.

SWCA and the KPB contacted the following entities representing Native Alaskan interests to inquire about their community values at risk, project recommendations and fire response capabilities.

1. Port Graham Village Council
2. Native Village of Tyonek
3. Seldovia Village Tribe
4. Qutekcak Native Tribe
5. Ninilchik Village Tribe
6. Nanwalek IRA Council
7. Kenaitze Indian Tribe

8. Salamatof Native Association
9. Chugachmiut
10. Cook Inlet Region, Inc (CIRI)

Four entities, Chugachmiut, (representing Nanwalek and Port Graham), CIRI (an Alaska Native Corporation and the largest private landowner in Southcentral Alaska), Salamatof Native Association and Native Village of Tyonek, were available to engage in this conversation. In some cases, they provided recommendations, which are included within the appropriate community polygon.

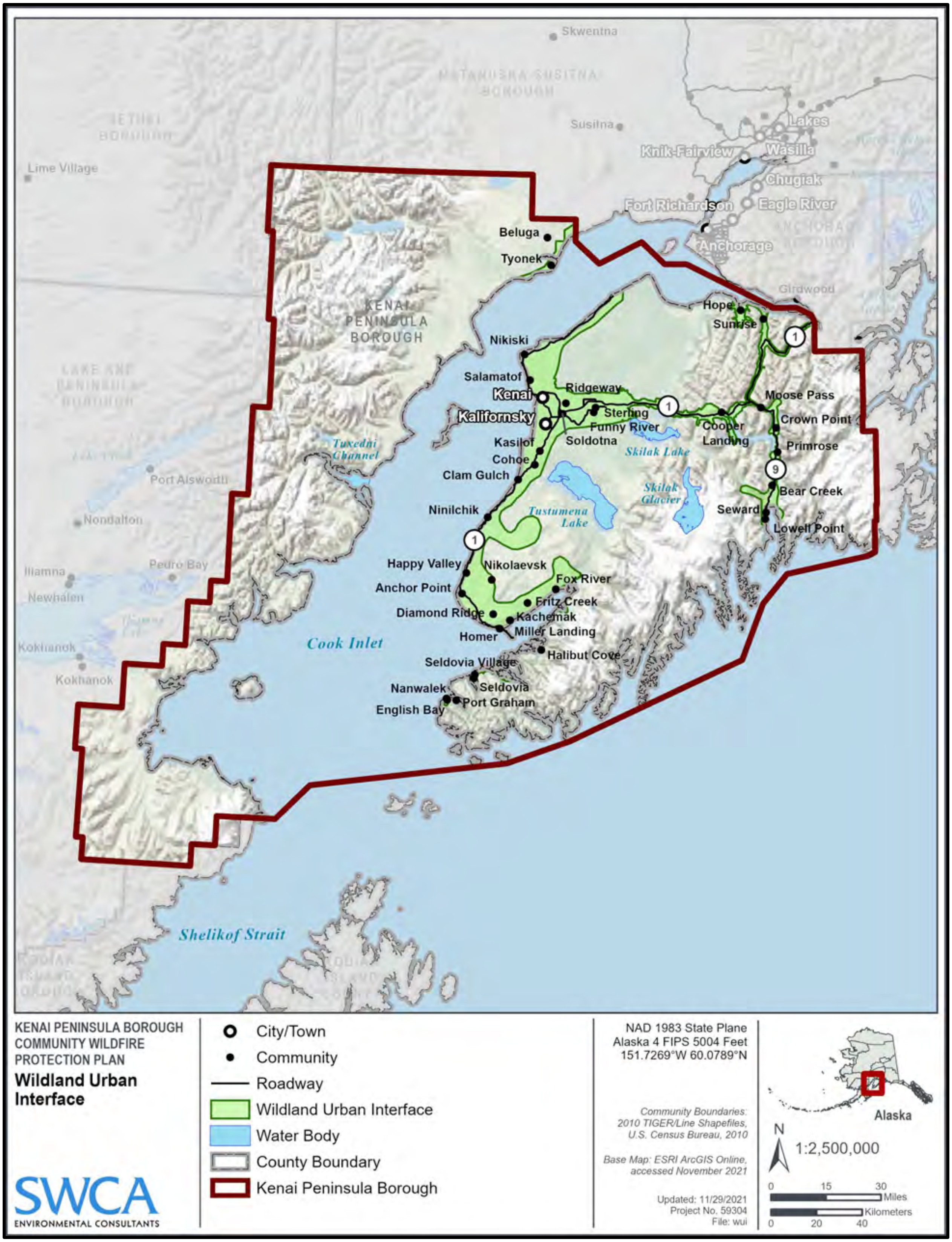

Figure D.1 Identifies all WUI areas delineated across the Kenai Peninsula.

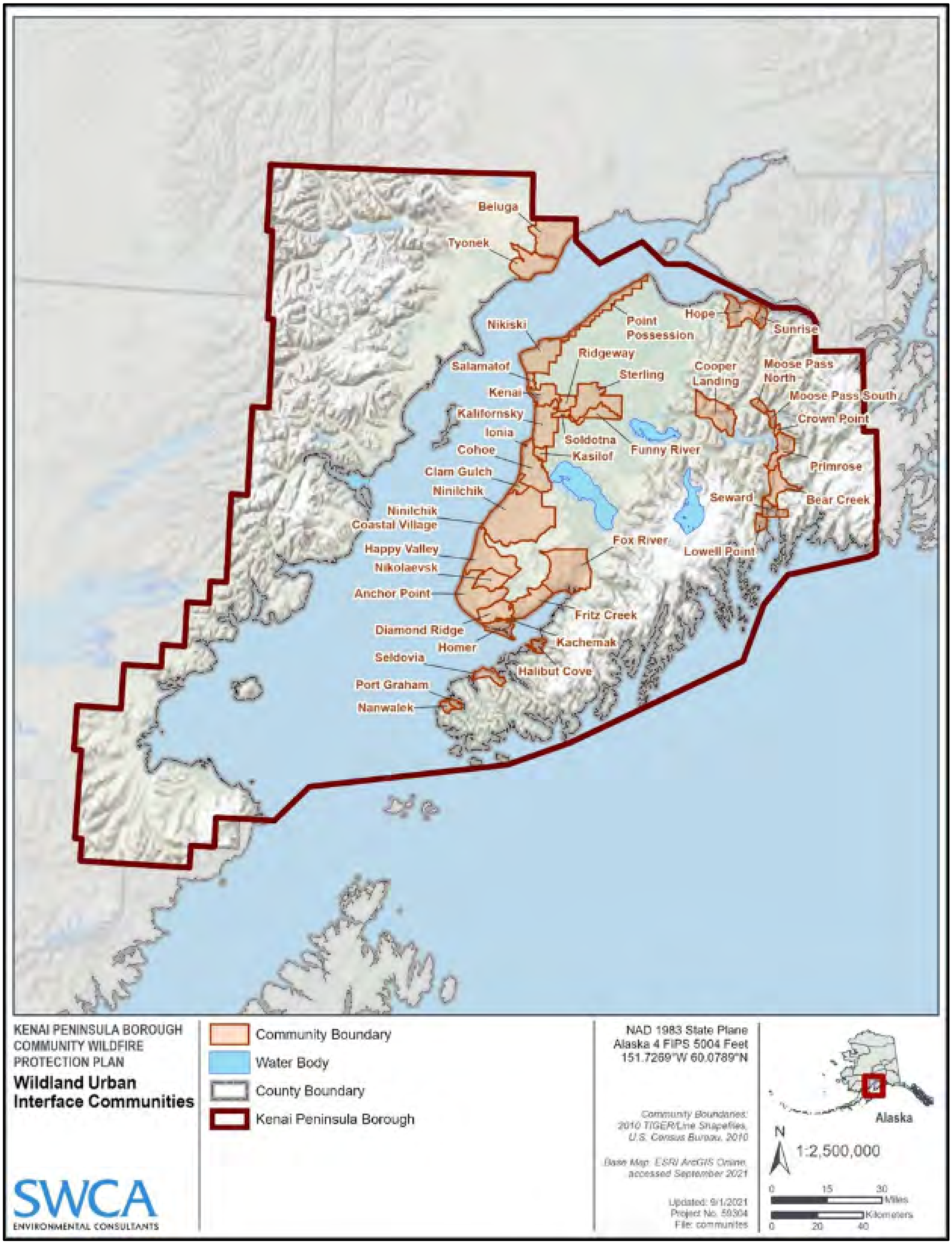

Figure D.2. Community boundaries within the WUI.

Source: U.S. Census Bureau TIGER/Line Shapefiles of census designated places

KENAI PENINSULA BOROUGH WILDLAND URBAN INTERFACE COMMUNITIES

ANCHOR POINT POLYGON SUMMARY STATISTICS

Community Description

Anchor Point is located on the Kenai Peninsula at the junction of the Anchor River and its North Fork, 14 miles northwest of Homer. It lies at mile 156 of the Sterling Highway at approximately 59.776670° north latitude and -151.83139° west longitude. Anchor Point is located in the Homer Recording District. The area encompasses 90.8 square miles of land. January temperatures range from -40° F to 42° F. July temperatures range from 46° F to 75° F. Average annual precipitation is 20 inches. Western Emergency Services (formerly Anchor Point Volunteer Fire Department) and the Alaska Division of Forestry provides fire protection to Anchor Point residents (Kenai Peninsula Borough [KPB], 2006a). Additional information about community background and demographics can be found in the community CWPP (KPB, 2006a).

Community Polygon Summary

Community Polygon Name: Anchor Point **Total Score:** 59 **Rating:** **Moderate**

Town: Anchor Point

Land Area (*mi.^{2}*): 91.2

Population Density (people/*mi.^{2}*)$_1$: 22.2

Home Density (housing units/ *mi.^{2}*)$_2$: 25.0

Percent of Community Classified by Wildland Urban Interface (WUI) Types

Acres (*mi.^{2}*): 81.0

Percent: 88.1%

Percent of Community by Modeled Wildfire Related Loss

Low	Medium - Low	Medium	Medium – High	High
9.7%	13.7%	2.5%	0.4%	0.0%

Dominant Fuel Type

Grass	Grass/Shrub	Shrub	Timber Understory	Timber Litter
GR1 GR2	GS1	SH2 SH5	TU2 TU3 TU5	TL2

Percent of Community by Modeled/Calculated Wildfire Risk Inputs

Flame Length	Dist. From Fire Station
0-4 (ft): 99%	0-0.5 (mi.): 1%
4-8 (ft): 41%	0.5-1.0 (mi.): 3%
8-12 (ft): 1%	1.0-1.5 (mi.): 4%
>12 (ft): 0%	>1.5 (mi.): 92%

Fire Department Statistics: Western Emergency Services (formerly Anchor Point)					
Communities Served: **Anchor Point, Ninilchik, Nikolaevsk, Happy Valley**					
Fulltime Firefighters: 10		On-call Firefighters: 0		Volunteer Firefighters: 38	
Water Tender:			Wildland Engines		
Type 1:	1-3	Total Number:	4WD/AWD:	Brush Breaker:	
Type 2:	1-3	Type 3: ----	0	0	
Type 3:	0	Type 4: ----	0	0	
Structure Engines:		Type 5: ----	0	0	
Type 1:	1-3	Type 6: 1-3	1-3	1-3	
Type 2:	0	Type 7: ----	0	0	
Port-A-Tanks:	8				
Portable Pumps:	4				
Recent Fires within the polygon: N/A					
Fire Management Options:					
Critical Protection around urban areas: **99%**			Full Protection around WUI: **0%**		

Current Fire and Fuel Management Programs and Plans

- 2018 ALAH Action Plan
- 2019 Kenai Peninsula Borough Hazard Mitigation Plan
- 2006 Anchor Point/Happy Valley/Nikolaevsk Community Wildfire Protection Plan.

Community Polygon NFPA 1144 Survey Summary

Positive Attributes (Low Scores)

- Street signs: visible and reflective
- Vegetation type: mixture of grass, shrub, timber understory, and timber litter fuels
- Defensible space: moderate
- Building construction: metal and composite roofs dominant
- Slope: area has a 10% to 20% slope
- Water source: hydrants present

Negative Attributes (High Scores)

- Ingress and egress: one road in and out
- Building construction: combustible siding
- Utility placement: aboveground
- Decking and fencing: combustible
- Separation of adjacent structures: minimal

Suggested Mitigation Focus Area

Areas of Concern

- Whiskey Gulch East of Sterling Highway, Old Sterling and Dusty Street area, South Fork of Anchor River land is steep; picnic areas, such as State Parks, and shooting areas need to be cleared (Anchor Point / Happy Valley / Nikolaevsk CWPP, 2006).
- Campgrounds
- Nikolaevsk, North Fork area (Anchor Point), and Oilwell Road area (Ninilchik).

Summary of Mitigation Needs (for details, see Recommendation Matrices in main document)

- Need a lumber market and processing to support increased fuel treatments
- Spruce bark beetle damage is moderate or minimal
- Gradient winds in the area. Pressure differences between land and sea elevates fire danger.
- Many buildings have no exterior siding, which exposes the home to potential ember penetration and reduces the home’s resistance to convective heat.

- Clean downed timber and piles through chipping and burns (Anchor Point / Happy Valley / Nikolaevsk CWPP, 2006).
- Provide public disposal site for brush/slash to be burned by the KPB once or twice per year (Anchor Point / Happy Valley / Nikolaevsk CWPP, 2006).

Fire Department Concerns:

- Nikolaevsk, North Fork area (Anchor Point) and Oilwell road area (Ninilchik) are highest risk
- Goals (in order of importance): training, hazardous fuels reduction, ecological management

KENAI PENINSULA BOROUGH WILDLAND URBAN INTERFACE COMMUNITIES

BEAR CREEK POLYGON SUMMARY STATISTICS

Community Description

Bear Creek is located on the Kenai Peninsula, next to Resurrection Bay. It is bordered to the north by Primrose and to the south by Seward. Bear Creek encompasses an area of 37.4 square miles. Bear Creek is situated at approximately 60.136420° north latitude and -149.382348° west longitude. Bear Creek is in the Seward Recording District (ADNR 2021). Winter temperatures range from 4 degrees F to 27 on average. Some winters it has been 20 below. Summer temperatures vary from 45 to 65 degrees. Bear Creek Volunteer Fire and the Alaska Division of Forestry provide fire protection to the Bear Creek area (KPB, 2021a).

Community Polygon Summary

Community Polygon Name: Bear Creek | **Total Score:** 66 | **Rating:** Moderate

Town: Bear Creek

Land Area (*mi.^{2}*): 37.4

Population Density (people/*mi.^{2}*)$_1$: 52.3

Home Density (housing units/ *mi.^{2}*)$_2$: 29.0

Percent of Community Classified by Wildland Urban Interface (WUI) Types

Acres (*mi.^{2}*): 19.1

Percent: 48.4%

Percent of Community by Modeled Wildfire Related Loss

Low	Medium – Low	Medium	Medium – High	High
3.2%	0.0%	0.0%	0.0%	0.0%

Dominant Fuel Type

Grass	Grass/Shrub	Shrub	Timber Understory	Timber Litter
		SH5	TU1, TU2	TL1, TL2

Percent of Community by Modeled/Calculated Wildfire Risk Inputs

Flame Length	Dist. From Fire Station
0-4 (ft): 95%	0-0.5 (mi.): 2%
4-8 (ft): 1%	0.5-1.0 (mi.): 5%
8-12 (ft): 0%	1.0-1.5 (mi.): 8%
>12 (ft): 0%	>1.5 (mi.): 85%

Fire Department Statistics: Bear Creek Volunteer Fire				
Communities Served: **Bear Creek***				
Fulltime Firefighters: 2		On-call Firefighters: 0		Volunteer Firefighters: 28
Water Tender:			Wildland Engines	
Type 1:	1-3	Total Number:	4WD/AWD:	Brush Breaker:
Type 2:	1-3	Type 3: 1-3	1-3	1-3
Type 3:	0	Type 4: ----	0	0
Structure Engines:		Type 5: ----	0	0
Type 1:	1-3	Type 6: 1-3	1-3	1-3
Type 2:	0	Type 7: ----	0	0
Port-A-Tanks:	5			
Portable Pumps:	4			
Recent Fires within the polygon: N/A				
Fire Management Options:				
Critical Protection around urban areas: **24%**		Full Protection around WUI: **31%**		

* Bear Creek, Seward, and Lowell Point Fire Departments support each other's firefighting efforts through Automatic Aid Agreements.

Current Fire and Fuel Management Programs and Plans

- 2018 ALAH Action Plan
- 2019 Kenai Peninsula Borough Hazard Mitigation Plan

Community Polygon NFPA 1144 Survey Summary

Positive Attributes (Low Scores)

- Ingress and egress: main highway paved
- Street signs: visible and reflective
- Vegetation type: more humid forest cover
- Building construction: metal and composite roofs dominant
- Organized response: fire department in community
- History of fire occurrence: low
- Severe fire weather potential: low; high humidity

Negative Attributes (High Scores)

- Building construction: combustible siding
- Water source: no water availability through hydrants but do have water tender
- Utility placement: aboveground
- Decking and fencing: combustible
- Separation of adjacent structures: minimal
- Fire response access to private residences: weak bridges
- Defensible space: minimal, with some homes with poor maintenance and refuse in yard.

Suggested Mitigation Focus Area

Areas of Concern:

- Forest Acres subdivision and the base of Mt. Marathon.

Summary of Mitigation Needs (for details, see Recommendation Matrices in main document):

- Need a lumber market and processing to support increased fuel treatments
- Need fire weather reports that are specific to east-side peninsula communities. Currently using Kodiak reports. Using weather reporting from outside of the peninsula can impact fire danger ratings and burn restrictions.
- Address access concerns within Bear Creek, especially weak bridges to private residences.
- Address yard maintenance and derelict property concerns in Bear Creek.
- Address ignition concern on adjacent USFS property through education campaigns on safe campfire use.

Fire Department Concerns:

- Goals (in order of importance): training, hazardous fuels reduction, forest management.
- The department would like to offer volunteers a weekend-long training option.
- Need more frequent inventory of PPE and equipment.
- Ensure all fire fighters have appropriate PPE.

Figure D.3. Example of homes in Bear Creek with very minimal defensible space.

KENAI PENINSULA BOROUGH
WILDLAND URBAN INTERFACE COMMUNITIES
BELUGA POLYGON SUMMARY STATISTICS

Community Description

Beluga is located on the Kenai Peninsula, on the western side of the Cook Inlet. It is bordered by Tyonek to the southwest and encompasses an area of 95.3 square miles. Beluga is situated at approximately 61.182384° north latitude and -151.069518° west longitude. Beluga is in the Anchorage Recording District (Alaska Department of Natural Resources [ADNR] 2021). Winter temperatures range from -10˚ F to 35˚ F; summer temperatures vary from 45˚ F to 65˚ F. Average annual precipitation is 24 inches. The Tyonek Volunteer Fire Department and the Nikiski Fire Service provide fire protection to Beluga residents (KPB, 2021b).

Community Polygon Summary		
Community Polygon Name: Beluga	**Total Score:** 104	**Rating:** **High**
Town: Beluga		
Land Area (*mi.^{2}*): 95.3		
Population Density (people/*mi.^{2}*)$_1$: 0.2		
Home Density (housing units/ *mi.^{2}*)$_2$: 0.5		

Percent of Community Classified by Wildland Urban Interface (WUI) Types
Acres (*mi.^{2}*): 19.4
Percent: 19.3%

Percent of Community by Modeled Wildfire Related Loss				
Low	Medium - Low	Medium	Medium – High	High
0.5%	1.9%	0.1%	0.0%	0.0%
Dominant Fuel Type				
Grass	Grass/Shrub	Shrub	Timber Understory	Timber Litter
GR1 GR5	GS1 GS2 GS3	SH2	TU2, TU3, TU5	TL2

Percent of Community by Modeled/Calculated Wildfire Risk Inputs	
Flame Length	Dist. From Fire Station
0-4 (ft): 69%	0-0.5 (mi.): 1%
4-8 (ft): 33%	0.5-1.0 (mi.): 2%
8-12 (ft): 3%	1.0-1.5 (mi.): 3%
>12 (ft): 2%	>1.5 (mi.): 95%

Fire Department Statistics: Nikiski Fire Department					
Communities Served: **Nikiski, Beluga*, Tyonek**					
Fulltime Firefighters: 25		On-call Firefighters: 0		Volunteer Firefighters: 30	
Water Tender:			Wildland Engines		
Type 1:	4-7	Total Number:		4WD/AWD:	Brush Breaker:
Type 2:	0	Type 3: ----		0	0
Type 3:	0	Type 4: ----		0	0
Structure Engines:		Type 5: ----		0	0
Type 1:	4-7	Type 6: 1-3		1-3	0
Type 2:	0	Type 7: ----		0	0
Port-A-Tanks:	10				
Portable Pumps:	0				
Recent Fires within the polygon: - Tyonek, 2014					
Fire Management Options:					
Critical Protection around urban areas: **0%**			Full Protection around WUI: **19%**		

* The Tyonek Volunteer Fire Department provides fire response support.

Current Fire and Fuel Management Programs and Plans

- 2018 ALAH Action Plan
- 2019 Kenai Peninsula Borough Hazard Mitigation Plan

Community Polygon NFPA 1144 Survey Summary
(No assessments completed during 2021 CWPP update. Desktop analysis only)

Positive Attributes (Low Scores)

- Values at risk: Low population density
- Separation of adjacent structures: good
- Slope: area has a 10% to 20% slope
- Street signs: visible and reflective
- Building construction: metal and composite roofs dominant

Negative Attributes (High Scores)

- Ingress and egress: Very inaccessible. Sea and air access only
- Building construction: combustible siding
- Utility placement: aboveground
- Decking and fencing: combustible
- Vegetation type: timber understory- flammable
- Fire response from Nikiski

Suggested Mitigation Focus Area

Areas of Concern:

- Island Lake Area, Holt-Lamplight Area, Captain Cook State Park, and KNWR.

Summary of Mitigation Needs (for details, see Recommendation Matrices in main document)

- Increase defensible space around values at risk and safety shelters.
- Implement understory thinning and overall fuel reduction in areas determined to be at risk of intense fire behavior as determined by the risk assessment.
- Relocate wood piles to 100+ feet away from structures and install a fire break with a 10-foot buffer around the wood pile.
- Increase fuel free buffers along roads to prevent fire jumping the road. Remove or prune alder trees that impede on the roadways.
- Partner with logging companies to harvest and sell beetle kill wood or look for opportunities to utilize as fuel wood.

- Implement regular wildland fire training events for local volunteer fire responders.
- Increase defensible space and road access – install fuel breaks and response vehicle turn-outs along narrow roads.
- Install firebreaks around all above ground utility tanks with a 15-foot buffer.
- Distribute wildfire education resources in regard to home hardening, defensible space, structural ignitability, and how to shelter in place if you will not evacuate.
- Consider the use of prescribed fire (where appropriate) to maintain grassland areas.
- Implement fuel breaks in strategic locations to slow fire spread, for example in areas perpendicular to prevailing winds on the edge of the community.
- Host firefighter recruitment events.
- Implement regular prescribed fire training events.

Fire Department Concerns:

- Need volunteers for local fire department
- Need training to respond to wildfire and to do prescribed burns

KENAI PENINSULA BOROUGH
WILDLAND URBAN INTERFACE COMMUNITIES
CLAM GULCH POLYGON SUMMARY STATISTICS

Community Description

Located on the Kenai Peninsula, Clam Gulch lies on Sterling Highway 24 miles south of the City of Kenai at approximately 60.231110° north latitude and -151.39361° west longitude. Clam Gulch is in the Kenai Recording District. The area encompasses 13.3 square miles of land. January temperatures range from 4˚ F to 22˚ F degrees Fahrenheit. July temperatures vary from 46˚ F to 65˚ F degrees. Average annual precipitation is 20 inches. Fire and EMS protection is provided to Clam Gulch area residents by the KPB Central Emergency Services (CES). The Alaska Division of Forestry also provides wildland fire protection to the area. DOF bases its Kenai Peninsula operations at the Kenai-Kodiak Area Office (KKAO) located in Soldotna with a seasonal field office in Homer (KPB, 2006b). Additional information about community background and demographics can be found in the community CWPP (KPB, 2006b).

Community Polygon Summary		
Community Polygon Name: Clam Gulch	**Total Score:** 52	**Rating:** Moderate
Town: Clam Gulch		
Land Area (*mi.²*): 13.3		
Population Density (people/*mi.²*)₁: 12.5		
Home Density (housing units/ *mi.²*)₂: 25.9		

Percent of Community Classified by Wildland Urban Interface (WUI) Types
Acres (*mi.²*): 31
Percent: 45.3%

Percent of Community by Modeled Wildfire Related Loss				
Low	Medium - Low	Medium	Medium – High	High
2.8%	13.7%	6.0%	3.2%	0.%
Dominant Fuel Type				
Grass	Grass-Shrub	Shrub	Timber Understory	Timber Litter
	GS1		TU2, TU3, TU5	

Percent of Community by Modeled/Calculated Wildfire Risk Inputs	
Flame Length	Dist. From Fire Station
0-4 (ft): 97%	0-0.5 (mi.): 0%
4-8 (ft): 32%	0.5-1.0 (mi.): 0%
8-12 (ft): 1%	1.0-1.5 (mi.): 0%
>12 (ft): 0%	>1.5 (mi.): 100%

Fire Department Statistics: Central Emergency Services					
Communities Served: **Soldotna, Ridgeway, Sterling, Kasilof, Kalifornsky Beach, Cohoe, Clam Gulch, Funny River**					
Fulltime Firefighters: 46		On-call Firefighters: 0		Volunteer Firefighters: ~ 20	
Water Tender:				Wildland Engines	
Type 1:	0	Total Number:		4WD/AWD:	Brush Breaker:
Type 2:	4-7	Type 3: 1-3		1-3	0
Type 3:	0	Type 4: ----		0	0
Structure Engines:		Type 5: 1-3		1-3	0
Type 1:	8-10, 1-3 have 4WD	Type 6: ----		0	0
Type 2:	0	Type 7: ----		0	0
Port-A-Tanks:	Only within the road system, Forestry often asks that tanks be left on-scene, which creates a shortage for additional responses.				
Portable Pumps:	5				
Recent Fires within the polygon: N/A					
Fire Management Options:					
Critical Protection around urban areas: **100%**			Full Protection around WUI: **0%**		

Current Fire and Fuel Management Programs and Plans

- 2018 ALAH Action Plan
- 2019 Kenai Peninsula Borough Hazard Mitigation Plan
- 2006 Kalifornsky/ Kasilof /Cohoe/Clam Gulch Community Wildfire Protection Plan

Community Polygon NFPA 1144 Survey Summary

Positive Attributes (Low Scores)

- Ingress and egress: main highway paved and more than one road in and out of most subdivisions
- Street signs: visible and reflective
- Vegetation type: timber understory
- Building construction: metal and composite roofs dominant
- Slope: area has a 10% to 20% slope
- Water source: hydrants

Negative Attributes (High Scores)

- Building construction: combustible siding
- Utility placement: aboveground
- Decking and fencing: combustible
- Separation of adjacent structures: minimal

Suggested Mitigation Focus Area

Areas of concern

- Johnson Lake Road, Cohoe Loop, Tustumena Lake Road, north of Clamshell Lodge, Captain Cook subdivision from Wayside Park (Kalifornsky/ Kasilof /Cohoe/Clam Gulch CWPP, 2006).
- State Park hazard fuel reduction. Create defensible space/safe zones at State Park facilities (Kalifornsky/ Kasilof /Cohoe/Clam Gulch CWPP, 2006).

- Caribou Hills area (far east of Clam Gulch) has many cabins and no water. Could make significant improvements by increasing defensible space in the area. Due to limited access, people need to be more self-sufficient in mitigation.
- Kasilof/Cohoe, Funny River, and Tustumena.

Summary of Mitigation Needs (for details, see Recommendation Matrices in main document)

- Need a lumber market and processing to support increased fuel treatments.
- Homes off of borough roads need maintenance and have very limited access.
- Evaluate electric grid in subdivisions and identify need for electric generators
- Pre-season fire planning to identify critical infrastructure where point protection should be applied
- Support Firewise programs
- The Caribou Lakes area has a high hazardous fuel loading and is not easily accessible (Kalifornsky/ Kasilof /Cohoe/Clam Gulch CWPP, 2006).
- Public slash disposal site in Kasilof/Clam Gulch area (Kalifornsky/ Kasilof /Cohoe/Clam Gulch CWPP, 2006).
- Continue removal of dead trees and brush piles on public and private land (Kalifornsky/ Kasilof /Cohoe/Clam Gulch CWPP, 2006).
- State Park hazard fuel reduction. Create defensible space/safe zones at State Park facilities (Kalifornsky/ Kasilof /Cohoe/Clam Gulch CWPP, 2006).

Fire Department Concerns:

- Fuel hazards, beetle kill throughout the interface both in developed areas and open areas.
- Goals (in order of importance): training, hazardous fuels reduction, ecological management
- Kasilof/Cohoe, Funny River, Tustumena are highest risk

Figure D.4. Example of an unsurfaced road, a frequent occurrence within the community.

KENAI PENINSULA BOROUGH
WILDLAND URBAN INTERFACE COMMUNITIES
COHOE POLYGON SUMMARY STATISTICS

Community Description

Cohoe is located on the Kenai Peninsula on the west bank of the Kasilof River, 13 miles south of the City of Kenai on the Sterling Highway at approximately 60.368030° north latitude and - 151.3086° west longitude. Cohoe is in the Kenai Recording District. The area encompasses 69.9 square miles of land. January temperatures range from 4˚ F to 22˚ F. July temperatures vary from 46˚ F to 65˚ F. Average annual precipitation is 20 inches. Fire and EMS protection is provided to the Cohoe area residents by KPB Central Emergency Services (CES). The Alaska Division of Forestry also provides wildland fire protection to the area. DOF bases its Kenai Peninsula operations at the Kenai-Kodiak Area Office (KKAO) located in Soldotna with a seasonal field office in Homer (KPB, 2006b). Additional information about community background and demographics can be found in the community CWPP (KPB, 2006b).

Community Polygon Summary		
Community Polygon Name: Cohoe	**Total Score:** 54	**Rating:** Moderate
Town: Cohoe		
Land Area (*mi.^{2}*): 69.9		
Population Density (people/*mi.^{2}*)$_1$: 20.3		
Home Density (housing units/ *mi.^{2}*)$_2$: 19.5		

Percent of Community Classified by Wildland Urban Interface (WUI) Types
Acres (*mi.^{2}*): 51.9
Percent: 70.8%

Percent of Community by Modeled Wildfire Related Loss				
Low	Medium - Low	Medium	Medium – High	High
2.3%	11.3%	6.8%	4.4%	0.0%
Dominant Fuel Type				
Grass	Grass/Shrub	Shrub	Timber Understory	Timber Litter
GR1	GS1	SH5	TU2, TU3, TU5	

Percent of Community by Modeled/Calculated Wildfire Risk Inputs	
Flame Length	Dist. From Fire Station
0-4 (ft): 78%	0-0.5 (mi.): 1%
4-8 (ft): 27%	0.5-1.0 (mi.): 3%
8-12 (ft): 5%	1.0-1.5 (mi.): 4%
>12 (ft): 0%	>1.5 (mi.): 92%

Fire Department Statistics: Central Emergency Services					
Communities Served: **Soldotna, Ridgeway, Sterling, Kasilof, Kalifornsky Beach, Cohoe, Clam Gulch, Funny River**					
Fulltime Firefighters: 46		On-call Firefighters: 0		Volunteer Firefighters: ~ 20	
Water Tender:				Wildland Engines	
Type 1:	0		Total Number:	4WD/AWD:	Brush Breaker:
Type 2:	4-7		Type 3: 1-3	1-3	0
Type 3:	0		Type 4: ----	0	0
Structure Engines:			Type 5: 1-3	1-3	0
Type 1:	8-10, 1-3 have 4WD		Type 6: ----	0	0
Type 2:	0		Type 7: ----	0	0
Port-A-Tanks:	Only within the road system, Forestry often asks that tanks be left on-scene, which creates a shortage for additional responses.				
Portable Pumps:	5				
Recent Fires within the polygon: • Cohoe Loop, 2006 • Crooked Creek, 1996					
Fire Management Options:					
Critical Protection around urban areas: **99%**			Full Protection around WUI: **0%**		

Current Fire and Fuel Management Programs and Plans

- 2018 ALAH Action Plan
- 2019 Kenai Peninsula Borough Hazard Mitigation Plan
- 2006 Kalifornsky/Kasilof/Cohoe/Clam Gulch Community Wildfire Protection Plan

Community Polygon NFPA 1144 Survey Summary

Positive Attributes (Low Scores)

- Ingress and egress: main highway paved and more than one road in and out of most subdivisions
- Street signs: visible and reflective
- Vegetation type: mixture of fuels, including timber-litter, timber-understory, and grass-shrub
- Building construction: metal and composite roofs dominant
- Slope: minimal slope adjacent to most homes
- Defensible space: moderate

Negative Attributes (High Scores)

- Building construction: combustible siding
- Water source: no water availability through hydrants but do have water tender
- Utility placement: aboveground
- Decking and fencing: combustible

Suggested Mitigation Focus Area

Areas of concern

- Johnson Lake Road, Cohoe Loop, Tustumena Lake Road, North of Clamshell Lodge, Captain Cook subdivision from Wayside Park (Kalifornsky/ Kasilof /Cohoe/Clam Gulch CWPP, 2006).
- State Park hazard fuel reduction. Create defensible space/safe zones at state park facilities (Kalifornsky/ Kasilof /Cohoe/Clam Gulch CWPP, 2006).
- Kasilof/Cohoe, Funny River, and Tustumena.

Summary of Mitigation Needs (for details, see Recommendation Matrices in main document)

- Need a lumber market and processing to support increased fuel treatments
- Noticeable spruce bark beetle damage and standing dead trees. Continue removal of dead trees and brush piles on public and private land.
- Evaluate electric grid in subdivisions and identify need for electric generators
- Pre-season fire planning to identify critical infrastructure where point protection should be applied
- Support Firewise programs
- Public slash disposal site in Kasilof/Clam Gulch area (Kalifornsky/ Kasilof /Cohoe/Clam Gulch CWPP, 2006).
- Continue removal of dead trees and brush piles on public and private land (Kalifornsky/ Kasilof /Cohoe/Clam Gulch CWPP, 2006).
- State Park hazard fuel reduction. Create defensible space/safe zones at State Park facilities (Kalifornsky/ Kasilof /Cohoe/Clam Gulch CWPP, 2006).

Fire Department Concerns:

- Fuel hazards, beetle kill throughout the interface both in developed areas and open areas.
- Goals (in order of importance): training, hazardous fuels reduction, ecological management
- Kasilof/Cohoe, Funny River, Tustumena are highest risk.

Figure D.5. Example of an unsurfaced road, a frequent occurrence within the community.

KENAI PENINSULA BOROUGH
WILDLAND URBAN INTERFACE COMMUNITIES
COOPER LANDING POLYGON SUMMARY STATISTICS

Community Description

Cooper Landing lies at the west end of Kenai Lake on a stretch of the Sterling Highway, 30 miles northwest of Seward in the Chugach Mountains. Its coordinates are approximately 60.49° North Latitude and -149.83417° West Longitude. Cooper Landing is in the Seward Recording District. The area encompasses 65.3 sq. miles of land. January temperatures range from 4 to 22 degrees Fahrenheit. July temperatures vary from 46 to 65 degrees Fahrenheit. Average annual precipitation is 20 inches. Fire protection is provided to the area by Cooper Landing Emergency Services (ES) and the Alaska Division of Forestry. Other fire agencies such as USFS, Moose Pass VFD, Girdwood FD are at a minimum 45 minutes to one hour away. Cooper Landing ES and the Forest Service have joint cooperative agreements in place (Ecology and Environment [E&E], 2006a). Additional information about community background and demographics can be found in the community CWPP (E&E, 2006a).

Community Polygon Summary		
Community Polygon Name: Cooper Landing	**Total Score:** 69	**Rating:** Moderate
	Town: Cooper Landing	
	Land Area (*mi.^{2}*): 65.3	
	Population Density (people/*mi.^{2}*)$_1$: 3.6	
	Home Density (housing units/ *mi.^{2}*)$_2$: 5.9	

Percent of Community Classified by Wildland Urban Interface (WUI) Types
Acres (*mi.^{2}*): 31.6
Percent: 45.3%

Percent of Community by Modeled Wildfire Related Loss

Low	Medium - Low	Medium	Medium – High	High
2.3	2.9	0.4	0.1	0

Dominant Fuel Type

Grass	Grass/Shrub	Shrub	Timber Understory	Timber Litter
GR2	GS1	SH1	TU1, TU2, TU5	TL1, TL2

Percent of Community by Modeled/Calculated Wildfire Risk Inputs

Flame Length	Dist. From Fire Station
0-4 (ft): 92%	0-0.5 (mi.): 1%
4-8 (ft): 6%	0.5-1.0 (mi.): 3%
8-12 (ft): 0%	1.0-1.5 (mi.): 6%
>12 (ft): 0%	>1.5 (mi.): 90%

Fire Department Statistics: Cooper Landing Volunteer Fire Department					
Communities Served: **Cooper Landing***					
Fulltime Firefighters: .75 (3/4 position, 1 person)		On-call Firefighters: 0		Volunteer Firefighters: 25	
Water Tender:			Wildland Engines		
Type 1:	1, 4WD	Total Number:	4WD/AWD:	Brush Breaker:	
Type 2:	1, AWD	Type 3:		0	
Type 3:	0	Type 4: ----	0	0	
Structure Engines:		Type 5: ----	0	0	
Type 1:	1	Type 6: 1	1	0	
Type 2:	0	Type 7: ----	0	0	
Port-A-Tanks:	5				
Portable Pumps:	4				

Recent Fires within the polygon:

- Swan Lake, 2019
- Stetson Creek, 2015
- Snug Harbor, 1999
- Bean Creek #2, 1992
- Round Mountain, 1974
- Russian River, 1969
- Kenai Lake, 1959

Fire Management Options:	
Critical Protection around urban areas: **61%**	Full Protection around WUI: **18%**

* USFWS lands within Cooper Landing are also supported by the Kenai National Wildlife Refuge.

Current Fire and Fuel Management Programs and Plans

- 2018 ALAH Action Plan
- 2019 Kenai Peninsula Borough Hazard Mitigation Plan
- 2006 Cooper Landing Community Wildfire Protection Plan

Community Polygon NFPA 1144 Survey Summary

Positive Attributes (Low Scores)

- Street signs: visible and reflective
- Vegetation type: significant buffer to continuous heavy fuels due to Swan Lake fire extent adjacent to community
- Building construction: metal and composite roofs dominant
- Slope: minimal slope adjacent to most homes
- Water: available but gallon-capacity limited
- Defensible space: moderate

Negative Attributes (High Scores)

- Building construction: combustible siding
- Utility placement: aboveground
- Decking and fencing: combustible
- Separation of adjacent structures: minimal spacing between some homes
- Fire occurrence history: high
- Severe fire weather potential
- Ingress and egress: most subdivisions off main highway with one road in and out

Suggested Mitigation Focus Area

Areas of Concern:

- Sterling, Nikiski, and Kenai

Summary of Mitigation Needs (for details, see Recommendation Matrices in main document)

- Need a solution for green waste disposal. Snug Harbor Road dump fills up rapidly.
- Education on wildfire risk (even post Swan Lake) is needed across the community.
- Need to target education at seasonal homeowners.
- Need to provide Firewise type assessments to homeowners to provide specific action items for mitigation. Include Emergency Vehicle Access. Many homeowners clear space for personal vehicle size, not large equipment
- Need to look into incentives for defensible space actions.
- Need to address threats to HEA lines associated with wind throw.
-
- Institute a voluntary Firewise Inspection program within the community as a benefit to community residents to bring recommendations to protect their homes and structures (Cooper Landing CWPP, 2006).
- Establish fire patrols. - Not needed during 2021 Season. Fluctuates based on weather conditions (Cooper Landing CWPP, 2006).
- Develop contingency plans for voluntary community evacuation (Cooper Landing CWPP, 2006).
- Survey private and public structures for main power shut-offs, fuel storage, etc. for fire personnel safety Meet and coordinate with all agencies that would be involved in an incident (Cooper Landing CWPP, 2006).

Fire Department Concerns:

- Need local training opportunities for volunteer firefighters. Local, specific to CL. 1 hour Travel each way discourages volunteer training.
- Need to seek funding to provide programmable radios to the fire department.
- Need to purchase a new brush truck. Current Forestry-owned/loaned vehicle is 1985. Mechanically broken, 5x since Swan Lake.
- Upgrade the Quartz Creek bridge to allow passage of fire response vehicles. - Still Needed. Largest Vehicles unable to transverse 11 Ton Capacity limited bridge (Cooper Landing CWPP, 2006).
- Establish Dry Hydrant/Year Round Draft Site (Cooper Landing CWPP, 2006).
- Improve Water Supply beyond on-board apparatus tanks (Cooper Landing CWPP, 2006).
- Long Term, Replacement of CL Fire Station to support large scale staging/mitigation teams during events such as Swan Lake Fire. Existing facility undersize, largely outdated and does not match standards.

Figure D.6. Cooper Landing has a density of tourist values at risk from fire and was recently impacted by the Swan Lake Fire.

KENAI PENINSULA BOROUGH WILDLAND URBAN INTERFACE COMMUNITIES

CROWN POINT POLYGON SUMMARY STATISTICS

Community Description

Crown Point is located on the Kenai Peninsula within the Moose Pass area. Crown Point is an unincorporated community located approximately 22 miles north of Seward. Winter temperatures range from 4 degrees F to 27 on average. Some winters it has reached 20 below. Summer temperatures vary from 45 to 65 degrees. Annual precipitation ranges from 20 inches at the south end of the valley to 24 inches at the north end. The Moose Pass Volunteer Fire Company and the United States Forest Service provide initial attack fire protection to Crown Point area residents. Operations are based out of the fire station located at 35390 Seward Highway Moose Pass (KPB, 2006c). Additional information about community background and demographics can be found in the community CWPP (KPB, 2006c).

Community Polygon Summary		
Community Polygon Name: Crown Point	**Total Score:** 76	**Rating:** **High**
Town: Crown Point		
Land Area (*mi.^{2}*): 3.5		
Population Density (people/*mi.^{2}*)$_1$: 17.6		
Home Density (housing units/ *mi.^{2}*)$_2$: 19.9		

Percent of Community Classified by Wildland Urban Interface (WUI) Types
Acres (*mi.^{2}*): 3.4
Percent: 96%

Percent of Community by Modeled Wildfire Related Loss				
Low	Medium - Low	Medium	Medium – High	High
5.7%	0.6%	0.0%	0.0%	0.0%
Dominant Fuel Type				
Grass	Grass/Shrub	Shrub	Timber Understory	Timber Litter
			TU1	

Percent of Community by Modeled/Calculated Wildfire Risk Inputs	
Flame Length	Dist. From Fire Station
0-4 (ft): 99%	0-0.5 (mi.): 0%
4-8 (ft): 0%	0.5-1.0 (mi.): 0%
8-12 (ft): 0%	1.0-1.5 (mi.): 0%
>12 (ft): 0%	>1.5 (mi.): 100%

Fire Department Statistics: Moose Pass Volunteer Fire Company				
Communities Served: **Moose Pass*, Crown Point*, Primrose***				
Fulltime Firefighters:	On-call Firefighters: 4		Volunteer Firefighters: 5	
Water Tender: 1		Wildland Engines		
Type 1: ---	Total Number:		4WD/AWD:	Brush Breaker:
Type 2: ---	Type 3: ----		0	0
Type 3: ---	Type 4: ----		0	0
Structure Engines: 3	Type 5: ----		0	0
Type 1: ---	Type 6: ----		0	0
Type 2: ---	Type 7: ----		0	0
Port-A-Tanks: 2				
Portable Pumps: 2				

Recent Fires within the polygon:

- Kenai Lake fire in 2001 burned 3,529 acres just outside of polygon.

Fire Management Options:	
Critical Protection around urban areas: **22%**	Full Protection around WUI: **74%**

* Moose Pass, Crown Point, and Primrose are supported by the USFS via mutual aid agreement.

Current Fire and Fuel Management Programs and Plans

- 2018 ALAH Action Plan
- 2019 Kenai Peninsula Borough Hazard Mitigation Plan
- 2006 Moose Pass/Crown Point/Primrose Community Wildfire Protection Plan

Community Polygon NFPA 1144 Survey Summary

Positive Attributes (Low Scores)

- Street signs: visible and reflective
- Topography: limited slope
- Previous fire occurrence: low
- Potential for severe fire weather: low
- Separation of structures: good, large plots (except around some USFS infrastructure)
- Roofing: metal
- Water source: hydrants and tanks
- Emergency shelter in polygon
- Firefighting resources in polygon enhancing fire response capacity: USFS resources; Lawing Airstrip. Moose Pass FD provides fire response.

Negative Attributes (High Scores)

- Ingress and egress: main highway is paved, but still one road in and out to access community
- Ingress and egress: some narrow unsurfaced roads around USFS infrastructure and campgrounds
- Ingress and egress: poor turnaround space for apparatus
- Defensible space: limited clearance around some structures.
- Building construction: combustible siding
- Decking and fencing: combustible
- Utility placement: aboveground
- High density of values at risk in and adjacent to the polygon (i.e., campsites, USFS resources)

Suggested Mitigation Focus Area

Areas of Concern

- Individual homeowner preparedness (Moose Pass Area CWPP 2006).

Summary of Mitigation Needs (for details, see Recommendation Matrices in main document)

- Improve access by creating additional turnaround spaces.
- Increase fire prevention and mitigation outreach to public, with a focus on defensible space, structure hardening and safe debris disposal.
- Reduce heavy fuel loads on a landscape scale and create fuel breaks around community values at risk, especially critical infrastructure utilized for fire protection.
- Enhance fuel breaks with naturally occurring birch or willow.
- Manage popular recreation sites with outreach to users.
- Seek funding for water tender (Moose Pass Area CWPP 2006).
- Seek funding for portable water storage (Moose Pass Area CWPP 2006).
- Seek additional USFS and DOF training opportunities (Moose Pass Area CWPP 2006).
- Create equipment cache on north and south end of Moose Pass, Crown Point area (Moose Pass Area CWPP 2006).
- Create a pre-attack suppression plan with a focus on protection of cultural resources (Moose Pass Area CWPP 2006).
- Expand CERT and Fire Corps program (Moose Pass Area CWPP 2006).
- Encourage residents to develop a secondary water source (Moose Pass Area CWPP 2006).
- Restrict motorized access into areas where hazardous fuels exist on public land (Moose Pass Area CWPP 2006).

Fire Department Concerns:

- Fuels Hazards
- Beetle kill throughout the interface both developed and undeveloped areas
- Goals, in order of importance:
  - Training
  - Hazardous fuels reduction
  - Ecological management

Figure D.7. Example of cabins and other values at risk with limited defensible space, suggesting fire response concerns.

KENAI PENINSULA BOROUGH WILDLAND URBAN INTERFACE COMMUNITIES

DIAMOND RIDGE POLYGON SUMMARY STATISTICS

Community Description

The Diamond Ridge area is located on the bluff above Homer. It lies just south of Anchor Point at approximately 59.699040° north latitude and -151.56071° west longitude. Diamond Ridge is in the Homer Recording District. The area encompasses 42.4 square miles of land. January temperatures range from -10˚F to +35˚ F. July temperatures vary from 46˚ F to 65 ˚ F. Average annual precipitation is 20 inches.

The Kachemak Emergency Services Area (KESA), Homer Volunteer Fire Department (HVFD), and the Alaska Division of Forestry provide fire protection to the Diamond Point residents. KESA currently contracts with the City of Homer (HVFD) for fire and emergency medical services. The KESA station houses fire response equipment and is large enough to host training sessions. HVFD Fire Division firefighters are state certified at the Firefighter I, II, or Fire Officer I levels (KPB, 2006d). Additional information about community background and demographics can be found in the community CWPP (KPB, 2006d).

Community Polygon Summary		
Community Polygon Name: Diamond Ridge	**Total Score:** 62	**Rating:** Moderate
Town: Diamond Ridge		
Land Area (*mi.^{2}*): 42.4		
Population Density (people/*mi.^{2}*)$_1$: 29.0		
Home Density (housing units/ *mi.^{2}*)$_2$: 23.1		

Percent of Community Classified by Wildland Urban Interface (WUI) Types
Acres (*mi.^{2}*): 39.9
Percent: 94.1%

Percent of Community by Modeled Wildfire Related Loss				
Low	Medium - Low	Medium	Medium – High	High
7.0%	14.0%	8.7%	4.8%	0.0%
Dominant Fuel Type				
Grass	Grass/Shrub	Shrub	Timber Understory	Timber Litter
GR1	GS1		TU1 TU2 TU5	TL2

Percent of Community by Modeled/Calculated Wildfire Risk Inputs	
Flame Length	Dist. From Fire Station
0-4 (ft): 100%	0-0.5 (mi.): 2%
4-8 (ft): 41%	0.5-1.0 (mi.): 6%
8-12 (ft): 1%	1.0-1.5 (mi.): 10%
>12 (ft): 0%	>1.5 (mi.): 83%

Fire Department Statistics: Kachemak Emergency Services Area (KESA)					
Communities Served: **Greater Homer**					
Fulltime Firefighters: 5		On-call Firefighters: 0		Volunteer Firefighters: 30	
Water Tender:			Wildland Engines		
Type 1:	1-3 4WD brush breakers	Total Number:	4WD/AWD:	Brush Breaker:	
Type 2:	1-3 4WD brush breakers	Type 3: 1-3	0	0	
Type 3:	1-3 excess property	Type 4: ----	0	0	
Structure Engines:		Type 5: 1-3	1-3	1-3	
Type 1:	1-3 excess property 4-7 4WD brush breakers	Type 6: 1-3	1-3	1-3	
Type 2:	1-3 4WD brush breakers	Type 7: 1-3	1-3	1-3	
Port-A-Tanks:	6				
Portable Pumps:	5				

Recent Fires within the polygon:

- North Fork, 2019
- Gould Fire, 1950
- Davis, 1946

Fire Management Options:	
Critical Protection around urban areas: **100%**	Full Protection around WUI: **0%**

Current Fire and Fuel Management Programs and Plans

- 2018 ALAH Action Plan
- 2019 Kenai Peninsula Borough Hazard Mitigation Plan
- 2006 Diamond Ridge/Fritz Creek/Fox River Community Wildfire Protection Plan

Community Polygon NFPA 1144 Survey Summary

Positive Attributes (Low Scores)

- Street signs: visible and reflective
- Vegetation type: mixture of timber-understory and timber-litter fuels
- Defensible space: good
- Building construction: metal and composite roofs dominant
- Water source: hydrants

Negative Attributes (High Scores)

- Ingress and egress: one road in and out
- Building construction: combustible siding
- Utility placement: aboveground
- Decking and fencing: combustible
- Separation of adjacent structures: minimal
- Slope: 31% to 40%
- Topographic features: steep slopes with ridge top homes that are exposed to fire spread

Suggested Mitigation Focus Area

Areas of Concern:

- On bluff beyond Vosnesenka School (Diamond Ridge/Fritz Creek/Fox River CWPP, 2006).
- Baycrest skiing and hiking areas are surrounded by subdivisions. Much of the area is state and borough lands at extreme risk for wildfire. This would be an excellent location for demonstration projects (Diamond Ridge/Fritz Creek/Fox River CWPP, 2006).
- Kachemak Bay State Park (Diamond Ridge/Fritz Creek/Fox River CWPP, 2006).
- The Caribou Lakes area has a high hazardous fuel loading and is not easily accessible (Diamond Ridge/Fritz Creek/Fox River CWPP, 2006).
- East End Road,
- Skyline Drive,
- Caribou Lake
- Diamond Ridge

Summary of Mitigation Needs (for details, see Recommendation Matrices in main document)

- Need a lumber market and processing to support increased fuel treatments
- The local road system needs improvement. Many roads are not part of city or borough management and fall outside regular state maintenance. Skyline, Olson Mountain, and Hutler Roads need year-round access, with a better road base. They are impassable at critical times of the year, e.g., during spring “break up.” (Diamond Ridge/Fritz Creek/Fox River CWPP, 2006).
- Identify EERd location for slash disposal to be burned, possibly with KPB incinerator (Diamond Ridge/Fritz Creek/Fox River CWPP, 2006).
- Pursue public slash pickup/disposal service (Diamond Ridge/Fritz Creek/Fox River CWPP, 2006).
- Create firebreaks along section lines and around perimeters of areas with heavy fuel loading that are within 0.25 mile of structures (Diamond Ridge/Fritz Creek/Fox River CWPP, 2006).

Fire Department Concerns:

- N/A

Figure D.8. Example of a ridge which many homes are located.

KENAI PENINSULA BOROUGH
WILDLAND URBAN INTERFACE COMMUNITIES
FOX RIVER POLYGON SUMMARY STATISTICS

Community Description

The Fox River area comprises of 127 square miles of land and consists of small communities: Voznesenka, Razdolna, and Kachemak Selo. The three Russian Old Believer villages at the head of Kachemak Bay are similar in history and composition. Razdolna is located on a bluff on the east side of Swift Creek at the end of five-mile-long Circle Lake Road which branches off East End Road to the north about 19 miles east of Homer. The community of Voznesenka is located about 21 miles east of Homer and makes up the final occupied area on East End Road before the road ends and descends as a trail down the “Switchback” to the shore at the head of Kachemak Bay. The village stretches mainly along the final two miles of the road as well as along one side road that parallels the last mile of the main road. Most of the dwellings are on individual lots of 1 to 5 acres. Kachemak Selo lies on the shore of the head of Kachemak Bay at the bottom of the Switchback and northeast about 1 mile along the shore.
The Switchback allows four-wheel drive traffic most of the year. The houses of the village are mostly on small individual lots. Kachemak Emergency Services, and the Alaska Division of Forestry provide fire protection to the residents of Fox Creek. Kachemak Emergency Services Area currently contracts with the Homer Volunteer Fire Department (HVFD) for fire and emergency medical services. HVFD Fire Department firefighters are state certified at the Firefighter I, II, or Fire Officer I levels. (KPB, 2006d) Additional information about community background and demographics can be found in the community CWPP (KPB, 2006d).

Community Polygon Summary		
Community Polygon Name: Fox River	**Total Score:** 82	**Rating:** Moderate
Town: Fox River		
Land Area (*mi.^{2}*): 126.84		
Population Density (people/*mi.^{2}*)$_1$: 5.3		
Home Density (housing units/ *mi.^{2}*)$_2$: 2.6		

Percent of Community Classified by Wildland Urban Interface (WUI) Types
Acres (*mi.^{2}*): 49.7
Percent: 38.7%

Percent of Community by Modeled Wildfire Related Loss				
Low	Medium - Low	Medium	Medium – High	High
3.2%	1.5%	0.7%	0.3%	0.0%
Dominant Fuel Type				
Grass	Grass/Shrub	Shrub	Timber Understory	Timber Litter
GR1 GR2	GS1	SH2	TU1, TU2, TU5	TL2

Percent of Community by Modeled/Calculated Wildfire Risk Inputs	
Flame Length	Dist. From Fire Station
0-4 (ft): 94%	0-0.5 (mi.): 0%
4-8 (ft): 30%	0.5-1.0 (mi.): 0%
8-12 (ft): 0%	1.0-1.5 (mi.): 0%
>12 (ft): 0%	>1.5 (mi.): 100%

Fire Department Statistics: Kachemak Emergency Services Area (KESA)

Communities Served: **Greater Homer**

Fulltime Firefighters: 5 | On-call Firefighters: 0 | Volunteer Firefighters: 30

Water Tender:		Wildland Engines		
Type 1:	1-3 4WD brush breakers	Total Number:	4WD/AWD:	Brush Breaker:
Type 2:	1-3 4WD brush breakers	Type 3: 1-3	0	0
Type 3:	1-3 excess property	Type 4: ----	0	0
Structure Engines:		Type 5: 1-3	1-3	1-3
Type 1:	1-3 excess property 4-7 4WD brush breakers	Type 6: 1-3	1-3	1-3
Type 2:	1-3 4WD brush breakers	Type 7: 1-3	1-3	1-3
Port-A-Tanks:	6			
Portable Pumps:	5			

Recent Fires within the polygon:

- Caribou Lake, 2019
- Caribou Hills, 2007

Fire Management Options:

Critical Protection around urban areas: **90%**	Full Protection around WUI: **0%**

Current Fire and Fuel Management Programs and Plans

- 2018 ALAH Action Plan
- 2019 Kenai Peninsula Borough Hazard Mitigation Plan
- 2006 Diamond Ridge/Fritz Creek/Fox River Community Wildfire Protection Plan

Community Polygon NFPA 1144 Survey Summary

Positive Attributes (Low Scores)

- Street signs: visible and reflective
- Vegetation type: timber and grass mixture. Grass and grass shrubs at higher elevation.
- Defensible space: good; well-maintained homes and yards in many areas
- Building construction: metal and composite roofs dominant
- Water source: hydrants

Negative Attributes (High Scores)

- Ingress and egress: one road in and out
- Building construction: combustible siding
- Utility placement: aboveground
- Decking and fencing: combustible
- Separation of adjacent structures: minimal
- Slope: area has a 31% to 40% slope
- Topographic features: steep slopes with ridge top homes that are exposed to fire spread

Suggested Mitigation Focus Area

Areas of Concern:

- On bluff beyond Vosnesenka School (Diamond Ridge/Fritz Creek/Fox River CWPP, 2006).
- Baycrest skiing and hiking areas are surrounded by subdivisions. Much of the area is state and borough lands at extreme risk for wildfire. This would be an excellent location for demonstration projects (Diamond Ridge/Fritz Creek/Fox River CWPP, 2006).
- Kachemak Bay State Park (Diamond Ridge/Fritz Creek/Fox River CWPP, 2006).
- East End Road,
- Skyline Drive,
- Caribou Lake
- Diamond Ridge

Summary of Mitigation Needs (for details, see Recommendation Matrices in main document)

- Need a lumber market and processing to support increased fuel treatments
- Scenic values, cultural values and historic buildings need to be protected.
- The local road system needs improvement. Many roads are not part of city or borough management and fall outside regular state maintenance. Skyline, Olson Mountain, and Hutler Roads need year-round access, with a better road base. They are impassable at critical times of the year, e.g., during spring “break up.” (Diamond Ridge/Fritz Creek/Fox River CWPP, 2006).
- Identify EERd location for slash disposal to be burned, possibly with KPB incinerator (Diamond Ridge/Fritz Creek/Fox River CWPP, 2006).
- Pursue public slash pickup/disposal service (Diamond Ridge/Fritz Creek/Fox River CWPP, 2006).

Fire Department Concerns:

- N/A

Figure D.9. Fox River is sparsely populated and comprises many cultural and natural values at risk, including critical habitat.

KENAI PENINSULA BOROUGH WILDLAND URBAN INTERFACE COMMUNITIES

FRITZ CREEK POLYGON SUMMARY STATISTICS

Community Description

Fritz Creek is located 7 miles northeast of Homer, on the north shore of Kachemak Bay, off East End Road. It lies at the foot of Bald Mountain at approximately 59.748420° north latitude and - 151.2778° west longitude. Fritz Creek is in the Homer Recording District. The area encompasses 54 square miles of land. Winter temperatures range from -10˚ F to +35˚ F; summer temperatures vary from 45˚ F to 65 ˚F. Average annual precipitation is 24 inches. The Kachemak Emergency Services Area (KESA), Homer Volunteer Fire Department (HVFD), and the Alaska Division of Forestry provide fire protection to the Fritz Creek residents. Kachemak Emergency Services Area currently contracts with the City of Homer (HVFD) for fire and emergency medical services. HVFD Fire Division firefighters are state certified at the Firefighter I, II, or Fire Officer I levels. (KPB, 2006d) Additional information about community background and demographics can be found in the community CWPP (KPB, 2006d).

Community Polygon Summary		
Community Polygon Name: Fritz Creek	**Total Score:** 54	**Rating:** Moderate
Town: Fritz Creek		
Land Area (*mi.^{2}*): 53.9		
Population Density (people/*mi.^{2}*)$_1$: 39.0		
Home Density (housing units/ *mi.^{2}*)$_2$: 28.7		

Percent of Community Classified by Wildland Urban Interface (WUI) Types
Acres (*mi.^{2}*): 51.8
Percent: 95.9%

Percent of Community by Modeled Wildfire Related Loss				
Low	Medium - Low	Medium	Medium – High	High
5.8%	20.4%	4.9%	1.7%	0.0%
Dominant Fuel Type				
Grass	Grass/Shrub	Shrub	Timber Understory	Timber Litter
GR1 GR2	GS1 GS2	SH2 SH5	TU1, TU2, TU5	TL2

Percent of Community by Modeled/Calculated Wildfire Risk Inputs	
Flame Length	Dist. From Fire Station
0-4 (ft): 100%	0-0.5 (mi.): 1%
4-8 (ft): 59%	0.5-1.0 (mi.): 4%
8-12 (ft): 0%	1.0-1.5 (mi.): 7%
>12 (ft): 0%	>1.5 (mi.): 87%

Fire Department Statistics: Kachemak Emergency Services Area (KESA)					
Communities Served: **Greater Homer**					
Fulltime Firefighters: 5		On-call Firefighters: 0		Volunteer Firefighters: 30	
	Water Tender:			Wildland Engines	
	Type 1:	1-3 4WD brush breakers	Total Number:	4WD/AWD:	Brush Breaker:
	Type 2:	1-3 4WD brush breakers	Type 3: 1-3	0	0
	Type 3:	1-3 excess property	Type 4: ----	0	0
	Structure Engines:		Type 5: 1-3	1-3	1-3
	Type 1:	1-3 excess property 4-7 4WD brush breakers	Type 6: 1-3	1-3	1-3
	Type 2:	1-3 4WD brush breakers	Type 7: 1-3	1-3	1-3
	Port-A-Tanks:	6			
	Portable Pumps:	5			
Recent Fires within the polygon: - 17 East End Road, 2009 - Tracy Ave, 2005 - Circle Lake Fire, 2002 - Mansfield Ave, 1999					
Fire Management Options:					
Critical Protection around urban areas: **100%**			Full Protection around WUI: **0%**		

Current Fire and Fuel Management Programs and Plans

- 2018 ALAH Action Plan
- 2019 Kenai Peninsula Borough Hazard Mitigation Plan
- 2006 Diamond Ridge/Fritz Creek/Fox River Community Wildfire Protection Plan

Community Polygon NFPA 1144 Survey Summary

Positive Attributes (Low Scores)

- Street Signs: visible and reflective
- Vegetation type: timber, grass and shrub mixture, forests are more open with some meadow areas interspersed.
- Defensible space: good
- Building construction: metal and composite roofs dominant
- Water source: hydrants
- Slope: Area slope is 10% to 20%

Negative Attributes (High Scores)

- Ingress and egress: one road in and out
- Building construction: combustible siding
- Water source: no water availability through hydrants but do have water tender
- Utility placement: aboveground
- Decking and fencing: combustible
- Separation of adjacent structures: minimal

Suggested Mitigation Focus Area
Areas of Concern: • On bluff beyond Vosnesenka School (Diamond Ridge/Fritz Creek/Fox River CWPP, 2006). • Baycrest skiing and hiking areas are surrounded by subdivisions. Much of the area is state and borough lands at extreme risk for wildfire. This would be an excellent location for demonstration projects (Diamond Ridge/Fritz Creek/Fox River CWPP, 2006). • Kachemak Bay State Park (Diamond Ridge/Fritz Creek/Fox River CWPP, 2006). • East End Road • Skyline Drive • Caribou Lake • Diamond Ridge Summary of Mitigation Needs (for details, see Recommendation Matrices in main document) • Need a lumber market and processing to support increased fuel treatments on the east side of Peninsula. • Agricultural, livestock, horses; tourism and viewshed to be protected • The local road system needs improvement. Many roads are not part of city or borough management and fall outside regular state maintenance. Skyline, Olson Mountain, and Hutler Roads need year-round access, with a better road base. They are impassable at critical times of the year, e.g., during spring “break up.” (Diamond Ridge/Fritz Creek/Fox River CWPP, 2006). • Identify EERd location for slash disposal to be burned, possibly with KPB incinerator (Diamond Ridge/Fritz Creek/Fox River CWPP, 2006). • Pursue public slash pickup/disposal service (Diamond Ridge/Fritz Creek/Fox River CWPP, 2006). Fire Department Concerns: • N/A

Figure D.10. The Fritz Creek WUI is comprised of scattered properties with varied topography.

KENAI PENINSULA BOROUGH WILDLAND URBAN INTERFACE COMMUNITIES

FUNNY RIVER POLYGON SUMMARY STATISTICS

Community Description

Funny River is located on the Kenai Peninsula, approximately 15 miles east of Soldotna and along the Kenai River, from River Mile 29 to 45. It lies at approximately 60.48 degrees North Latitude and 150.84 degrees West Longitude. Funny River is in the Kenai Recording District. The area encompasses 27.2 sq. miles of land. The Central Emergency Services Fire Department provide fire protection to Funny River residents (KPB, 2009a). Additional information about community background and demographics can be found in the community CWPP (KPB, 2009a).

Community Polygon Summary		
Community Polygon Name: Funny River	**Total Score:** 44	**Rating:** Moderate
Town: Funny River		
Land Area (*mi.^{2}*): 26.6		
Population Density (people/*mi.^{2}*)$_1$: 32.8		
Home Density (housing units/ *mi.^{2}*)$_2$: 53.8		

Percent of Community Classified by Wildland Urban Interface (WUI) Types
Acres (*mi.^{2}*): 29
Percent: 100%

Percent of Community by Modeled Wildfire Related Loss				
Low	Medium - Low	Medium	Medium – High	High
0.7%	17.0%	12.5%	10.3%	0.0%
Dominant Fuel Type				
Grass	Grass/Shrub	Shrub	Timber Understory	Timber Litter
GR1	GS1	SH5	TU1, TU3, TU5	TL3, TL6

Percent of Community by Modeled/Calculated Wildfire Risk Inputs	
Flame Length	Dist. From Fire Station
0-4 (ft): 63%	0-0.5 (mi.): 2%
4-8 (ft): 69%	0.5-1.0 (mi.): 4%
8-12 (ft): 1%	1.0-1.5 (mi.): 9%
>12 (ft): 0%	>1.5 (mi.): 85%

Fire Department Statistics: Central Emergency Services				
Communities Served: **Soldotna, Ridgeway, Sterling, Kasilof, Kalifornsky Beach, Cohoe, Clam Gulch, Funny River**				
Fulltime Firefighters: 46	On-call Firefighters: 0		Volunteer Firefighters: ~ 20	
Water Tender:			Wildland Engines	
		Total Number:	4WD/AWD:	Brush Breaker:
Type 1:	0	Type 3: 1-3	1-3	0
Type 2:	4-7	Type 4: ----	0	0
Type 3:	0	Type 5: 1-3	1-3	0
Structure Engines:		Type 6: ----	0	0
Type 1:	8-10, 1-3 have 4WD	Type 7: ----	0	0
Type 2:	0			
Port-A-Tanks:	Only within the road system, Forestry often asks that tanks be left on-scene, which creates a shortage for additional responses.			
Portable Pumps:	5			

Recent Fires within the polygon:

- Card Street, 2015
- Funny River, 2014
- Ashley, 2009
- Kenai Fire, 1947

Fire Management Options:	
Critical Protection around urban areas: **68%**	Full Protection around WUI: **33%**

Current Fire and Fuel Management Programs and Plans

- 2018 ALAH Action Plan
- 2019 Kenai Peninsula Borough Hazard Mitigation Plan
- 2009 Funny River Area Community Wildfire Protection Plan

Community Polygon NFPA 1144 Survey Summary

Positive Attributes (Low Scores)

- Ingress and egress: good turnarounds for most homes
- Defensible space: very good clearance for some homes.
- Topography: flat
- History for fire occurrence: low
- Potential for severe fire weather: low
- Separation of adjacent structures: good, larger lots
- Water source: drafting from river possible
- Station close to community
- Signage: present and reflective

Negative Attributes (High Scores)

- Ingress and egress: one road in and out
- Ingress and egress: some unsurfaced and poorly maintained roads with narrow sections
- Vegetation type: timber and understory fuels
- Building construction: combustible siding
- Decking and fencing: combustible
- Utility placement: aboveground

Suggested Mitigation Focus Area

Areas of Concern

- State Park (Funny River Area CWPP, 2009).
- East end of Funny River Road (Funny River Area CWPP, 2009).
- Kasilof/Cohoe, Funny River, and Tustumena.

Summary of Mitigation Needs (for details, see Recommendation Matrices in main document)

- Reduce structure ignition potential through use of home ignition zone training.
- Develop projects and seek funding for fuel treatments at Funny River State Park.
- Develop options for the public to access beetle killed trees for firewood.
- Identify slash disposal sites.
- Widen utility ROW for use as fire breaks.
- Develop programs to support vulnerable populations with defensible space actions
- Support Firewise programs
- Locate and identify alternative routes to serve as escape routes
- Identify safety zones.
- Map water sources.
- Identify and map fill sites.
- Create alternative ingress/egress route for Funny River (currently only one ingress/egress).
- Road widening is needed in some places to accommodate tankers and other large equipment.
- Evaluate electric grid in subdivisions and identify need for electric generators
- Develop residential inspection program for structural ignitability
- Increase/expand use of CERT and associated training (Funny River Area CWPP, 2009). Develop a CWPP media outreach plan (Funny River Area CWPP, 2009).
- Develop a "rapid notify in place" system for the area (Funny River Area CWPP, 2009).
- Develop a boat escape plan (Funny River Area CWPP, 2009).

Fire Department Concerns:

- Pre-season fire planning to identify critical infrastructure where point protection should be applied.

Figure D.11. Example of good defensible space around a home in Funny River.

KENAI PENINSULA BOROUGH WILDLAND URBAN INTERFACE COMMUNITIES

HALIBUT COVE POLYGON SUMMARY STATISTICS

Community Description

The Halibut Cove area includes 25 miles of mountainous shoreline from Bear Cove to Jakolof Bay. There are an increasing number of secondary and primary homes throughout the numerous coves and bays. The area is primarily bordered by the southern shore of Kachemak Bay. The Halibut Cove area encompasses 8.3 square miles. There is no local or state fire department to house equipment or provide training. The nearest wildland fire resources are a seasonal State Forestry crew based in Homer which responds by local hire helicopter or marine vessel. The Division of Forestry, Soldotna base, hosts a contract helicopter starting in mid-April each season for wildland fire response. The ship is staffed with a helitack crew and a bucket for delivery of water drops. Air attack retardant provided by State Forestry is based in Palmer, though during high fire danger it can be pre-positioned at the Kenai airport (Terry Anderson Consulting [TAC] 2008a). Additional information about community background and demographics can be found in the community CWPP (TAC 2008a).

Community Polygon Summary		
Community Polygon Name: Halibut Cove	**Total Score:** 105	**Rating:** **High**
Town: Halibut Cove (not a traditional town; it is a group of cabins and a few year-round residences)		
Land Area (*mi.^{2}*): 8.3		
Population Density (people/*mi.^{2}*)$_1$: 7.4		
Home Density (housing units/ *mi.^{2}*)$_2$: 77		

Percent of Community Classified by Wildland Urban Interface (WUI) Types
Acres (*mi.^{2}*): 3.9
Percent: 33.7%

Percent of Community by Modeled Wildfire Related Loss				
Low	Medium - Low	Medium	Medium – High	High
0%	0%	0%	0%	0%
Dominant Fuel Type				
Grass	Grass/Shrub	Shrub	Timber Understory	Timber Litter
			TU2, TU5	

Percent of Community by Modeled/Calculated Wildfire Risk Inputs	
Flame Length	Dist. From Fire Station
0-4 (ft): 76%	0-0.5 (mi.): 0%
4-8 (ft): 6%	0.5-1.0 (mi.): 0%
8-12 (ft): 0%	1.0-1.5 (mi.): 0%
>12 (ft): 0%	>1.5 (mi.): 100%

Fire Department Statistics: N/A – No local Fire Department				
Communities Served: Halibut Cove* does not have a local fire department. Mutual aid is provided by State and Federal Resources.				
Fulltime Firefighters: N/A	On-call Firefighters: N/A		Volunteer Firefighters: N/A	
Water Tender:		Wildland Engines		
Type 1: ---	Total Number:	4WD/AWD:	Brush Breaker:	
Type 2: ---	Type 3: ----	0	0	
Type 3: ---	Type 4: ----	0	0	
Structure Engines:	Type 5: ----	0	0	
Type 1: ---	Type 6: ----	0	0	
Type 2: ---	Type 7: ----	0	0	
Port-A-Tanks: ---				
Portable Pumps: ---				
Recent Fires within the polygon: • N/A				
Fire Management Options:				
Critical Protection around urban areas: **18%**		Full Protection around WUI: **21%**		

* Kenai Kodiak Area Statistics: 12 seasonal fire technicians and 1 contract helicopter (from the 3rd week of April through the first week of August).

Current Fire and Fuel Management Programs and Plans

- 2018 ALAH Action Plan
- 2019 Kenai Peninsula Borough Hazard Mitigation Plan
- 2008 Halibut Cove and Vicinity Community Wildfire Protection Plan

Community Polygon NFPA 1144 Survey Summary
(No assessments completed during 2021 CWPP update, desktop analysis only)

Positive Attributes (Low Scores)

- Vegetation Types: coastal and humid
- Fire History: minimal
- Values at risk: minimal - cabins

Negative Attributes (High Scores)

- Ingress and egress: Bad. Accessible only by water.
- Building construction: combustible siding
- Decking and fencing: combustible
- Water source: drafting only
- Fire response: from mainland

Suggested Mitigation Focus Area

Summary of Mitigation Needs (for details, see Recommendation Matrices in main document)

- NA (based on the level of fire risk and the number of year-round residents)

Fire Department Concerns:

- There is no local fire department. Suppression efforts are dependent upon State Forestry resources.
- There are no wildland or structural engines available to the area, past suppression efforts were provided via boat.

KENAI PENINSULA BOROUGH WILDLAND URBAN INTERFACE COMMUNITIES

HAPPY VALLEY POLYGON SUMMARY STATISTICS

Community Description

Happy Valley lies on the west coast of the Kenai Peninsula on Sterling Highway, 22 miles northwest of Homer, on Happy Valley Creek at approximately 59.935830° north latitude and - 151.73722° west longitude. Happy Valley is in the Homer Recording District. The area encompasses 88 square miles of land. Winter temperatures range from -40˚ F to 37˚ F; summer temperatures vary from 45˚ F to 80˚ F. Average annual precipitation is 24 inches. Western Emergency Services (formerly Anchor Point Volunteer Fire Department) and the Alaska Division of Forestry provide fire protection to Anchor Point residents (KPB, 2006a). Additional information about community background and demographics can be found in the community CWPP (KPB, 2006a).

Community Polygon Summary		
Community Polygon Name: Happy Valley	**Total Score:** 67	**Rating:** Moderate
Town: Happy Valley		
Land Area (*mi.^{2}*): 88.1		
Population Density (people/*mi.^{2}*)$_1$: 7.1		
Home Density (housing units/ *mi.^{2}*)$_2$: 10.7		

Percent of Community Classified by Wildland Urban Interface (WUI) Types
Acres (*mi.^{2}*): 35.6
Percent: 40.3%

Percent of Community by Modeled Wildfire Related Loss				
Low	Medium - Low	Medium	Medium – High	High
5.3%	6.5%	0.8%	1.0%	0.0%
Dominant Fuel Type				
Grass	Grass/Shrub	Shrub	Timber Understory	Timber Litter
GR1 GR2	GS1	SH2 SH5	TU2, TU3, TU5	

Percent of Community by Modeled/Calculated Wildfire Risk Inputs	
Flame Length	Dist. From Fire Station
0-4 (ft): 100%	0-0.5 (mi.): 0%
4-8 (ft): 64%	0.5-1.0 (mi.): 0%
8-12 (ft): 0%	1.0-1.5 (mi.): 1%
>12 (ft): 0%	>1.5 (mi.): 99%

Fire Department Statistics: Western Emergency Services (formerly Anchor Point)					
Communities Served: **Anchor Point, Ninilchik, Nikolaevsk, Happy Valley**					
Fulltime Firefighters: 10		On-call Firefighters: 0		Volunteer Firefighters: 38	
Water Tender:			Wildland Engines		
Type 1:	1-3	Total Number:	4WD/AWD:	Brush Breaker:	
Type 2:	1-3	Type 3: ----	0	0	
Type 3:	0	Type 4: ----	0	0	
Structure Engines:		Type 5: ----	0	0	
Type 1:	1-3	Type 6: 1-3	1-3	1-3	
Type 2:	0	Type 7: ----	0	0	
Port-A-Tanks:	8				
Portable Pumps:	4				

Recent Fires within the polygon:

- Homestead, 2008
- Cottonfield Road, 2003
- Dimitri Road, 2002

Fire Management Options:	
Critical Protection around urban areas: **80%**	Full Protection around WUI: **0%**

Current Fire and Fuel Management Programs and Plans

- 2018 ALAH Action Plan
- 2019 Kenai Peninsula Borough Hazard Mitigation Plan
- 2006 Anchor Point/Happy Valley/Nikolaevsk Community Wildfire Protection Plan

Community Polygon NFPA 1144 Survey Summary

Positive Attributes (Low Scores)

- Ingress and egress: main highway paved and more than one road in and out of most subdivisions
- Street signs: visible and reflective
- Vegetation type: open forest and grassland mixture
- Building construction: metal and composite roofs dominant
- Poor defensible space
- Slope: area slope is 10% to 20%
- Water source: hydrants

Negative Attributes (High Scores)

- Building construction: combustible siding
- Utility placement: aboveground
- Decking and fencing: combustible
- Separation of adjacent structures: minimal

Suggested Mitigation Focus Area

<u>Areas of Concern</u>

- Whiskey Gulch east of Sterling Highway, Old Sterling and Dusty Street area, South Fork of Anchor River land is steep, Picnic areas, such as State Parks, and shooting areas need to be cleared.
- Nikolaevsk, North Fork area (Anchor Point), and Oilwell Road area (Ninilchik).

<u>Summary of Mitigation Needs (for details, see Recommendation Matrices in main document)</u>

- Need a lumber market and processing to support increased fuel treatments
- Commercial, tourism, coastal resource, fishing and industry values to be protected.
- Clean downed timber and piles through chipping and burns (Anchor Point/Happy Valley/Nikolaevsk CWPP, 2006).
- Provide public disposal site for brush/slash to be burned by the KPB once or twice a year (Anchor Point/Happy Valley/Nikolaevsk CWPP, 2006).

<u>Fire Department Concerns:</u>

- Nikolaevsk, North Fork area (Anchor Point) and Oilwell road area (Ninilchik) are highest risk
- Goals (in order of importance):
  - Training
  - Hazardous fuels reduction
  - Ecological management

Figure D.12. Example of the landscape in Happy Valley.

KENAI PENINSULA BOROUGH WILDLAND URBAN INTERFACE COMMUNITIES

HOMER POLYGON SUMMARY STATISTICS

Community Description

The City of Homer is located on the north shore of Kachemak Bay on the southwestern edge of the Kenai Peninsula. The Homer Spit, a 4.5-mile-long bar of gravel, extends from the Homer shoreline. Homer is 227 road miles south of Anchorage, at the southernmost point of Sterling Highway. It lies at approximately 59.6425° north latitude and -151.54833° west longitude. Homer is in the Homer Recording District.
The area encompasses 14 square miles of uplands, including Beluga Lake. Homer lies in the maritime climate zone. During the winter, temperatures range from 14˚F to 27˚ F; summer temperatures vary from 45˚F to 65˚ F. Average annual precipitation is 24 inches, including 55 inches of snow. The Homer Fire Volunteer Department (HVFD), Kenai Emergency Services, and the Alaska Division of Forestry provide fire protection to the Homer area. HFD Fire Division firefighters are state certified at the Firefighter I, II, or Fire Officer I levels. DOF bases its Kenai Peninsula operations at the Kenai-Kodiak Area Office (KKAO) located in Soldotna with a seasonal field office in Homer. International Organization for Standardization (ISO) fire protection Class-3 rating has been provided in areas equipped with hydrants (KPB, 2006e). Additional information about community background and demographics can be found in the community CWPP (KPB, 2006e).

Community Polygon Summary		
Community Polygon Name: Homer	**Total Score:** 32	**Rating:** Low
Town: Homer		
Land Area (*mi.^{2}*): 13.8		
Population Density (people/*mi.^{2}*)$_1$: 195.5		
Home Density (housing units/ *mi.^{2}*)$_2$: 139.9		

Percent of Community Classified by Wildland Urban Interface (WUI) Types
Acres (*mi.^{2}*): 14.1
Percent: 53.5%

Percent of Community by Modeled Wildfire Related Loss				
Low	Medium - Low	Medium	Medium – High	High
5.0%	17.4%	9.2%	5.6%	0.0%
Dominant Fuel Type				
Grass	Grass/Shrub	Shrub	Timber Understory	Timber Litter
GR1 GR2			TU1, TU2, TU5	TL2

Percent of Community by Modeled/Calculated Wildfire Risk Inputs	
Flame Length	Dist. From Fire Station
0-4 (ft): 51%	0-0.5 (mi.): 3%
4-8 (ft): 17%	0.5-1.0 (mi.): 9%
8-12 (ft): 0%	1.0-1.5 (mi.): 14%
>12 (ft): 0%	>1.5 (mi.): 74%

Fire Department Statistics: Homer Volunteer Fire Department

Communities Served: **Homer*, Kachemak City***

Fulltime Firefighters: 8 | On-call Firefighters: 0 | Volunteer Firefighters: 16

Water Tender:		Wildland Engines Total Number:	4WD/AWD:	Brush Breaker:
Type 1:	1-3	Type 3: 1-3	0	0
Type 2:	0	Type 4: ----	0	0
Type 3:	0	Type 5: ----	0	0
Structure Engines:		Type 6: ----	0	0
Type 1:	1-3 excess property	Type 7: 1-3	0	0
Type 2:	1-3			
Port-A-Tanks:	1			
Portable Pumps:	1			

Recent Fires within the polygon:

- Davis, 1946

Fire Management Options:

Critical Protection around urban areas: **53%**	Full Protection around WUI: **0%**

* Homer is also supported by Kachemak Emergency Service Area (KESA).

Current Fire and Fuel Management Programs and Plans

- 2018 ALAH Action Plan
- 2019 Kenai Peninsula Borough Hazard Mitigation Plan
- 2006 City of Homer and Kachemak City Community Wildfire Protection Plan

Community Polygon NFPA 1144 Survey Summary

Positive Attributes (Low Scores)

- Ingress and egress: main highway paved
- Street signs: visible and reflective
- Vegetation type: grass and shrub in coastal areas, mixture of grasses and timber-understory at higher elevation
- Building construction: metal and composite roofs dominant
- Water source: hydrants but some are low flow
- Defensible space is good

Negative Attributes (High Scores)

- Building construction: combustible siding
- Utility placement: aboveground
- Decking and fencing: combustible
- Separation of adjacent structures: minimal
- Some homes located on slopes (mid and top of slope)

Suggested Mitigation Focus Area
<u>Areas of Concern</u> • East End Road, Skyline Drive, Caribou Lake, and Diamond Ridge. <u>Summary of Mitigation Needs (for details, see Recommendation Matrices in main document)</u> • High volume of tourism in summer. Consider addressing seasonal visitors and sharing fire education messaging to tourists using signage on heavily trafficked roads. • Tsunami evacuation route well marked. • Suggestion to create a trails network as a fuel break <u>Fire Department Concerns:</u> • Goals (in order of importance): training, hazardous fuels reduction, ecological management • Would like to purchase a couple of new brush trucks • Would like ATV or UTV to increase access into narrow areas. • Would like a Class A Pumper • Areas of risk depend upon the fire season and conditions. • Area north of the airport is a concern due to grass/fine fuel hazard. • Sprucewood Drive area is a concern due to no hydrants. • Areas along the bluff are more inaccessible and have slow response times. • Easter Day Road and North Fork Fire Area is a concern due to continued fire danger. Need Firewise recommendations applied in the area. • Evacuation concerns for communities in eastern portion. Russian villages – Razdolna- would be impossible to evacuate. They need a safety zone so they can shelter in place. Would require fuel treatments and education to community members. Hayfields (only if hayed) could provide shelter in place. • Kachemak Selo – switchbacks and slow response and evacuation. Beach could be a safety zone in worst case scenario • Firewise program used to be more active. It has stagnated recently. Need to reinvigorate.

Figure D.13. The Homer WUI is composed of some scattered homes transitioning to more densely populated urban area.

KENAI PENINSULA BOROUGH WILDLAND URBAN INTERFACE COMMUNITIES

HOPE POLYGON SUMMARY STATISTICS

Community Description

Hope lies on the northern end of Kenai Peninsula, on the south shore of the Turnagain Arm of Cook Inlet. The community lies on the 17-mile Hope Highway, northwest of the Seward Highway, near the mouth of Resurrection Creek. It lies at approximately 60.920280° North Latitude and -149.64028° West Longitude. Hope is in the Seward Recording District. The area encompasses 51.6 sq. miles of land. Winter temperatures range from 14 to 27; summer temperatures vary from 45 to 65. Average annual precipitation is 20 inches. Fire protection is provided to the Hope area by the Hope-Sunrise Volunteer Fire Department (HSVFD). Other fire agencies, for example, USFS, Moose Pass Volunteer Fire Department, Girdwood Fire Department are at a minimum 45 minutes to one hour away. The HSVFD and the Forest Service have a joint cooperative agreement in place (E&E, 2006b). Additional information about community background and demographics can be found in the community CWPP (E&E, 2006b).

Community Polygon Summary		
Community Polygon Name: Hope	**Total Score:** 93	**Rating:** **High**
	Town: Hope	
	Land Area (*mi.*^{2}): 51.6	
	Population Density (people/*mi.*^{2})$_1$: 3.7	
	Home Density (housing units/ *mi.*^{2})$_2$: 4.8	

Percent of Community Classified by Wildland Urban Interface (WUI) Types
Acres (*mi.*^{2}): 21.6
Percent: 41.7%

Percent of Community by Modeled Wildfire Related Loss				
Low	Medium - Low	Medium	Medium – High	High
2.9%	0.3%	0.0%	0.0%	0.0%
Dominant Fuel Type				
Grass	Grass/Shrub	Shrub	Timber Understory	Timber Litter
			TU1, TU5	TL1

Percent of Community by Modeled/Calculated Wildfire Risk Inputs	
Flame Length	Dist. From Fire Station
0-4 (ft): 99%	0-0.5 (mi.): 1%
4-8 (ft): 0%	0.5-1.0 (mi.): 3%
8-12 (ft): 0%	1.0-1.5 (mi.): 5%
12 (ft): 05	>1.5 (mi.): 90%

Fire Department Statistics: Hope-Sunrise Volunteer Fire Department					
Communities Served: Hope and Sunrise					
Fulltime Firefighters: 0		On-call Firefighters: 2		Volunteer Firefighters: 7	
Water Tender: 1				Wildland Engines 1	
Type 1:		Total Number:		4WD/AWD:	Brush Breaker:
Type 2:	0	Type 3: ----		0	0
Type 3:	0	Type 4: ----		0	0
Structure Engines:		Type 5: ----		0	0
Type 1:	0	Type 6: ----		0	0
Type 2:	0	Type 7: ----		0	0
Port-A-Tanks:	1				
Portable Pumps:	2 float pumps				
Recent Fires within the polygon: N/A					
Fire Management Options:					
Critical Protection around urban areas: **32%**			Full Protection around WUI**: 29%**		

Current Fire and Fuel Management Programs and Plans

- 2018 ALAH Action Plan
- 2019 Kenai Peninsula Borough Hazard Mitigation Plan
- 2006 Hope-Sunrise-Summit Lake Community Wildfire Protection Plan

Community Polygon NFPA 1144 Survey Summary

Positive Attributes (Low Scores)

- Ingress and egress: main highway paved
- History of fire occurrence: low
- Humid environment
- Street signs: visible and reflective

Negative Attributes (High Scores)

- Ingress and egress: one road in and out
- Ingress and egress: non-surfaced road with narrow sections throughout community
- Ingress and egress: limited turnaround space for some homes
- Building construction: combustible siding
- Decking and fencing: combustible
- Vegetation type: timber is thick and continuous adjacent to community; coastal and riparian vegetation close to town; beetle killed trees
- Topography: steep and variable topography along access route
- Separation of adjacent structures: minimal
- Water source: no water availability
- Utility placement: aboveground
- Severe weather potential- extreme winds

Suggested Mitigation Focus Area

Areas of Concern

- Utility ROW (Hope-Sunrise-Summit Lake CWPP 2006).
- Critical infrastructure: roads and powerlines (Hope-Sunrise-Summit Lake CWPP 2006).
- Prioritize fire breaks based on fuel hazard (see 2006 plan) (Hope-Sunrise-Summit Lake CWPP 2006).

Summary of Mitigation Needs (for details, see Recommendation Matrices in main document)

- Develop strategies for evacuation and alternative ingress/egress routes.
- Promote individual homeowner preparedness.
- Identify vulnerable populations that require additional assistance for evacuation.
- Map water locations available for strategic firefighting.
- Create alternative ingress/egress route for Hope (currently only one ingress/egress).
- Implement a volunteer fire wise community program and associated home inspections (Hope-Sunrise-Summit Lake CWPP 2006).
- Educate community about vigilance during electrical storms, windstorms and camping (Hope-Sunrise-Summit Lake CWPP 2006).
- Utilize town meeting format for public education and preparedness (Hope-Sunrise-Summit Lake CWPP 2006).
- Implement fuel breaks along slopes above Hope Road (Hope-Sunrise-Summit Lake CWPP 2006).
- Purchase community satellite phones for emergency communications (Hope-Sunrise-Summit Lake CWPP 2006).
- Build economic community capacity (Hope-Sunrise-Summit Lake CWPP 2006).
- Define and promote stewardship contracting (Hope-Sunrise-Summit Lake CWPP 2006).
- Create water resources map (Hope-Sunrise-Summit Lake CWPP 2006).
- Appeal to USFS to create year-round fire training center in Hope (Hope-Sunrise-Summit Lake CWPP 2006).
- Develop and execute annual pre-season exercises with agency partners (Hope-Sunrise-Summit Lake CWPP 2006).
- Establish fire patrols during peak season (Hope-Sunrise-Summit Lake CWPP 2006).
- Create cache of emergency supplies (water, food, medical supplies) at fire station (Hope-Sunrise-Summit Lake CWPP 2006).

Fire Department Concerns:

- Increase firefighting training
- Purchase chipper for green waste disposal
- Increasing population, new tracts of land have been developed and sold. Fire department does not have a good road map of where everyone lives, nor up-to-date records on new tracts of land.
- No street numbers on new homes
- Many homes do not have defensible space
- Community doesn't have fire break zones
- Need to improve and expand working relationship to increase training opportunities and work with other departments throughout the peninsula
- Coordinating resources and equipment throughout the peninsula. (Fire department has trucks they can loan).
- Fire Department needs an administrator, they are currently seeking funding.

Figure D.14. Hope Historic District has many historic community values at risk from wildfire.

KENAI PENINSULA BOROUGH WILDLAND URBAN INTERFACE COMMUNITIES

IONIA POLYGON SUMMARY STATISTICS

Community Description

Ionia is located on the Kenai Peninsula on the west bank of the Kasilof River, 13 miles south of the City of Kenai on the Sterling Highway at approximately 60.375053° north latitude and - 151.319077° west longitude. Ionia is in the Kenai Recording District. The area encompasses 0.2 square miles of land. January temperatures range from 4˚ F to 22˚ F. July temperatures vary from 46˚ F to 65˚ F. Average annual precipitation is 20 inches. Fire protection is provided to the Ionia area residents by KPB Central Emergency Services (CES) (KPB, 2006b). Additional information about community background and demographics can be found in the community CWPP (KPB, 2006b).

Community Polygon Summary

Community Polygon Name: Ionia | **Total Score:** 50 | **Rating:** Moderate

Town: Ionia

Land Area (*mi.^{2}*): 0.2

Population Density (people/*mi.^{2}*)$_1$: 200.8

Home Density (housing units/ *mi.^{2}*)$_2$: 64.3

Percent of Community Classified by Wildland Urban Interface (WUI) Types

Acres (*mi.^{2}*): 0.2

Percent: 100%

Percent of Community by Modeled Wildfire Related Loss

Low	Medium - Low	Medium	Medium – High	High
22.0%	27.4%	4.7%	19.1%	0.0%

Dominant Fuel Type

Grass	Grass/Shrub	Shrub	Timber Understory	Timber Litter
			TU3, TU5	

Percent of Community by Modeled/Calculated Wildfire Risk Inputs

Flame Length	Dist. From Fire Station
0-4 (ft): 77%	0-0.5 (mi.): 0%
4-8 (ft): 52%	0.5-1.0 (mi.): 0%
8-12 (ft): 0%	1.0-1.5 (mi.): 0%
>12 (ft): 0%	>1.5 (mi.): 100%

Fire Department Statistics: Central Emergency Services						
Communities Served: **Soldotna, Ridgeway, Sterling, Kasilof, Kalifornsky Beach, Cohoe, Clam Gulch, Funny River**						
Fulltime Firefighters: 46		On-call Firefighters: 0		Volunteer Firefighters: ~ 20		
Water Tender:				Wildland Engines		
Type 1:	0		Total Number:	4WD/AWD:	Brush Breaker:	
Type 2:	4-7		Type 3: 1-3	1-3	0	
Type 3:	0		Type 4: ----	0	0	
Structure Engines:			Type 5: 1-3	1-3	0	
Type 1:	8-10, 1-3 have 4WD		Type 6: ----	0	0	
Type 2:	0		Type 7: ----	0	0	
Port-A-Tanks:	Only within the road system, Forestry often asks that tanks be left on-scene, which creates a shortage for additional responses.					
Portable Pumps:	5					
Recent Fires within the polygon: - Funny River, 2014						
Fire Management Options:						
Critical Protection around urban areas: **100%**			Full Protection around WUI: **0%**			

Current Fire and Fuel Management Programs and Plans

- 2018 ALAH Action Plan
- 2019 Kenai Peninsula Borough Hazard Mitigation Plan
- 2006 Kalifornsky/Kasilof/Cohoe/Clam Gulch Community Wildfire Protection Plan

Community Polygon NFPA 1144 Survey Summary

Positive Attributes (Low Scores)

- Street signs: visible and reflective
- Vegetation type: timber with grass or shrub understory; some fuel treatments carried out around larger buildings; large meadow areas and agricultural land create buffer to fire spread.
- Defensible space: good; wood piles are moved away from main community buildings
- Slope: area slope is 9% or less
- Building construction: metal and composite roofs dominant
- Building construction: siding materials (stucco) are fire resistive
- Water sources: sprinklers, wells, and pumps

Negative Attributes (High Scores)

- Ingress and egress: one road in and out
- Utility placement: aboveground
- Decking and fencing: combustible
- Separation of adjacent structures: minimal

Suggested Mitigation Focus Area

Areas of Concern:

- Kasilof/Cohoe, Funny River, and Tustumena.

Summary of Mitigation Needs (for details, see Recommendation Matrices in main document)

- Need a lumber market and processing to support increased fuel treatments.
- Community buildings, agricultural and residential values at risk and need to be protected.
- Main community buildings have good access. Residential loop is narrower and has fuels close to the road.
- Community has a goal to secure water independence (ability to respond to fire without assistance from others). Working to set up sprinklers on the peaks of community building roofs.
- Community has fire mitigation plan and fire crew.
- Need to continue to remove spruce beetle killed trees (have already removed numerous trees).
- Pre-season fire planning to identify critical infrastructure where point protection should be applied
- Support Firewise programs

Fire Department Concerns:

- N/A

Figure D.15. The Ionia community has many timber framed buildings, but have implemented fire protection measures with defensible space and installation of sprinklers on community buildings.

KENAI PENINSULA BOROUGH WILDLAND URBAN INTERFACE COMMUNITIES

KACHEMAK POLYGON SUMMARY STATISTICS

Community Description

The Kachemak polygon comprises Kachemak City and the separate Kachemak Emergency Service Area (KESA). The assessment averages conditions across the City and KESA.

The City of Kachemak is located adjacent to and northeast of the City of Homer on East End Road. It lies on the northern shore of Kachemak Bay, within the Kenai Peninsula Borough, approximately 59.67° north latitude and -151.43417° west longitude. Kachemak is in the Homer Recording District. The area encompasses 1.6 square miles of land. Winter temperatures average 14˚ F to 27˚ F; summer temperatures typically range from 45˚ F to 65˚ F. Average annual precipitation is 24 inches. The Homer Volunteer Fire Department (HVFD), Kachemak Emergency Services, and the Alaska Division of Forestry provide fire protection to the City of Kachemak. HVFD Fire Department firefighters are state certified at the Firefighter I, II, or Fire Officer I levels. DOF bases its Kenai Peninsula operations at the Kenai-Kodiak Area Office (KKAO) located in Soldotna with a seasonal field office in Homer (KPB, 2006e). Additional information about community background and demographics can be found in the community CWPP (KPB, 2006e).

Community Polygon Summary		
Community Polygon Name: Kachemak	**Total Score:** 50	**Rating:** Moderate
	Town: Kachemak	
	Land Area (*mi.^{2}*): 1.6	
	Population Density (people/*mi.^{2}*)$_1$: 291.9	
	Home Density (housing units/ *mi.^{2}*)$_2$: 239.5	

Percent of Community Classified by Wildland Urban Interface (WUI) Types
Acres (*mi.^{2}*): 1.6
Percent: 99.2%

Percent of Community by Modeled Wildfire Related Loss				
Low	Medium - Low	Medium	Medium – High	High
5.7%	68.7%	14.6%	5.9%	0.0%
		Dominant Fuel Type		
Grass	Grass/Shrub	Shrub	Timber Understory	Timber Litter
GR2			TU1	TL2

Percent of Community by Modeled/Calculated Wildfire Risk Inputs	
Flame Length	Dist. From Fire Station
0-4 (ft): 98%	0-0.5 (mi.): 0%
4-8 (ft): 29%	0.5-1.0 (mi.):0%

8-12 (ft): 80%	1.0-1.5 (mi.): 0%
>12 (ft): 0%	>1.5 (mi.): 100%

Fire Department Statistics: Homer Volunteer Fire Department

Communities Served: **Homer*, Kachemak City***

Fulltime Firefighters: 8 | On-call Firefighters: 0 | Volunteer Firefighters: 16

Water Tender:		Wildland Engines Total Number:	4WD/AWD:	Brush Breaker:
Type 1:	1-3			
Type 2:	0	Type 3: 1-3	0	0
Type 3:	0	Type 4: ----	0	0
Structure Engines:		Type 5: ----	0	0
Type 1:	1-3 excess property	Type 6: ----	0	0
Type 2:	1-3	Type 7: 1-3	0	0
Port-A-Tanks:	1			
Portable Pumps:	1			

Recent Fires within the polygon: N/A

Fire Management Options:

Critical Protection around urban areas: **99%**	Full Protection around WUI: **0%**

* Kachemak is also supported by Kachemak Emergency Service Area (KESA). KESA serves areas outside of Kachemak City boundaries.

Current Fire and Fuel Management Programs and Plans

- 2018 ALAH Action Plan
- 2019 Kenai Peninsula Borough Hazard Mitigation Plan
- 2006 City of Homer and Kachemak City Community Wildfire Protection Plan

Community Polygon NFPA 1144 Survey Summary

Positive Attributes (Low Scores)

- Ingress and egress: main highway paved
- Street signs: visible and reflective
- Vegetation type: primarily grass with timber and shrub overstories
- Building construction: metal and composite roofs dominant
- Moderate defensible space
- Slope: 10% to 20% (steep elevation in some areas)

Negative Attributes (High Scores)

- Building construction: combustible siding
- Utility placement: aboveground
- Decking and fencing: combustible
- Separation of adjacent structures: minimal
- Severe fire weather potential (extreme wind shifts)
- Water source: Some hydrants within Kachemak City boundaries, but no hydrants within the KESA, with exception of Russian Village of Vonesenka within the KESA protection area this only services the villages and some adjoining roads. This is a private water system fed by a 300,000 water tower.

Suggested Mitigation Focus Area

Areas of concern:

- Prioritize protection of homes, structures, and infrastructure (City of Homer and Kachemak City CWPP 2006).
- Schools and churches identified as emergency shelters in KPB disaster plan must have maintained defensible space (City of Homer and Kachemak City CWPP 2006).
- The forested area north of Beluga Lake and near Paul Banks school contains heavy hazard fuels loading (City of Homer and Kachemak City CWPP 2006).
- Skyline/West Hill, Toulin/Olson, and Bridge Creek Watershed areas (City of Homer and Kachemak City CWPP 2006).
- The water treatment plant needs to be protected from wildfire (City of Homer and Kachemak City CWPP 2006).
- Far east side of town due to poor access
- There has been a lot of new development across the area, and the fire dept has seen an increase in call volume in last few years.
- East End Road, Skyline Drive, Caribou Lake, and Diamond Ridge.

Summary of Mitigation Needs (for details, see Recommendation Matrices in main document):

- Need a lumber market and processing to support increased fuel treatments.
- Viewshed, tourism, and residential values at risk and need to be protected.
- Need to recognize the evacuation risks for communities in eastern portion. The Russian villages (Razdolna in particular) would be impossible to evacuate. They need a safety zone so they can shelter in place.
- Fuel treatments needed and education to community members. Hayfields (only if hayed) could provide shelter in place.
- Kachemak Selo has switchbacks on the roads and slow response and difficult evacuation. Beach could be a safety zone.
- Kachemak Selo may be building a new school, which potentially would be a value at risk to be protected
- Reduce thick fuels located at Olson Mountain
- The community has been implementing some defensible space in some areas and needs to continue this effort.
- Need to reinvigorate Firewise program.
- Need a green waste disposal site.
- There is a weather phenomenon in the area that contributes to extreme (180 degree) wind shifts. Observed during several recent fires.
- There are no hydrants in Kachemak area. Identify locations for strategic water storage/water tanks.
- Utilize a “pump to dump” water operation, using drafting and then transport in tanks.
- Baycrest Ski and Hiking areas & Demonstration Forest (City of Homer and Kachemak City CWPP 2006):
  - Location for demonstration projects.
  - Much of the area is state and borough lands at extreme risk for wildfire and surrounded by subdivisions.

Fire Department Concerns:

- East End Road, Skyline Drive, Caribou Lake, Diamond Ridge are highest risk
- Goals (in order of importance): training, hazardous fuels reduction, ecological management

Figure D.16. The Kachemak WUI includes some scattered homes located in varied topography.

KENAI PENINSULA BOROUGH WILDLAND URBAN INTERFACE COMMUNITIES

KALIFORNSKY POLYGON SUMMARY STATISTICS

Community Description

Kalifornsky is located on the Kenai Peninsula on the east shore of Cook Inlet. This area lies on Kalifornsky Beach Road. It lies off the Sterling Highway, 10 miles south of the City of Kenai at approximately 60.418330° north latitude and -151.29° west longitude. Kalifornsky is in the Kenai Recording District. The area encompasses 68.2 square miles of land. Winter temperatures range from 14˚ F to 27˚ F; summer temperatures vary from 45˚ F to 65˚ F. Average annual precipitation is 24 inches. Fire and EMS protection is provided to the Kalifornsky area residents by KPB Central Emergency Services (CES). The Alaska Division of Forestry also provides wildland fire protection to the area. DOF bases its Kenai Peninsula operations at the Kenai-Kodiak Area Office (KKAO) located in Soldotna with a seasonal field office in Homer (KPB, 2006b). Additional information about community background and demographics can be found in the community CWPP (KPB, 2006b).

Community Polygon Summary

Community Polygon Name: Kalifornsky | **Total Score:** 45 | **Rating:** Moderate

Town: Kalifornsky

Land Area (*mi.*^{2}): 68.2

Population Density (people/*mi.*^{2})[1]: 124.4

Home Density (housing units/ *mi.*^{2})[2]: 73.4

Percent of Community Classified by Wildland Urban Interface (WUI) Types

Acres (*mi.*^{2}): 69.5

Percent: 99.7%

Percent of Community by Modeled Wildfire Related Loss

Low	Medium - Low	Medium	Medium – High	High
2.9%	12.2%	11.5%	13.6%	0.0%

Dominant Fuel Type

Grass	Grass/Shrub	Shrub	Timber Understory	Timber Litter
GR1 GR2	GS1	SH2 SH5	TU1, TU3, TU5	

Percent of Community by Modeled/Calculated Wildfire Risk Inputs

Flame Length	Dist. From Fire Station
0-4 (ft): 74%	0-0.5 (mi.): 1%
4-8 (ft): 23%	0.5-1.0 (mi.): 2%
8-12 (ft): 8%	1.0-1.5 (mi.): 3%
>12 (ft): 0%	>1.5 (mi.): 95%

Fire Department Statistics: Central Emergency Services					
Communities Served: **Soldotna, Ridgeway, Sterling, Kasilof, Kalifornsky Beach, Cohoe, Clam Gulch, Funny River**					
Fulltime Firefighters: 46		On-call Firefighters: 0		Volunteer Firefighters: ~ 20	
Water Tender:			Wildland Engines		
Type 1:	0	Total Number:	4WD/AWD:	Brush Breaker:	
Type 2:	4-7	Type 3: 1-3	1-3	0	
Type 3:	0	Type 4: ----	0	0	
Structure Engines:		Type 5: 1-3	1-3	0	
Type 1:	8-10, 1-3 have 4WD	Type 6: ----	0	0	
Type 2:	0	Type 7: ----	0	0	
Port-A-Tanks:	Only within the road system, Forestry often asks that tanks be left on-scene, which creates a shortage for additional responses.				
Portable Pumps:	5				

Recent Fires within the polygon:

- Funny River, 2014
- Mile 101, 1981
- ECHO, 1969

Fire Management Options:	
Critical Protection around urban areas: **91%**	Full Protection around WUI: **9%**

Current Fire and Fuel Management Programs and Plans

- 2018 ALAH Action Plan
- 2019 Kenai Peninsula Borough Hazard Mitigation Plan
- 2006 Kalifornsky/Kasilof/Cohoe/Clam Gulch Community Wildfire Protection Plan

Community Polygon NFPA 1144 Survey Summary

Positive Attributes (Low Scores)

- Ingress and egress: main highway paved, and more than one road in and out of most subdivisions
- Street signs: visible and reflective
- Vegetation type: timber-understory, younger and smaller-diameter trees, open forest
- Building construction: metal and composite roofs dominant
- Organized response: fire department in community
- Water source: hydrants
- Slope: minimal slope adjacent to most homes
- Defensible space: moderate; yards are well-kept.

Negative Attributes (High Scores)

- Building construction: combustible siding
- Utility placement: aboveground
- Decking and fencing: combustible
- Separation of adjacent structures: moderate

Suggested Mitigation Focus Area
<u>Areas of concern</u> • Johnson Lake Road, Cohoe Loop, Tustumena Lake Road, North of Clamshell Lodge, The Captain Cook subdivision from Wayside Park (Kalifornsky/Kasilof/Cohoe/Clam Gulch CWPP, 2006). • State Park hazard fuel reduction (Kalifornsky/Kasilof/Cohoe/Clam Gulch CWPP, 2006). • Kasilof/Cohoe, Funny River, and Tustumena.
<u>Summary of Mitigation Needs (for details, see Recommendation Matrices in main document)</u> • Need a lumber market and processing to support increased fuel treatments on the east side of Peninsula. • Industrial and commercial values are present in the community and need to be protected • Pre-season fire planning to identify critical infrastructure where point protection should be applied • Support Firewise programs • Public slash disposal site in Kasilof/Clam Gulch area (Kalifornsky/Kasilof/Cohoe/Clam Gulch CWPP, 2006). • Continue removal of dead trees and brush piles on public and private lands (Kalifornsky/Kasilof/Cohoe/Clam Gulch CWPP, 2006). • State Park hazard fuel reduction. Create defensible space/safe zones at State Park facilities (Kalifornsky/Kasilof/Cohoe/Clam Gulch CWPP, 2006).

<u>Fire Department Concerns:</u>
• Fuel hazards, beetle kill throughout the interface both in developed areas as well as open areas.
• Kasilof/Cohoe, Funny River, Tustumena are highest risk
• Goals (in order of importance):
    o Training
    o Hazardous fuels reduction
    o Ecological management

Figure D.17. Example of typical Kalifornsky landscape

KENAI PENINSULA BOROUGH
WILDLAND URBAN INTERFACE COMMUNITIES
KASILOF POLYGON SUMMARY STATISTICS

Community Description

Kasilof is located on the east shore of Cook Inlet on the Kenai Peninsula. It lies on Sterling Highway, 12 miles south of the City of Kenai at approximately 60.336920° north latitude and - 151.27665° west longitude. Kasilof is in the Kenai Recording District. The area encompasses 10.4 square miles of land. Winter temperatures range from 14˚ F to 27˚ F; summer temperatures vary from 45˚ F to 65˚ F. Average annual precipitation is 24 inches. Fire and EMS protection is provided to the Kasilof area residents by KPB Central Emergency Services (CES). The Alaska Division of Forestry also provides wildland fire protection to the area. DOF bases its Kenai Peninsula operations at the Kenai-Kodiak Area Office (KKAO) located in Soldotna with a seasonal field office in Homer (KPB, 2006b). Additional information about community background and demographics can be found in the community CWPP (KPB, 2006b).

Community Polygon Summary

Community Polygon Name: Kasilof — **Total Score:** 54 — **Rating:** Moderate

Town: Kasilof

Land Area (*mi.²*): 10.2

Population Density (people/*mi.²*)[1]: 50.1

Home Density (housing units/ *mi.²*)[2]: 44.2

Percent of Community Classified by Wildland Urban Interface (WUI) Types

Acres (*mi.²*): 10.6

Percent: 100%

Percent of Community by Modeled Wildfire Related Loss

Low	Medium – Low	Medium	Medium – High	High
1.5%	15.4%	19.3%	15.6%	0.0%

Dominant Fuel Type

Grass	Grass/Shrub	Shrub	Timber Understory	Timber Litter
	GS1		TU3, TU5	

Percent of Community by Modeled/Calculated Wildfire Risk Inputs

Flame Length	Dist. From Fire Station
0-4 (ft): 62%	0-0.5 (mi.): 0%
4-8 (ft): 17%	0.5-1.0 (mi.): 2%
8-12 (ft): 15%	1.0-1.5 (mi.): 11%
>12 (ft): 0%	>1.5 (mi.): 87%

Fire Department Statistics: Central Emergency Services					
Communities Served: **Soldotna, Ridgeway, Sterling, Kasilof*, Kalifornsky Beach, Cohoe, Clam Gulch, Funny River**					
Fulltime Firefighters: 46		On-call Firefighters: 0		Volunteer Firefighters: ~ 20	
Water Tender:				Wildland Engines	
Type 1:	0		Total Number:	4WD/AWD:	Brush Breaker:
Type 2:	4-7		Type 3: 1-3	1-3	0
Type 3:	0		Type 4: ----	0	0
Structure Engines:			Type 5: 1-3	1-3	0
Type 1:	8-10, 1-3 have 4WD		Type 6: ----	0	0
Type 2:	0		Type 7: ----	0	0
Port-A-Tanks:	Only within the road system, Forestry often asks that tanks be left on-scene, which creates a shortage for additional responses.				
Portable Pumps:	5				
Recent Fires within the polygon: • Funny River, 2014					
Fire Management Options:					
Critical Protection around urban areas: **66%**			Full Protection around WUI: **34%**		

* USFWS lands within Kasilof are also supported by the Kenai National Wildlife Refuge.

Current Fire and Fuel Management Programs and Plans

- 2018 ALAH Action Plan
- 2019 Kenai Peninsula Borough Hazard Mitigation Plan
- 2006 Kalifornsky/Kasilof/Cohoe/Clam Gulch Community Wildfire Protection Plan

Community Polygon NFPA 1144 Survey Summary

Positive Attributes (Low Scores)

- Ingress and Egress: main highway paved; more than one road in and out of most subdivisions
- Street signs: visible and reflective
- Vegetation type: timber-understory, younger and smaller-diameter trees, open forest
- Building construction: metal and composite roofs dominant
- Organized response: fire department in community
- Slope: minimal slope adjacent to most homes
- Defensible space: moderate

Negative Attributes (High Scores)

- Building construction: combustible siding
- Utility placement: aboveground
- Decking and fencing: combustible
- Separation of adjacent structures: moderate
- Water source: no hydrants

Suggested Mitigation Focus Area

Areas of concern

- Johnson Lake Road, Cohoe Loop, Tustumena Lake Road, North of Clamshell Lodge, The Captain Cook subdivision from Wayside Park (Kalifornsky/Kasilof/Cohoe/Clam Gulch CWPP, 2006).
- State Park hazard fuel reduction (Kalifornsky/Kasilof/Cohoe/Clam Gulch CWPP, 2006).
- Kasilof/Cohoe, Funny River, and Tustumena.
- Sterling, Nikiski, and Kenai

Summary of Mitigation Needs (for details, see Recommendation Matrices in main document)

- Need a lumber market and processing to support increased fuel treatments.
- Reduce heavy fuel loads on a landscape scale (interagency), target dead beetle killed trees, create additional fuel breaks around community.
- Implement aggressive fuel breaks around population centers
- Pre-season fire planning to identify critical infrastructure where point protection should be applied
- Support Firewise programs
- Public slash disposal site in Kasilof/Clam Gulch area (Kalifornsky/Kasilof/Cohoe/Clam Gulch CWPP, 2006).
- Continue removal of dead trees and brush piles on public and private lands (Kalifornsky/Kasilof/Cohoe/Clam Gulch CWPP, 2006).
- State Park hazard fuel reduction. Create defensible space/safe zones at state park facilities (Kalifornsky/Kasilof/Cohoe/Clam Gulch CWPP, 2006).

Fire Department Concerns:

- Fuel hazards, beetle kill throughout the interface both in developed areas as well as open areas.
- Kasilof/Cohoe, Funny River, Tustumena are highest risk
- Goals (in order of importance):
  - Training
  - Hazardous fuels reduction
  - Ecological management

Figure D.18. The Central Emergency Services, Kasilof station serves the community.

KENAI PENINSULA BOROUGH WILDLAND URBAN INTERFACE COMMUNITIES

KENAI POLYGON SUMMARY STATISTICS

Community Description

Kenai is located on the western coast of the Kenai Peninsula, fronting Cook Inlet. It lies on the western boundary of the Kenai National Wildlife Refuge, on the Kenai Spur Highway. It is approximately 155 highway miles southwest of Anchorage via Sterling Highway. It lies at approximately 60.34° north latitude and 151.15° west longitude. Kenai is in the Kenai Recording District. The area encompasses 29.5 square miles of land. Winter temperatures range from 4° F to 22° F; summer temperatures average from 46° F to 65° F. Average annual precipitation is 20 inches. The City of Kenai Fire Department and the Alaska Division of Forestry provide fire protection to Kenai area residents. Kenai Fire Department firefighters are state certified at the Firefighter I and II levels. International Organization for Standardization (ISO) fire protection Class-3 rating has been provided in areas served by hydrants (KPB, 2006f). Additional information about community background and demographics can be found in the community CWPP (KPB, 2006f).

Community Polygon Summary		
Community Polygon Name: Kenai	**Total Score:** 50	**Rating:** Moderate
Town: Kenai		
Land Area (*mi.²*): 29.5		
Population Density (people/*mi.²*)$_1$: 200.5		
Home Density (housing units/ *mi.²*)$_2$: 132.1		

Percent of Community Classified by Wildland Urban Interface (WUI) Types
Acres (*mi.²*): 32
Percent: 90.2%

Percent of Community by Modeled Wildfire Related Loss				
Low	Medium - Low	Medium	Medium – High	High
1.2%	6.1%	5.0%	13.3%	0.0%
Dominant Fuel Type				
Grass	Grass/Shrub	Shrub	Timber Understory	Timber Litter
GR1	GS1	SH2	TU3, TU4, TU5	

Percent of Community by Modeled/Calculated Wildfire Risk Inputs	
Flame Length	Dist. From Fire Station
0-4 (ft): 68%	0-0.5 (mi.): 2%
4-8 (ft): 25%	0.5-1.0 (mi.): 7%
8-12 (ft): 0%	1.0-1.5 (mi.): 12%
>12 (ft): 0%	>1.5 (mi.): 79%

Fire Department Statistics:					
Communities Served: **Kenai***					
Fulltime Firefighters: 19		On-call Firefighters: 0		Volunteer Firefighters: 28	
Water Tender:				Wildland Engines	
Type 1:	0	Total Number:		4WD/AWD:	Brush Breaker:
Type 2:	0	Type 3: ----		0	0
Type 3:	0	Type 4: ----		0	0
Structure Engines:		Type 5: ----		0	0
Type 1:	- 3 Class A structural engines - 1 95' Aerial Platform - 1500 GPM pump that holds 200-gals water	Type 6: 2		0	0
Type 2:	0	Type 7: ----		0	0
Port-A-Tanks:	2 - 500 gal tanks 4 - 2500 gal tanks				
Portable Pumps:	1				

Recent Fires within the polygon:

- Candlelight, 1984
- Swanson River, 1969

Fire Management Options:	
Critical Protection around urban areas: **66%**	Full Protection around WUI: **26%**

* USFWS lands within Kenai are also supported by with the Kenai National Wildlife Refuge.

Current Fire and Fuel Management Programs and Plans

- 2018 ALAH Action Plan
- 2019 Kenai Peninsula Borough Hazard Mitigation Plan
- 2006 Kenai Area Community Wildfire Protection Plan

Community Polygon NFPA 1144 Survey Summary

Positive Attributes (Low Scores)

- Ingress and egress: main highway paved with minimal grade
- Ingress and egress: more than one road in and out
- Ingress and egress: moderate turnarounds around many homes
- Street signs: visible and reflective
- Topography: flat
- Water source: hydrants throughout community
- Fire protection: fire department in community
- Separation of adjacent structures: mixed
- Building construction: metal and composite roofs dominant

Negative Attributes (High Scores)

- Building construction: combustible siding
- Decking and fencing: combustible
- Utility placement: aboveground
- Vegetation: spruce bark beetle mortality; combination of timber and grass understory
- Heavy density of values at risk
- Significant development activity in the WUI

Suggested Mitigation Focus Area

Areas of Concern

- Kenai River Delta (Kenai Area CWPP, 2006).
- Treed gullies (Kenai Area CWPP, 2006).
- Hilly terrain (Kenai Area CWPP, 2006).
- ROW - north end of city (along Spur Road) (Kenai Area CWPP, 2006).
- Historic portion of town (Kenai Area CWPP, 2006).
- Areas behind Sears Elementary and Mtn View Elementary (Kenai Area CWPP, 2006).
- Auk Subdivision (Kenai Area CWPP, 2006).
- Beaver Creek Drainage (Kenai Area CWPP, 2006).
- State land north of Spur Highway (Kenai Area CWPP, 2006).
- Sterling, Nikiski, and Kenai

Summary of Mitigation Needs (for details, see Recommendation Matrices in main document)

- Support individual property owners making properties Firewise:
  - Targeted and coordinated public outreach campaign focused on defensible space, structure hardening etc. Utilize community events. Repeat messaging.
  - Initiate a community program for hazardous fuel reduction- chipper days, subdivision cleanup etc.
  - Develop home assessment program using an NFPA 1144 methodology or similar.
  - Consider monetary reimbursement to support landowners with costs associated with clearing property.
- Make escape route a priority for North Kenai. Consider paving.
- Create fire breaks using mechanized approaches:
  - Create 300-foot fuel break around Kenai refinery. Remove beetle killed trees.
  - Identify and implement (in conjunction with oil and gas operators) strategic fuels treatments around oil and gas infrastructure and Right of Ways throughout Kenai Gas Field areas.
  - Create fuel breaks along edges of existing subdivisions.
- Remove hazardous fuels along Beaver Creek Road
- Clear dead and dying trees out of creek gullies.
- Provide incentives (tax break, insurance reduction) to homeowners for implementing Firewise techniques (Kenai Area CWPP, 2006).
- Establish new slash disposal site (Kenai Area CWPP, 2006).
- Identify contractors who can carry out tree removal (Kenai Area CWPP, 2006).
- Pursue adoption of the International WUI Code (Kenai Area CWPP, 2006).
- Educate land developers, realtors etc., on Firewise techniques (Kenai Area CWPP, 2006).
- Provide fire prevention education at the Kenai Visitors Center (targeting tourists) (Kenai Area CWPP, 2006).
- Improve public notifications of emergency situations (Kenai Area CWPP, 2006).
- Educate residents on evacuation district procedures (Kenai Area CWPP, 2006).
- Address concerns related to smoke on highway as part of education campaign (Kenai Area CWPP, 2006).

Fire Department Concerns:

- Equipment needs- tanker and wildland engine with a CAFS unit (Kenai Area CWPP, 2006).
- Increase water supply to air retardant base (Kenai Area CWPP, 2006).
- Expand number of firefighting water storage or drafting sites (Kenai Area CWPP, 2006).
- Recruit and train more personnel (Kenai Area CWPP, 2006).
- Build a substation in Beaver Creek Area (Kenai Area CWPP, 2006).
- Provide National Incident Management training (NIMS) (Kenai Area CWPP, 2006).

Figure D.19. Some parts of the community are more urban with landscaping and minimal vegetation.

KENAI PENINSULA BOROUGH WILDLAND URBAN INTERFACE COMMUNITIES

LOWELL POINT POLYGON SUMMARY STATISTICS

Community Description

Lowell Point is located on the Kenai Peninsula, adjacent to Resurrection Bay. It is bordered to the north by Seward. Lowell Point encompasses an area of 11.9 square miles. Lowell Point is situated at approximately 60.074769° north latitude and -149.468314° west longitude. Lowell Point is in the Seward Recording District (ADNR 2021). Winter temperatures range from 4 degrees F to 27 on average. Some winters it has been 20 below. Summer temperatures vary from 45 to 65 degrees. Lowell Point Volunteer Fire Department and the Alaska Division of Forestry provide fire protection to Lowell Point residents (Lowell Point Community Council, 2021).

Community Polygon Summary

Community Polygon Name: Lowell Point | **Total Score:** 83 | **Rating:** **High**

Town: Lowell Point

Land Area (*mi.^{2}*): 11.9

Population Density (people/*mi.^{2}*)$_1$: 6.4

Home Density (housing units/ *mi.^{2}*)$_2$: 7.0

Percent of Community Classified by Wildland Urban Interface (WUI) Types

Acres (*mi.^{2}*): 2.5

Percent: 21.2%

Percent of Community by Modeled Wildfire Related Loss

Low	Medium - Low	Medium	Medium – High	High
0.3%	0.0%	0.0%	0.0%	0.0%

Dominant Fuel Type

Grass	Grass/Shrub	Shrub	Timber Understory	Timber Litter
				TL1, TL2

Percent of Community by Modeled/Calculated Wildfire Risk Inputs

Flame Length	Dist. From Fire Station
0-4 (ft): 5%	0-0.5 (mi.): 96%
4-8 (ft): 10%	0.5-1.0 (mi.): 1%
8-12 (ft): 13%	1.0-1.5 (mi.): 0%
>12 (ft): 72%	>1.5 (mi.): 0%

Fire Department Statistics: Lowell Point Volunteer Fire Department (LPVFD)					
Communities Served: **Lowell Point**					
Fulltime Firefighters: 0		On-call Firefighters: 7 (also volunteer)		Volunteer Firefighters: --	
Water Tender:			Wildland Engines		
		Total Number:	4WD/AWD:	Brush Breaker:	
Type 1:	0				
Type 2:	2*	Type 3: ----	0	0	
Type 3:	0	Type 4: ----	0	0	
Structure Engines:		Type 5: ----	0	0	
Type 1:	0	Type 6: ----	0	0	
Type 2:	0	Type 7: ----	0	0	
Port-A-Tanks:	1, 2500 gals				
Portable Pumps:	1, 120 GPM				
* Tanker 221 w/ 2500 Gallons Water and 750 GPM Pump, Tanker 222 w/ 4000 Gallons Water and 1000 GPM Pump					
Recent Fires within the polygon: - NA – Lowell Point Volunteer Fire Department responded to and extinguished a wildland fire in the area in 2020					
Fire Management Options:					
Critical Protection around urban areas: **11%**			Full Protection around WUI: **12%**		

* Bear Creek, Seward, and Lowell Point Fire Departments support each other's firefighting efforts through Automatic Aid Agreements.

Current Fire and Fuel Management Programs and Plans

- 2018 ALAH Action Plan
- 2019 Kenai Peninsula Borough Hazard Mitigation Plan

Community Polygon NFPA 1144 Survey Summary

Positive Attributes (Low Scores)

- Street Signs: visible and reflective
- Vegetation type: more humid forest cover
- Previous fire history: low
- Potential for severe weather potential: low
- Building construction: metal and composite roofs dominant
- Water: hydrants – No hydrants in the area – Purpose built, 20,000 Gallon underground tank with submersible pump for water source
- Fire protection: fire station in community

Negative Attributes (High Scores)

- Ingress and egress: one road in and out
- Ingress and egress: very limited turnaround space
- Defensible space: very limited
- Topography: steep topography adjacent to community
- Separation of adjacent structures: minimal
- Building construction: combustible siding
- Decking and fencing: combustible
- Utility placement: aboveground – 90% of utilities are underground

Suggested Mitigation Focus Area

Areas of Concern

- Evacuation
- Forest Acres subdivision and the base of Mt. Marathon.

Summary of Mitigation Needs (for details, see Recommendation Matrices in main document)

- Need fire weather reports specific to this portion of the Peninsula.
- Targeted and coordinated public outreach campaign focused on defensible space, structure hardening etc. Utilize community events. Repeat messaging.
- Develop home assessment program using an NFPA 1144 methodology or similar.
- Look at options to create greater turnaround areas to improve ingress and egress of fire equipment.

Fire Department Concerns:

- Limited fire response resources. Depend on Seward for support. Mutual Automatic Aid Agreements with Seward Fire and Bear Creek
- Need strategies to address evacuation concerns.
- Need increased training options for volunteers (weekends, etc.) and more focus on wildland training.
- Need to inventory wildland PPE and provide appropriate equipment for all volunteers and new recruits.

Figure D.20. Because the community is compact and encapsulated due to topography, many homes have limited defensible space or structure separation.

KENAI PENINSULA BOROUGH WILDLAND URBAN INTERFACE COMMUNITIES

MOOSE PASS SOUTH POLYGON SUMMARY STATISTICS

Community Description

The Moose Pass area encompasses 8.3 square miles and is comprised of the communities of Moose Pass, Crown Point, Lawing, Lakeview, and Primrose. All are unincorporated communities located from 17 miles to 32 miles north of Seward. Although separate communities they all consider themselves to be part of the Moose Pass area. The communities are all located in the Seward Recording District. Winter temperatures range from 4 degrees F to 27 on average. Some winters it has been 20 below. Summer temperatures vary from 45 to 65 F. Annual precipitation ranges from 20 inches at the south end of the valley to 24 inches at the north end. The Moose Pass Volunteer Fire Company and the United States Forest Service provide initial attack efforts to community residents. Operations are based out of the fire station located at 35390 Seward Highway Moose Pass (KPB, 2006c). Additional information about community background and demographics can be found in the community CWPP (KPB, 2006c).

Community Polygon Summary

Community Polygon Name: Moose Pass- Downtown Moose Pass and south | **Total Score:** 60 | **Rating:** Moderate

Town: Moose Point

Land Area (*mi.^{2}*): 8.3

Population Density (people/*mi.^{2}*)$_1$: 27.5

Home Density (housing units/ *mi.^{2}*)$_2$: 11.7

Percent of Community Classified by Wildland Urban Interface (WUI) Types

Acres (*mi.^{2}*): 3.4

Percent: 40.9%

Percent of Community by Modeled Wildfire Related Loss

Low	Medium - Low	Medium	Medium – High	High
6.5%	0.3%	0%	0%	0%

Dominant Fuel Type

Grass	Grass/Shrub	Shrub	Timber Understory	Timber Litter
		SH1		TL1, TL2

Percent of Community by Modeled/Calculated Wildfire Risk Inputs

Flame Length	Dist. From Fire Station
0-4 (ft): 98%	0-0.5 (mi.): 0%
4-8 (ft): 1%	0.5-1.0 (mi.): 0%
8-12 (ft): 0%	1.0-1.5 (mi.): 0%
>12 (ft): 0%	>1.5 (mi.): 100%

Fire Department Statistics: Moose Pass Volunteer Fire Company			
Communities Served: **Moose Pass*, Crown Point*, Primrose***			
Fulltime Firefighters: 0	On-call Firefighters: 4	Volunteer Firefighters: 5	
Water Tender: 1		Wildland Engines	
Type 1: ---	Total Number:	4WD/AWD:	Brush Breaker:
Type 2: ---	Type 3: ----	0	0
Type 3: ---	Type 4: ----	0	0
Structure Engines: 3	Type 5: ----	0	0
Type 1: ---	Type 6: ----	0	0
Type 2: ---	Type 7: ----	0	0
Port-A-Tanks: 2			
Portable Pumps: 2			
Recent Fires within the polygon: - Moose Pass, 1986			
Fire Management Options:			
Critical Protection around urban areas: **16%**	Full Protection around WUI: **26%**		

* Moose Pass, Crown Point, and Primrose are supported by the USFS via mutual aid agreement.

Current Fire and Fuel Management Programs and Plans

- 2018 ALAH Action Plan
- 2019 Kenai Peninsula Borough Hazard Mitigation Plan
- 2006 Moose Pass Area Community Wildfire Protection Plan

Community Polygon NFPA 1144 Survey Summary

Positive Attributes (Low Scores)

- Ingress and egress: main highway paved
- Ingress and egress: good turnaround areas, short driveways
- Street signs: visible and reflective
- Topography: limited in WUI
- Previous fire history: low
- Potential for severe weather: low
- Separation of adjacent structures: good
- Building construction: metal and composite roofs dominant
- Fire protection: station in community

Negative Attributes (High Scores)

- Vegetation: timber and understory; spruce bark beetle; some previous treatments but have not been well maintained
- Building construction: combustible siding
- Defensible space: some homes have poor defensible space
- Decking and fencing: combustible
- Utility placement: aboveground
- Water source: no water availability through hydrants; need to shuttle water

Suggested Mitigation Focus Area

Areas of Concern:

- Individual homeowner preparedness (Moose Pass Area CWPP, 2006).
- Ignition concerns from road and railroad

Summary of Mitigation Needs (for details, see Recommendation Matrices in main document):

- Increase fire prevention and mitigation outreach to public, with a focus on defensible space, structure hardening and safe debris disposal.
- Reduce heavy fuel loads on a landscape scale, target dead trees, create fuel breaks around community values at risk, especially critical infrastructure utilized for fire protection.
- Enhance fuel breaks with naturally occurring birch or willow.
- Connect previous treatments and extend from Tern Lake to the Crown Point area.
- Work with private landowners to support removal of beetle killed trees (Bean Creek Road identified as area of concern).
- Manage popular recreation sites with outreach to users.
- Seek funding for water tender (Moose Pass Area CWPP, 2006).
- Seek funding for portable water storage (Moose Pass Area CWPP, 2006).
- Seek additional USFS and DOF training opportunities (Moose Pass Area CWPP, 2006).
- Create equipment cache on north and south end of Moose Pass, Crown Point area (Moose Pass Area CWPP, 2006).
- Create a pre-attack suppression plan with a focus on protection of cultural resources (Moose Pass Area CWPP, 2006).
- Expand CERT and Fire Corps program (Moose Pass Area CWPP, 2006).
- Encourage residents to develop a secondary water source (Moose Pass Area CWPP, 2006).
- Restrict motorized access into areas where hazardous fuels exist on public lands (Moose Pass Area CWPP, 2006).

Fire Department Concerns:

- Increased response capacity, education, fuel reduction, and ignition source management.
- Fuels Hazards
- Beetle kill throughout the interface both developed and undeveloped areas
- Goals, in order of importance:
  - Training
  - Hazardous fuels reduction
  - Ecological management

Figure D.21. Moose Pass homes and structures are typically surrounded by forested lands, sometimes with limited defensible space.

KENAI PENINSULA BOROUGH WILDLAND URBAN INTERFACE COMMUNITIES

MOOSE PASS NORTH POLYGON SUMMARY STATISTICS

Community Description

The Moose Pass North area encompasses 9.3 square miles. Winter temperatures range from 4 degrees F to 27 on average. Some winters it has been 20 below. Summer temperatures vary from 45 to 65 degrees. Annual precipitation ranges from 20 inches at the south end of the valley to 24 inches at the north end. The Moose Pass Volunteer Fire Company and the United States Forest Service provide initial attack efforts to community residents. Operations are based out of the fire station located at 35390 Seward Highway Moose Pass (KPB, 2006c). Additional information about community background and demographics can be found in the community CWPP (KPB, 2006c).

Community Polygon Summary		
Community Polygon Name: Moose Pass North (area north of downtown Moose Pass)	**Total Score:** 89	**Rating:** **High**
Town: Moose Point		
Land Area (*mi.²*): 9.3		
Population Density (people/*mi.²*)₁: 21.1		
Home Density (housing units/ *mi.²*)₂: 9.5		

Percent of Community Classified by Wildland Urban Interface (WUI) Types
Acres (*mi.²*): 4.3
Percent: 44.9%

Percent of Community by Modeled Wildfire Related Loss				
Low	Medium - Low	Medium	Medium – High	High
5.1%	4.8%	0%	0%	0%
Dominant Fuel Type				
Grass	Grass/Shrub	Shrub	Timber Understory	Timber Litter
		SH1	TU1	TL1, TL2

Percent of Community by Modeled/Calculated Wildfire Risk Inputs	
Flame Length	Dist. From Fire Station
0-4 (ft): 98%	0-0.5 (mi.): 0%
4-8 (ft): 1%	0.5-1.0 (mi.): 0%
8-12 (ft): 0%	1.0-1.5 (mi.): 0%
>12 (ft): 0%	>1.5 (mi.): 0%

Fire Department Statistics: Moose Pass Fire				
Communities Served: **Moose Pass*, Crown Point*, Primrose***				
Fulltime Firefighters: 0	On-call Firefighters: 4		Volunteer Firefighters: 5	
Water Tender: 1			Wildland Engines	
Type 1: ---		Total Number:	4WD/AWD:	Brush Breaker:
Type 2: ---		Type 3: ----	0	0
Type 3: ---		Type 4: ----	0	0
Structure Engines: 3		Type 5: ----	0	0
Type 1: ---		Type 6: ----	0	0
Type 2: ---		Type 7: ----	0	0
Port-A-Tanks: 2				
Portable Pumps: 2				
Recent Fires within the polygon: N/A				
Fire Management Options:				
Critical Protection around urban areas: **19%**		Full Protection around WUI: **24%**		

* Moose Pass, Crown Point, and Primrose are supported by the USFS via mutual aid agreement.

Current Fire and Fuel Management Programs and Plans

- 2018 ALAH Action Plan
- 2019 Kenai Peninsula Borough Hazard Mitigation Plan
- Moose Pass Area Community Wildfire Protection Plan

Community Polygon NFPA 1144 Survey Summary

Positive Attributes (Low Scores)

- Ingress and egress: main highway paved
- Street signs: visible and reflective
- Building construction: metal and composite roofs dominant
- Previous fire occurrence: low
- Potential for severe fire weather: low
- Separation of adjacent structures: good, larger lots

Negative Attributes (High Scores)

- Ingress and egress: limited turnarounds
- Vegetation: timber and understory, spruce bark beetle, some previous treatments but have not been well maintained.
- Building construction: combustible siding
- Defensible space: limited around many homes
- Decking and fencing: combustible
- Utility placement: aboveground
- Topography: steep grades close to homes
- Water source: no water availability through hydrants; need to shuttle water
- Utility placement: aboveground

Suggested Mitigation Focus Area

Areas of Concern:

- Individual homeowner preparedness (Moose Pass Area CWPP, 2006).
- Ignition concerns from road and railroad

Summary of Mitigation Needs (for details, see Recommendation Matrices in main document)

- Increase fire prevention and mitigation outreach to public, with a focus on defensible space, structure hardening and safe debris disposal.
- Reduce heavy fuel loads on a landscape scale, target dead trees, create fuel breaks around community values at risk, especially critical infrastructure utilized for fire protection.
- Enhance fuel breaks with naturally occurring birch or willow.

- Manage popular recreation sites with outreach to users.
- Seek funding for water tender (Moose Pass Area CWPP, 2006).
- Seek funding for portable water storage (Moose Pass Area CWPP, 2006).
- Seek additional USFS and DOF training opportunities (Moose Pass Area CWPP, 2006).
- Create equipment cache on north and south end of Moose Pass, Crown Point area (Moose Pass Area CWPP, 2006).
- Create a pre-attack suppression plan with a focus on protection of cultural resources (Moose Pass Area CWPP, 2006).
- Expand CERT and Fire Corps program (Moose Pass Area CWPP, 2006).
- Encourage residents to develop a secondary water source (Moose Pass Area CWPP, 2006).
- Restrict motorized access into areas where hazardous fuels exist on public lands (Moose Pass Area CWPP, 2006).

Fire Department Concerns:

- Increased response capacity, education, fuel reduction, and ignition source management
- Fuels Hazards
- Beetle kill throughout the interface both developed and undeveloped areas
- Goals, in order of importance:
  - Training
  - Hazardous fuels reduction
  - Ecological management

Figure D.22. Some homes have an abundance of yard debris and hazards that increase the risk ratings.

KENAI PENINSULA BOROUGH WILDLAND URBAN INTERFACE COMMUNITIES

NANWALEK POLYGON SUMMARY STATISTICS

Community Description

Nanwalek is located at the southern tip of the Kenai Peninsula, 10 miles southwest of Seldovia and four miles east of Port Graham. The area encompasses 8.1 square miles of land. Winter temperatures range from 14 to 27 degrees. Summer temperatures vary from 45 to 60. Average annual precipitation is 24 inches. Fire protection is provided to the area by the Alaska Division of Forestry. Wildland and structure fire equipment is provided by the Alaska State Fire Marshals' Project Code Red program. This consists of a compressed air foam system, portable pumps, and wildland fire tools. A secondary resource for wildland firefighting is the Division of Forestry personnel based in Homer, who can respond by local hire helicopter or marine vessels. The DOF, Soldotna base, hosts a contract helicopter starting in mid-April each season for wildland fire response. The ship is staffed with a helitack crew and a bucket for delivery of water drops (TAC 2008d). Additional information about community background and demographics can be found in the community CWPP (TAC 2008d).

The Bureau of Indian Affairs has trust responsibility to manage native allotment lands on behalf of their owners. The majority of the land in Nanwalek is designated as Native Allotment. Chugachmiut, a non-profit Native consortium, works as an agent for the Native landowners both Native allotment owners and Trust townsite lot owners associated with Nanwalek and Port Graham, Alaska.

Community Polygon Summary		
Community Polygon Name: Nanwalek	**Total Score:** 93	**Rating:** **High**
	Town: Nanwalek	
	Land Area (*mi.^{2}*): 8.1	
	Population Density (people/*mi.^{2}*)[1]: 35.7	
	Home Density (housing units/ *mi.^{2}*)[2]: 9.0	

Percent of Community Classified by Wildland Urban Interface (WUI) Types
Acres (*mi.^{2}*): 1.6
Percent: 0%

Percent of Community by Modeled Wildfire Related Loss				
Low	Medium - Low	Medium	Medium – High	High
4.8%	0.0%	0.0%	0.0%	0.0%
		Dominant Fuel Type		
Grass	Grass/Shrub	Shrub	Timber Understory	Timber Litter
				TL1

Percent of Community by Modeled/Calculated Wildfire Risk Inputs	
Flame Length	Dist. From Fire Station
0-4 (ft): 95%	0-0.5 (mi.): 0%
4-8 (ft): 5%	0.5-1.0 (mi.): 0%
8-12 (ft): 0%	1.0-1.5 (mi.): 0%
>12 (ft): 0%	>1.5 (mi.): 100%

Fire Department Statistics: Nanwalek Volunteer Fire Department **

Communities Served: Nanwalek*

Fulltime Firefighters: 1 | On-call Firefighters: 1 | Volunteer Firefighters: 0***

Water Tender: 0		Wildland Engines: 0 – Use personal vehicles and ATVs		
Type 1:	0	Total Number:	4WD/AWD:	Brush Breaker:
Type 2:	0	Type 3: ----	0	0
Type 3:	0	Type 4: ----	0	0
Structure Engines: 0 – use personal vehicles and ATVs		Type 5: ----	0	0
Type 1:	0	Type 6: ----	0	0
Type 2:	0	Type 7: ----	0	0
Port-A-Tanks:	1			
Portable Pumps:	2			

Recent Fires within the polygon: N/A

Fire Management Options:	
Critical Protection around urban areas: **0%******	Full Protection around WUI: **19%**

* Nanwalek has a code red firefighting system
** The Nanwalek VFD service area is currently installing new water lines and fire hydrants.
*** There is no list of active volunteers. However, if a fire occurs the volunteers will support suppression efforts. Chief is currently looking into options to increase recruitment.
****Chugachmiut, KPB, and AK DOF are currently updating Fire Management options for Nanwalek and status will be changed from Full to Critical

Current Fire and Fuel Management Programs and Plans

- 2018 ALAH Action Plan
- 2019 Kenai Peninsula Borough Hazard Mitigation Plan
- 2008 Nanwalek Community Wildfire Protection Plan

Community Polygon NFPA 1144 Summaries
(No assessments completed during 2021 CWPP update. Desktop analysis only)

Positive Attributes (Low Scores)

- Vegetation type: more humid forest cover
- Building construction: metal and composite roofs dominant
- Fire History: low
- Values at risk: lower density

Negative Attributes (High Scores)

- Ingress and egress: Bad. Access by air and sea
- Topography: steep topography adjacent to community
- Separation of adjacent structures: minimal
- Building construction: combustible siding
- Decking and fencing: combustible
- Utility placement: aboveground

Suggested Mitigation Focus Area

Areas of Concern

- No organized fire response (Nanwalek CWPP 2008).
- No fire resources (Nanwalek CWPP 2008).
- Limited fresh water supply for fire suppression (Nanwalek CWPP 2008).
- Low fire risk (Nanwalek CWPP 2008).
- Limited fire mitigation around homes (Nanwalek CWPP 2008).
- Poor access (Nanwalek CWPP 2008).
- The Nanwalek airport is difficult to use
- An unnamed creek is the primary source of drinking water and often dries in the summer months (Bottles of drinking water need to be brought to the community during these times)
- English Bay River is extremely important for salmon fishing
- Cabins surrounding lakes which are used by community members for fishing and hunting

Summary of Mitigation Needs (for details, see Recommendation Matrices in main document)

- Procure a small air compressor to effectively fight fire with compressed air foam (Nanwalek CWPP 2008).
- Procure a shipping container to house fire equipment (Nanwalek CWPP 2008).
- Inventory all homes for smoke detectors and fire extinguishers (Nanwalek CWPP 2008).
- Conduct Firewise assessments and home assessments to identify mitigation needs (Nanwalek CWPP 2008).
- Provide fire (structure and wildland) protection training to community members (Nanwalek CWPP 2008).
- Provide school curriculum to students on wildfire prevention and mitigation (Nanwalek CWPP 2008).
- Increase public awareness through mail campaign (Nanwalek CWPP 2008).
- Support water improvement projects, creating adequate supply for fire suppression (Nanwalek CWPP 2008).
- Sign mutual aid agreement with all South Kachemak communities for fire response (Nanwalek CWPP 2008).
- Water resources and habitat are highly valued in Nanwalek and the protection of riparian areas, fisheries, particularly for salmon, and drinking water is critical
- Many cultural values need to be protected
- Need to create a map to identify the location transmission/distribution line between Port Graham and Nanwalek and work with HEA to identify any needed upgrades to the line and/or vegetation management actions needed to enhance fire resilience and protection. There is a trail that is not maintained regularly that may be used to access the lines, but the trail is not accessible by vehicle.
- Consider enhancing ROW for the transmission line to serve as a fuel break recreational trail.
- Enhance existing road access. Look at feasibility of connecting and expanding existing road network, while protecting resources. (Currently a BIA roads project is in planning phase).
- Enhance road connections between Port Graham and Nanwalek to facilitate transport of fire crews from Port Graham airport into Nanwalek.
- Build firefighting resources and capabilities for wildland fire. Procure wildland fire equipment and PPE and identify location and resources to build appropriate storage. Provide optional training for residents in basic wildland fire fighting.
- Pre-season planning to practice bringing in resources from the sea.

- Initiate a public education campaign to inform residents of the threat of wildfire and focus efforts on encouraging defensible space practices around properties and values at risk, and preparedness and evacuation.
- Identify location(s) for evacuation shelter and safety zones and provide messaging to the community on those locations.
- Identify evacuation routes and develop maintenance schedule to ensure they remain safe routes for residents to utilize.
- Ensure that all previous treatments are maintained to preserve effectiveness.
- Identify vulnerable residents and build a plan to address preparedness and response needs for those populations.
- Improve the existing or build a new airport

Fire Department Concerns:

- Fire crews need to enter and exit Nanwalek through the Nanwalek airport, which is known to be difficult to use due to its location and the physical landscape (steep cliffs).
- Fire department is 100% volunteer and are focused on structural fires, not wildland fire.
- Do not have firefighting hand tools. Have significant equipment needs. They currently have a code red trailer, but it may not be functional. A code red trailer was brought to Nanwalek prior to 2009. The level of maintenance of the equipment is unclear.
    - Code red trailer: A trailer used to house fire response equipment
- Need to identify a designated site for evacuation and evacuation routes

KENAI PENINSULA BOROUGH WILDLAND URBAN INTERFACE COMMUNITIES

NIKISKI POLYGON SUMMARY STATISTICS

Community Description

Nikiski is located on the Kenai Peninsula, 9 miles north of the City of Kenai, on the Kenai Spur Road. It is also known as Port Nikiski and Nikishka. It lies at approximately 60.716050° north latitude and -151.34066° west longitude. Nikiski is in the Kenai Recording District. The area encompasses 67.4 square miles of land. Winter temperatures range from -10˚ F to 35˚ F; summer temperatures vary from 45˚ F to 65˚ F. Average annual precipitation is 24 inches. The Nikiski Fire Department (NFD) and Alaska Division of Forestry provide fire protection to Nikiski area residents. The NFD firefighters are state-certified at the Firefighter I, II, or Fire Officer I levels (KPB, 2006g). Additional information about community background and demographics can be found in the community CWPP (KPB, 2006g).

Community Polygon Summary		
Community Polygon Name: Nikiski	**Total Score:** 47	**Rating:** Moderate
Town: Nikiski		
Land Area (*mi.^{2}*): 67.4		
Population Density (people/*mi.^{2}*)$_1$: 60.8		
Home Density (housing units/ *mi.^{2}*)$_2$: 40.4		

Percent of Community Classified by Wildland Urban Interface (WUI) Types
Acres (*mi.^{2}*): 75.6
Percent: 99.6%

Percent of Community by Modeled Wildfire Related Loss				
Low	Medium - Low	Medium	Medium – High	High
5.9%	14.3%	8.9%	12.6%	0.0%
Dominant Fuel Type				
Grass	Grass/Shrub	Shrub	Timber Understory	Timber Litter
GR2	GS1	SH5	TU1, TU2, TU5	TL2, TL3, TL6

Percent of Community by Modeled/Calculated Wildfire Risk Inputs	
Flame Length	Dist. From Fire Station
0-4 (ft): 50%	0-0.5 (mi.): 1%
4-8 (ft): 10%	0.5-1.0 (mi.): 3%
8-12 (ft): 21%	1.0-1.5 (mi.): 4%
>12 (ft): 0%	>1.5 (mi.): 92%

Fire Department Statistics: Nikiski Fire Department

Communities Served: **Nikiski*, Beluga, Tyonek**

Fulltime Firefighters: 25 | On-call Firefighters: 0 | Volunteer Firefighters: 30

Water Tender:		Wildland Engines		
		Total Number:	4WD/AWD:	Brush Breaker:
Type 1:	4-7	Type 3: ----	0	0
Type 2:	0	Type 4: ----	0	0
Type 3:	0	Type 5: ----	0	0
Structure Engines:		Type 6: 1-3	1-3	0
Type 1:	4-7	Type 7: ----	0	0
Type 2:	0			
Port-A-Tanks:	10			
Portable Pumps:	0			

Recent Fires within the polygon:

- Island Lake, 1970
- Swanson River, 1969

Fire Management Options:

Critical Protection around urban areas: **84%**	Full Protection around WUI: **16%**

* USFWS lands within Nikiski are also supported by the Kenai National Wildlife Refuge.

Current Fire and Fuel Management Programs and Plans

- 2018 ALAH Action Plan
- 2019 Kenai Peninsula Borough Hazard Mitigation Plan
- 2006 Nikiski /Salamatof Community Wildfire Protection Plan

Community Polygon NFPA 1144 Survey Summary

Positive Attributes (Low Scores)

- Ingress and egress: main highway paved and more than one road in and out of most subdivision areas
- Street signs: visible and reflective
- Vegetation type: hardwood dominant with conifer component
- Building construction: metal and composite roofs dominant
- Defensible space: moderate

Negative Attributes (High Scores)

- Building construction: combustible siding
- Water source: hydrants only in some areas
- Utility placement: aboveground
- Decking and fencing: combustible
- Separation of adjacent structures: minimal
- Northern portion of community has poor access

Suggested Mitigation Focus Area

Areas of concern

- Captain Cook State Park mitigation and fuel reduction. Create defensible space/safe zones (Nikiski/Salamatof CWPP, 2006).
- Include Cottonwood Lane and Admiralty Drive (Nikiski/Salamatof CWPP, 2006).
- Empty/abandoned buildings and vehicles pose a fire/safety hazard and should be removed (Nikiski/Salamatof CWPP, 2006).
- Island Lake Area, Holt-Lamplight Area, Captain Cook State Park, and KNWR.
- Sterling, Nikiski, and Kenai

Summary of Mitigation Needs (for details, see Recommendation Matrices in main document)

- Need a lumber market and processing to support increased fuel treatments.
- The Strategic Fuel Break is adjacent to Nikiski and will continue to be extended. There is strong support for extending the fuel break and continuing to maintain the fuel break.
- Need a fill site closer to Halibouty. An underground cistern would work.
- Transient population in the Halibouty area. In the event of a wildfire, there may be people who haven't been recognized, who would need to evacuate.
- Investigate access issues including turn-around and access areas for Puppy Dog Lake, Tauriainan Trail, Goode Lake, Beck Lake, Bishops Creek, and Northwoods subdivision at Bishop Creek Bar, Halibouty Road.
- Build a fuel break from Funny River to Homer using the easement Right of Way. Integrate the fuel break with recreational uses such as snowmobilers.
- Develop community evacuation plans, with goal of developing subdivision plans. Provide outreach to educate population on evacuation routes.
- Define and provide education on "shelter in place" vs. evacuation.
- Implement education campaign on the importance of defensible space.
- Implement defensible space and hazardous fuel reduction projects within Captain Cook State Park
- Identify and implement (in conjunction with oil and gas operators) strategic fuels treatments around oil and gas infrastructure and Right of Ways throughout Kenai Gas Field areas.
- Lisburne/Pipeline is a very long road, and access problems will occur if traffic is backed up along Lisburne to Basteen. Improve section of Basteen (Nikiski/Salamatof CWPP, 2006).
- Empty/abandoned buildings and vehicles pose a fire/safety hazard and should be removed (Nikiski/Salamatof CWPP, 2006).

Fire Department Concerns:

- Island Lake Area, Holt-Lamplight Area, Captain Cook State Park and KNWR are highest risk
- Goals (in order of importance): training, hazardous fuels reduction, ecological management
- Need additional staff

Figure D.23. The community is served by the Nikiski Fire Department.

KENAI PENINSULA BOROUGH WILDLAND URBAN INTERFACE COMMUNITIES

NIKOLAESVK POLYGON SUMMARY STATISTICS

Community Description

Nikolaevsk is located inland on the Kenai Peninsula, near Anchor Point. It lies on a road leading from North Fork Road and the Sterling Highway. It was named to honor St. Nicholas, the patron saint of the town's church. It lies at approximately 59.811940° north latitude and -151.61056° west longitude. Nikolaevsk is in the Homer Recording District. The area encompasses 34.8 square miles of land. Winter temperatures range from -40˚ F to 37˚ F; summer temperatures vary from 45˚ F to 80˚ F. Average annual precipitation is 24 inches. Western Emergency Services (formerly Anchor Point Volunteer Fire Department) and the Alaska Division of Forestry provide fire protection to Anchor Point residents (KPB, 2006a). Additional information about community background and demographics can be found in the community CWPP (KPB, 2006a).

Community Polygon Summary

Community Polygon Name: Nikolaesvk **Total Score:** 67 **Rating:** **Moderate**

Town: Nikolaesvk

Land Area (*mi.*^{2}): 34.8

Population Density (people/*mi.*^{2})$_1$: 8.2

Home Density (housing units/ *mi.*^{2})$_2$: 9.8

Percent of Community Classified by Wildland Urban Interface (WUI) Types

Acres (*mi.*^{2}): 18.8

Percent: 53.9%

Percent of Community by Modeled Wildfire Related Loss

Low	Medium - Low	Medium	Medium – High	High
4.9%	6.6%	1.8%	0.7%	0.0%

Dominant Fuel Type

Grass	Grass/Shrub	Shrub	Timber Understory	Timber Litter
GR2	GS1	SH2	TU1, TU2, TU5	TL2

Percent of Community by Modeled/Calculated Wildfire Risk Inputs

Flame Length	Dist. From Fire Station
0-4 (ft): 100%	0-0.5 (mi.): 2%
4-8 (ft): 60%	0.5-1.0 (mi.): 6%
8-12 (ft): 0%	1.0-1.5 (mi.): 9%
>12 (ft): 0%	>1.5 (mi.): 83%

Fire Department Statistics: Western Emergency Services (formerly Anchor Point)

Communities Served: **Anchor Point, Ninilchik, Nikolaevsk, Happy Valley**

Fulltime Firefighters: 10 | On-call Firefighters: 0 | Volunteer Firefighters: 38

Water Tender:

Type 1:	1-3
Type 2:	1-3
Type 3:	0

Structure Engines:

Type 1:	1-3
Type 2:	0

Port-A-Tanks: 8

Portable Pumps: 4

Wildland Engines

Total Number:	4WD/AWD:	Brush Breaker:
Type 3: ----	0	0
Type 4: ----	0	0
Type 5: ----	0	0
Type 6: 1-3	1-3	1-3
Type 7: ----	0	0

Recent Fires within the polygon:

- Nikolaesvk, 2018

Fire Management Options:

Critical Protection around urban areas: **95%**	Full Protection around WUI: **0%**

Current Fire and Fuel Management Programs and Plans

- 2018 ALAH Action Plan
- 2019 Kenai Peninsula Borough Hazard Mitigation Plan
- 2006 Anchor Point/Happy Valley/Nikolaevsk Community Wildfire Protection Plan

Community Polygon NFPA 1144 Survey Summary

Positive Attributes (Low Scores)

- Street signs: visible and reflective
- Vegetation type: mixture of timber litter, timber understory, grass and shrub fuels, open woodland, and forest patches
- Defensible space: moderate
- Water source: hydrants
- Slope: area has a 10% to 20% slope

Negative Attributes (High Scores)

- Ingress and egress: one road in and out
- Building construction: combustible siding
- Water source: limited numbers of hydrants but do have water tender.
- Utility placement: aboveground
- Decking and fencing: combustible
- Separation of adjacent structures: minimal
- History fire occurrence: high
- Building construction: pressure-treated composite shakes and shingles

Suggested Mitigation Focus Area

Areas of Concern

- Whiskey Gulch East of Sterling Highway, Old Sterling and Dusty Street area, South Fork of Anchor River land is steep, Picnic areas, such as State parks, and shooting areas need to be cleared (Anchor Point/Happy Valley/Nikolaevsk CWPP, 2006).
- Bull Crossing Road is area of concern. Recent fires and poor access.
- North of Nikolaevsk is very poor access. Poor maintenance of roads. Need improvements and increased Right of Way.

- Nikolaevsk, North Fork area (Anchor Point), and Oilwell Road area (Ninilchik).

Summary of Mitigation Needs (for details, see Recommendation Matrices in main document)

- Need a lumber market and processing to support increased fuel treatments
- Cultural values at risk in village
- Education and outreach about defensible space and home hardening is needed here as many homes are close together, homes are missing siding and have poor yard maintenance.
- There are many logging slash piles that need to be removed and managed. They increase hazard, especially in early winter when it could dry out.
- During a recent fire in Caribou Hills Fire, they observed poor access. Need to improve access.
- In poor access areas the Division of Forestry can provide heli-crews to improve access for suppression. This is more limited during a busy fire season.
- There are a lot of locked gates.
- There is a lot of potential development. Lots of platted land with poor access.
- A fuel break is needed around the community.
- Clean downed timber and piles through chipping and burns (Anchor Point/Happy Valley/Nikolaevsk CWPP, 2006).
- Provide public disposal site for brush/slash to be burned by the KPB once or twice a year (Anchor Point/Happy Valley/Nikolaevsk CWPP, 2006).

Fire Department Concerns:

- Nikolaevsk, North Fork area (Anchor Point) and Oilwell Road area (Ninilchik) are highest risk
- Goals (in order of importance): training, hazardous fuels reduction, ecological management

Figure D.24. Example of limited defensible space in Nikolaevsk.

KENAI PENINSULA BOROUGH
WILDLAND URBAN INTERFACE COMMUNITIES
NINILCHIK VILLAGE POLYGON SUMMARY STATISTICS

Community Description

Ninilchik Village lies on the west coast of the Kenai Peninsula on the Sterling Highway, 38 miles southwest of the City of Kenai, and 188 road miles from Anchorage. The community lies between mileposts 119 and 144 of the Sterling Highway. It lies at approximately 60.051390° north latitude and -151.66889° west longitude. Ninilchik is in the Homer Recording District. The area encompasses 0.1 square miles of land. Winter temperatures range from 14˚ F to 27˚ F; summer temperatures vary from 45˚ F to 65˚ F. Average annual precipitation is 24 inches. The Ninilchik Emergency Services (NES) and the Alaska Division of Forestry provide fire protection to the Ninilchik area. The NES fire service area extends from milepost 144 to 119 on the Sterling Highway and along secondary roads, including Oil Well Road. They officially respond to wildfires located up to 1,000 feet off an established roadway (KPB, 2006h). Additional information about community background and demographics can be found in the community CWPP (KPB, 2006h).

Community Polygon Summary		
Community Polygon Name: Ninilchik Village	**Total Score:** 69	**Rating:** Moderate
Town: Ninilchik Village		
Land Area (*mi.^{2}*): 0.1		
Population Density (people/*mi.^{2}*)$_1$: 3588.2		
Home Density (housing units/ *mi.^{2}*)$_2$: 771.5		

Percent of Community Classified by Wildland Urban Interface (WUI) Types
Acres (*mi.^{2}*): 0
Percent: 87.2%

Percent of Community by Modeled Wildfire Related Loss				
Low	Medium - Low	Medium	Medium – High	High
0.1%	22.5%	64.7%	7.8%	0.0%
Dominant Fuel Type				
Grass	Grass/Shrub	Shrub	Timber Understory	Timber Litter
GR1 GR2	GS1	SH2 SH5	TU2, TU3, TU5	

Percent of Community by Modeled/Calculated Wildfire Risk Inputs	
Flame Length	Dist. From Fire Station
0-4 (ft): 95%	0-0.5 (mi.): 51%
4-8 (ft): 89%	0.5-1.0 (mi.): 50%
8-12 (ft):0%	1.0-1.5 (mi.): 0%
>12 (ft): 0%	>1.5 (mi.): 0%

Fire Department Statistics: Western Emergency Services (formerly Anchor Point)				
Communities Served: **Anchor Point, Ninilchik, Nikolaesvk, Happy Valley**				
Fulltime Firefighters: 10	On-call Firefighters: 0	Volunteer Firefighters: 38		
Water Tender:			Wildland Engines	
Type 1: 1-3		Total Number:	4WD/AWD:	Brush Breaker:
Type 2: 1-3		Type 3: ----	0	0
Type 3: 0		Type 4: ----	0	0
Structure Engines:		Type 5: ----	0	0
Type 1: 1-3		Type 6: 1-3	1-3	1-3
Type 2: 0		Type 7: ----	0	0
Port-A-Tanks: 8				
Portable Pumps: 4				
Recent Fires within the polygon: - Caribou Hills, 2007 - Crooked Creek, 1996 - Oilwell Road, 1989				
Fire Management Options:				
Critical Protection around urban areas: **100%**	Full Protection around WUI: **0%**			

Current Fire and Fuel Management Programs and Plans

- 2018 ALAH Action Plan
- 2019 Kenai Peninsula Borough Hazard Mitigation Plan
- 2006 Ninilchik Area Community Wildfire Protection Plan

Community Polygon NFPA 1144 Survey Summary

Positive Attributes (Low Scores)

- Street signs: visible and reflective
- Vegetation type: grass and shrub dominant
- Good defensible space
- Slope: 21% to 30%

Negative Attributes (High Scores)

- Ingress and egress: one road in and out
- Building construction: combustible siding
- Roofing: intreated wood single, plywood, particle board
- Utility placement: aboveground
- Decking and fencing: combustible

Suggested Mitigation Focus Area

Areas of Concern:

- Nikolaevsk, North Fork area (Anchor Point), and Oilwell Road area (Ninilchik).

Summary of Mitigation Needs (for details, see Recommendation Matrices in main document)

- Need a lumber market and processing to support increased fuel treatments
- Historic structures, heritage, tourism and fishing need to be protected
- Roads are narrow and windy. Access needs to be improved.
- Educate the public on emergency evacuation routes, procedures, including CAN system, and shelters are needed (Ninilchik Area CWPP, 2006).
- Set up slash disposal sites. Brush chipped or incinerated by KPB equipment (Ninilchik Area CWPP, 2006).

Fire Department Concerns:
- N/A

Figure D.25. Ninilchik Village has many historic and cultural sites that should be protected with mitigation measures such as defensible space.

KENAI PENINSULA BOROUGH WILDLAND URBAN INTERFACE COMMUNITIES

NINILCHIK POLYGON SUMMARY STATISTICS

Community Description

Ninilchik lies on the west coast of the Kenai Peninsula on the Sterling Highway, 25 miles southwest of the City of Kenai, and 176 road miles from Anchorage. It lies at approximately 60.151684° north latitude and -151.485068° west longitude. Ninilchik is in the Homer Recording District. The area encompasses 206.8 square miles of land. Winter temperatures range from 14˚ F to 27˚ F; summer temperatures vary from 45˚ F to 65˚ F. The Ninilchik Emergency Services (NES) and the Alaska Division of Forestry provide fire protection to the Ninilchik area. The NES fire service area extends from milepost 144 to 119 on the Sterling Highway and along secondary roads, including Oil Well Road. They officially respond to wildfires located up to 1,000 feet off an established roadway (KPB, 2006h). Additional information about community background and demographics can be found in the community CWPP (KPB, 2006h).

Community Polygon Summary		
Community Polygon Name: Ninilchik	**Total Score:** 49	**Rating:** Moderate
Town: Ninilchik		
Land Area (*mi.^{2}*): 206.8		
Population Density (people/*mi.^{2}*)$_1$: 4.1		
Home Density (housing units/ *mi.^{2}*)$_2$: 7.1		

Percent of Community Classified by Wildland Urban Interface (WUI) Types
Acres (*mi.^{2}*): 101.7
Percent: 49.1%

Percent of Community by Modeled Wildfire Related Loss				
Low	Medium - Low	Medium	Medium – High	High
2.6%	5.8%	1.0%	1.6%	0.0%
Dominant Fuel Type				
Grass	Grass/Shrub	Shrub	Timber Understory	Timber Litter
GR1, GR2	GS1, GS2	SH2, SH5	TU2, TU3, TU5	TL2, TL3

Percent of Community by Modeled/Calculated Wildfire Risk Inputs	
Flame Length	Dist. From Fire Station
0-4 (ft): 98%	0-0.5 (mi.): 0%
4-8 (ft):47%	0.5-1.0 (mi.): 1%
8-12 (ft): 1%	1.0-1.5 (mi.): 1%
>12 (ft): 0%	>1.5 (mi.): 98%

Fire Department Statistics: Western Emergency Services (formerly Anchor Point)				
Communities Served: **Anchor Point, Ninilchik, Nikolaesvk, Happy Valley**				
Fulltime Firefighters: 10		On-call Firefighters: 0		Volunteer Firefighters: 38
Water Tender:			Wildland Engines	
Type 1:	1-3	Total Number:	4WD/AWD:	Brush Breaker:
Type 2:	1-3	Type 3: ----	0	0
Type 3:	0	Type 4: ----	0	0
Structure Engines:		Type 5: ----	0	0
Type 1:	1-3	Type 6: 1-3	1-3	1-3
Type 2:	0	Type 7: ----	0	0
Port-A-Tanks:	8			
Portable Pumps:	4			

Recent Fires within the polygon:

- Caribou Hills, 2007
- Crooked Creek, 1996
- Oilwell Road, 1989

Fire Management Options:	
Critical Protection around urban areas: **100%**	Full Protection around WUI: **0%**

Current Fire and Fuel Management Programs and Plans

- 2018 ALAH Action Plan
- 2019 Kenai Peninsula Borough Hazard Mitigation Plan
- 2006 Ninilchik Area Community Wildfire Protection Plan

Community Polygon NFPA 1144 Survey Summary

Positive Attributes (Low Scores)

- Ingress and egress: main highway paved
- Street signs: visible and reflective
- Vegetation type: timber with grass or shrub understory
- Defensible space: moderate
- Building construction: metal and composite roofs dominant
- Slope: 9% or less
- Water source: hydrants

Negative Attributes (High Scores)

- Building construction: combustible siding
- Utility placement: aboveground
- Decking and fencing: combustible
- History of fire occurrence: high

Suggested Mitigation Focus Area

Areas of Concern

- State land east of Forties along transmission line (Ninilchik Area CWPP, 2006).
- Clear rights-of-way along roadways (Ninilchik Area CWPP, 2006).
- State Park hazard fuel reduction. Create defensible space/safe zones at state park facilities (Ninilchik Area CWPP, 2006).
- The residential area north of the Ninilchik River (Ninilchik Area CWPP, 2006).
- Marion Street near Oil Well Road and Oil Well Road up to Holly (Ninilchik Area CWPP, 2006).
- Remove dead trees from along gas pipeline ROW, between the highway and the pipeline (Ninilchik Area CWPP, 2006).
- MP 120, Marathon gas pad (Ninilchik Area CWPP, 2006).
- Fuel break between the Crooked Creek Fire area running southeast to tie into fire-resistant alpine areas (Ninilchik Area CWPP, 2006).
- Nikolaevsk, North Fork area (Anchor Point), and Oilwell Road area (Ninilchik).

Summary of Mitigation Needs (for details, see Recommendation Matrices in main document)

- Need a lumber market and processing to support increased fuel treatments
- Need to improve access
- Some roads do not meet Borough standards
- Old Sterling Highway and New Sterling Highway have created confusion in dispatch issues due to road names. Name differentiation and clarification is needed.
- Educate the public on emergency evacuation routes, procedures, including CAN system, and shelters are needed (Ninilchik Area CWPP, 2006).
- Set up slash disposal sites. Brush chipped or incinerated by KPB equipment (Ninilchik Area CWPP, 2006).
- Create buffers and defensible space around areas of cultural value.
- Explore the potential for a Ninilchik Traditional Council fire crew. Would require training and equipment purchases.
- Integrate fire planning into existing land management plans.
- Continue to look for opportunities to combine hazardous fuels mitigation with moose habitat improvements.
- Utilize CIRI non-profits to be a conduit for outreach to native communities.

Fire Department Concerns:

- N/A

Figure D.26. Example of minimal yard maintenance contributing to hazardous fuels and poor defensible space.

KENAI PENINSULA BOROUGH
WILDLAND URBAN INTERFACE COMMUNITIES
POINT POSSESSION POLYGON SUMMARY STATISTICS

Community Description

Point Possession is located on the Kenai Peninsula, 35 miles north of the City of Kenai. It lies at approximately 60.89279° north latitude and -150.62071° west longitude. Nikiski is in the Kenai Recording District. The area encompasses 40.9 square miles of land. Winter temperatures range from -10˚ F to 35˚ F; summer temperatures vary from 45˚ F to 65˚ F. Average annual precipitation is 24 inches. The Nikiski Fire Department (NFD) and Alaska Division of Forestry provide fire protection to Point Possession area residents. (KPB, 2006g). Additional information about community background and demographics can be found in the community CWPP (KPB, 2006g).

Community Polygon Summary		
Community Polygon Name: Point Possession (Gray Cliffs)	**Total Score:** 73	**Rating:** **High**
Town: Point Possession		
Land Area (*mi.*^{2}): 40.9		
Population Density (people/*mi.*^{2})$_1$: 0.0		
Home Density (housing units/ *mi.*^{2})$_2$: 4.7		

Percent of Community Classified by Wildland Urban Interface (WUI) Types
Acres (*mi.*^{2}): 28.8
Percent: 68.7%

Percent of Community by Modeled Wildfire Related Loss

Low	Medium - Low	Medium	Medium – High	High
0.9%	2.9%	0.0%	0.4%	0.0%

Dominant Fuel Type

Grass	Grass/Shrub	Shrub	Timber Understory	Timber Litter
GS1		SH5	TU2, TU4, TU5	

Percent of Community by Modeled/Calculated Wildfire Risk Inputs

Flame Length	Dist. From Fire Station
0-4 (ft): 31%	0-0.5 (mi.): 0%
4-8 (ft): 11%	0.5-1.0 (mi.): 0%
8-12 (ft): 43%	1.0-1.5 (mi.): 0%
>12 (ft): 0%	>1.5 (mi.): 100%

Fire Department Statistics: Nikiski Fire Department					
Communities Served: **Nikiski*, Beluga, Tyonek**					
Fulltime Firefighters: 25		On-call Firefighters: 0		Volunteer Firefighters: 30	
Water Tender:			Wildland Engines		
Type 1:	4-7	Total Number:	4WD/AWD:	Brush Breaker:	
Type 2:	0	Type 3: ----	0	0	
Type 3:	0	Type 4: ----	0	0	
Structure Engines:		Type 5: ----	0	0	
Type 1:	4-7	Type 6: 1-3	1-3	0	
Type 2:	0	Type 7: ----	0	0	
Port-A-Tanks:	10				
Portable Pumps:	0				
Recent Fires within the polygon: - Swanson River, 1969					
Fire Management Options:					
Critical Protection around urban areas: **30%**			Full Protection around WUI: **50%**		

* Nikiski is also supported by the Kenai National Wildlife Refuge via mutual aid agreement.

Current Fire and Fuel Management Programs and Plans

- 2018 ALAH Action Plan
- 2019 Kenai Peninsula Borough Hazard Mitigation Plan
- 2006 Nikiski/Salamatof Community Wildfire Protection Plan

Community Polygon NFPA 1144 Survey Summary

Positive Attributes (Low Scores)

- Street signs: visible and reflective
- Vegetation type: more deciduous and coastal vegetation (birch), lower fire danger
- Previous fire history: low, not within polygon but on adjacent land
- Topography: flat but cliffs
- Severe weather potential: low

Negative Attributes (High Scores)

- Ingress and egress: one road in and out, unsurfaced
- Ingress and egress: extremely limited turnaround space
- Defensible space: limited
- Separation of adjacent structures: minimal
- Building construction: combustible siding
- Decking and fencing: combustible
- Utility placement: aboveground
- Water: none; need to shuttle water, which is slow due to road conditions
- Fire protection: none; Nikiski serves the area
- Potential development and expansion of WUI

Suggested Mitigation Focus Area

Areas of Concern

- Rapid expansion of WUI
- Extremely limited road access
- Existing structures with poor defensible space
- Island Lake Area, Holt-Lamplight Area, Captain Cook State Park, and KNWR.
- Sterling, Nikiski, and Kenai

Summary of Mitigation Needs (for details, see Recommendation Matrices in main document)

- Increase fire prevention and mitigation outreach to public, with a focus on defensible space, structure hardening and safe debris disposal.
- Determine alternative evacuation routes
- Carry out road improvements. Create turnarounds and passing spaces.
- The Borough and Nikiski Fire should clear some parcels north of Nikiski to serve as a staging area for fire resources, equipment, water for Captain Cook area and Gray Cliffs.
- Increase ROW width and roadside clearing
- Support vulnerable populations who are not able to do necessary mitigation work
- Identify and publicize potential shelter locations (Nikiski/Salamatof CWPP, 2006).
- Develop community evacuation plans (Nikiski/Salamatof CWPP, 2006).
- Develop a public notification system (Nikiski/Salamatof CWPP, 2006).
- Develop alternative telephone system (Nikiski/Salamatof CWPP, 2006).
- Consider community wide evacuation drills (Nikiski/Salamatof CWPP, 2006).
- Define and provide education on “shelter in place” vs evacuation (Nikiski/Salamatof CWPP, 2006).
- Educate new residents on fire prevention and escape routes/facilities (Nikiski/Salamatof CWPP, 2006).
- Educate school children on fire prevention and safety (Nikiski/Salamatof CWPP, 2006).
- Identify and engage absentee landowners in fuel mitigation on land yet to be developed (Nikiski/Salamatof CWPP, 2006).
- Utilize a range of forums for public education (Nikiski/Salamatof CWPP, 2006).
- Develop a list of water resources (Nikiski/Salamatof CWPP, 2006).
- Look into options for emergency power outages- generators (Nikiski/Salamatof CWPP, 2006).

Fire Department Concerns:

- Increased response capacity- additional fire fighters needed to address growing WUI
- Increase response times- road improvements
- Facilitate safe access- wider roads and turnarounds
- Create a fire cache for equipment and water storage tanks
- Have GPS, GIS and computer mapping available on all fire trucks (Nikiski/Salamatof CWPP, 2006).

KENAI PENINSULA BOROUGH WILDLAND URBAN INTERFACE COMMUNITIES

PORT GRAHAM POLYGON SUMMARY STATISTICS

Community Description

The village of Port Graham is located close to the southern tip of the Kenai Peninsula facing Port Graham Bay, an arm of Cook Inlet. The location is approximately 24 miles southwest of Homer and is accessible by plane or boat. It is located 4 miles from Nanwalek, which is accessible by foot trail, plane, or boat. Seldovia, the nearest service center, is 7.5 miles away. The Port Graham Volunteer Fire Department and the Alaska Division of Forestry accompanied by local community resources provides fire response for the community. Fire equipment is located at a maintained and heated public safety building in the Community. Secondary fire response resources are located 25 miles away in Homer with a four person Alaska Division of Forestry fire crew. This crew historically responds via local hire helicopter or marine vessels. Soldotna State Forestry has a dedicated helicopter fire crew based in Soldotna (TAC 2008b). Additional information about community background and demographics can be found in the community CWPP (TAC 2008b).

The Bureau of Indian Affairs has trust responsibility to manage native allotment lands on behalf of their owners. The majority of the land in Port Graham is designated as Native Allotment. Chugachmiut, a non-profit Native consortium, works as an agent for the Native landowners both Native allotment owners and Trust townsite lot owners associated with Nanwalek and Port Graham, Alaska.

Community Polygon Summary
(Desktop analysis only)

Community Polygon Name: Port Graham | **Total Score:** 93 | **Rating:** **High**

Town: Port Graham

Land Area (*mi.²*): 6.4

Population Density (people/*mi.²*)₁: 26.1

Home Density (housing units/ *mi.²*)₂: 16.9

Percent of Community Classified by Wildland Urban Interface (WUI) Types

Acres (*mi.²*): 1.5

Percent: 23.4%

Percent of Community by Modeled Wildfire Related Loss

Low	Medium - Low	Medium	Medium – High	High
2.2%	0.0%	0.0%	0.0%	0.0%

Dominant Fuel Type

Grass	Grass/Shrub	Shrub	Timber Understory	Timber Litter
				TL1

Percent of Community by Modeled/Calculated Wildfire Risk Inputs	
Flame Length	Dist. From Fire Station
0-4 (ft): 99%	0-0.5 (mi.): 0%
4-8 (ft): 5%	0.5-1.0 (mi.): 0%
8-12 (ft): 0%	1.0-1.5 (mi.): 0%
>12 (ft): 0%	>1.5 (mi.): 0%

Fire Department Statistics: Port Graham Volunteer Fire Department

Communities Served: Port Graham

Fulltime Firefighters: 0 | On-call Firefighters: 0 | Volunteer Firefighters: 6

Water Tender:		Wildland Engines		
Type 1:	0	Total Number:	4WD/AWD:	Brush Breaker:
Type 2:	0	Type 3: ----	0	0
Type 3:	0	Type 4: ----	0	0
Structure Engines:		Type 5: ----	0	0
Type 1:	0	Type 6: ----	0	0
Type 2:	0	Type 7: 1	1	0
Port-A-Tanks:	0			
Portable Pumps:	4			

The Department can also use the Village Council 10,000-gal water tank and the bay.

Recent Fires within the polygon: NA

Fire Management Options:	
Critical Protection around urban areas: **0%***	Full Protection around WUI: **23%**

*Chugachmiut, KPB, and AK DOF are currently updating Fire Management options for Port Graham and status will be changed from Full to Critical

Current Fire and Fuel Management Programs and Plans

- 2018 ALAH Action Plan
- 2019 Kenai Peninsula Borough Hazard Mitigation Plan
- 2008 Port Graham Community Wildfire Protection Plan

Community Polygon NFPA 1144 Survey Summary
(No 1144 assessments completed during 2021 CWPP update. Desktop analysis only)

Positive Attributes (Low Scores)

- Vegetation type: more humid forest cover
- Building construction: metal and composite roofs dominant
- Fire History: low
- Values at risk: lower density

Negative Attributes (High Scores)

- Ingress and egress: Bad. Access by air and sea
- Separation of adjacent structures: minimal
- Defensible space: minimal
- Building construction: combustible siding
- Decking and fencing: combustible
- Utility placement: aboveground

Suggested Mitigation Focus Area

Areas of Concern

- Organized fire response is limited (Port Graham CWPP, 2008).
- Low fire risk (Port Graham CWPP, 2008).
- Limited fire mitigation around homes (Port Graham CWPP, 2008).
- Poor access and slow response times (Port Graham CWPP, 2008).
- Tribal headquarters, clinic, and mush building (serves as a safe community gathering place in the event of a tsunami)
- Port Graham Corporation Fishing Cannery stores 100,000+ gallons of fuel and gasoline and serves as a source of backup generation for Port Graham and Nanwalek when there is a power outage. (Homer Electric Association must travel to Port Graham to restore power in the event of a power outage, meaning additional time is needed to respond. In the interim the community relies on the backup generation as the primary source of power.)
- Dock is important infrastructure especially for small boats

Summary of Mitigation Needs (for details, see Recommendation Matrices in main document)

- Procure additional wildland fire equipment for the community (Port Graham CWPP, 2008).
- Procure a 4WD brush ATV for fast initial attack (Port Graham CWPP, 2008).
- Require wildland and structural fire refreshers annually (Port Graham CWPP, 2008).
- Port Graham Central Village need additional hydrants (Port Graham CWPP, 2008).
- Inventory all homes for smoke detectors and fire extinguishers (Port Graham CWPP, 2008).
- Conduct Firewise assessments and home assessments to identify mitigation needs (Port Graham CWPP, 2008).
- Provide fire (structure and wildland) protection training to community members (Port Graham CWPP, 2008).
- Provide school curriculum to students on wildfire prevention and mitigation (Port Graham CWPP, 2008).
- Increase public awareness through mail campaign (Port Graham CWPP, 2008).
- Sign mutual aid agreement with all South Kachemak communities for fire response (Port Graham CWPP, 2008).
- Provide for an annual project list of fuel reduction priorities in the WUI (Port Graham CWPP, 2008).
- Maintain clearance around airport, remove slash (Port Graham CWPP, 2008).
- Need to create a map to identify the location transmission/distribution line between Port Graham and Nanwalek and work with HEA to identify any needed upgrades to the line and/or vegetation management actions needed to enhance fire resilience and protection. There is a trail that is not maintained regularly that may be used to access the lines, but the trail is not accessible by vehicle.
- When the new road for the airport is built, it is recommended to bury the transmission line during construction.
- Look for opportunities to incorporate new development (airport and road) with enhancements for fire protection and fire response.
- Assess fire mitigation needs for cabins and infrastructure protection along road to Rocky and Windy Bay. Protect area for subsistence hunting.
- Make improvements to the road to Windy and Rocky Bay.
- Build firefighting resources and capabilities for wildland fire. Procure wildland fire equipment and PPE and identify location and resources to build appropriate storage. Provide optional training for residents in basic wildland fire fighting.
- Initiate a public education campaign to inform residents of the threat of wildfire and focus efforts on encouraging defensible space practices around properties and values at risk, and preparedness and evacuation.
- Identify location(s) for evacuation shelter and safety zones and provide messaging to the community on those locations.
- Identify evacuation routes and develop maintenance schedule to ensure they remain safe routes for residents to utilize.

Fire Department Concerns:

- Fire department is 100% volunteer and are focused on structural fires, not wildland fire.
- Significant equipment needs

KENAI PENINSULA BOROUGH
WILDLAND URBAN INTERFACE COMMUNITIES

PRIMROSE POLYGON SUMMARY STATISTICS

Community Description

Primrose is located on the Kenai Peninsula within the Moose Pass area. Primrose is an unincorporated community located approximately 26 miles north of Seward. Winter temperatures range from 4 degrees F to 27 on average. Some winters it has reached 20 below. Summer temperatures vary from 45 to 65 degrees. Annual precipitation ranges from 20 inches at the south end of the valley to 24 inches at the north end. The Moose Pass Volunteer Fire Company and the United States Forest Service provide initial attack fire protection to Primrose area residents. Operations are based out of the fire station located at 35390 Seward Highway in Moose Pass (KPB, 2006c). Additional information about community background and demographics can be found in the community CWPP (KPB, 2006c).

Community Polygon Summary		
Community Polygon Name: Primrose	**Total Score:** 60	**Rating:** Moderate
Town: Primrose		
Land Area (*mi.*^{2}): 33.9		
Population Density (people/*mi.*^{2})$_1$: 2.0		
Home Density (housing units/ *mi.*^{2})$_2$: 1.5		

Percent of Community Classified by Wildland Urban Interface (WUI) Types
Acres (*mi.*^{2}): 7.2
Percent: 20.1%

Percent of Community by Modeled Wildfire Related Loss				
Low	Medium - Low	Medium	Medium – High	High
1.2%	0.0%	0.0%	0.0%	0.0%
Dominant Fuel Type				
Grass	Grass/Shrub	Shrub	Timber Understory	Timber Litter
			TU1	TL1, TL2

Percent of Community by Modeled/Calculated Wildfire Risk Inputs	
Flame Length	Dist. From Fire Station
0-4 (ft): 80%	0-0.5 (mi.): 0%
4-8 (ft): 2%	0.5-1.0 (mi.): 0%
8-12 (ft): 0%	1.0-1.5 (mi.): 0%
>12 (ft): 0%	>1.5 (mi.): 100%

Fire Department Statistics: Moose Pass Fire				
Communities Served: **Moose Pass*, Crown Point*, Primrose***				
Fulltime Firefighters: 0	On-call Firefighters: 4		Volunteer Firefighters: 5	
Water Tender: 1			Wildland Engines	
Type 1: ---		Total Number:	4WD/AWD:	Brush Breaker:
Type 2: ---		Type 3: ----	0	0
Type 3: ---		Type 4: ----	0	0
Structure Engines: 3		Type 5: ----	0	0
Type 1: ---		Type 6: ----	0	0
Type 2: ---		Type 7: ----	0	0
Port-A-Tanks: 2				
Portable Pumps: 2				
Recent Fires within the polygon: N/A				
Fire Management Options:				
Critical Protection around urban areas: **4%**	Full Protection around WUI: **18%**			

* Moose Pass, Crown Point, and Primrose are supported by the USFS via mutual aid agreement.

Current Fire and Fuel Management Programs and Plans

- 2018 ALAH Action Plan
- 2019 Kenai Peninsula Borough Hazard Mitigation Plan
- 2006 Moose Pass Area Community Wildfire Protection Plan

Community Polygon NFPA 1144 Survey Summary

Positive Attributes (Low Scores)

- Ingress and egress: good turnaround space
- Street signs: visible and reflective
- Previous fire history: low
- Topography: some moderate slope
- Severe weather potential: low
- Separation of adjacent structures: good, larger lots

Negative Attributes (High Scores)

- Ingress and egress: one road in and out; some areas unsurfaced
- Vegetation type: timber and understory high fire danger; spruce bark beetle mortality.
- Defensible space: limited
- Building construction: combustible siding
- Decking and fencing: combustible
- Utility placement: aboveground
- Water: none; need to shuttle water; could draft from lake
- Fire protection: none
- Values at risk: campsite and trails (potential ignition source)

Suggested Mitigation Focus Area
Areas of Concern • Individual homeowner preparedness (Moose Pass Area CWPP, 2006). • Lack of water system (Moose Pass Area CWPP, 2006). Summary of Mitigation Needs (for details, see Recommendation Matrices in main document) • Increase fire prevention and mitigation outreach to public, with a focus on defensible space, structure hardening and safe debris disposal. • Reduce heavy fuel loads on a landscape scale, target dead trees, create fuel breaks around campground. • Manage campsite with outreach to users on fire mitigation and campfire safety. • Protect Primrose campground and trails (Moose Pass Area CWPP, 2006). • Develop water sources (Moose Pass Area CWPP, 2006). • Seek funding for portable water storage (Moose Pass Area CWPP, 2006). • Seek funding for brush truck with CAFS (Moose Pass Area CWPP, 2006). • Seek additional USFS and DOF training opportunities (Moose Pass Area CWPP, 2006). • Create equipment cache on north and south end of Moose Pass, Crown Point, Primrose area (Moose Pass Area CWPP, 2006). • Create a pre-attack suppression plan with a focus on protection of cultural resources (Moose Pass Area CWPP, 2006). • Expand CERT and Fire Corps program (Moose Pass Area CWPP, 2006). • Encourage residents to develop a secondary water source (Moose Pass Area CWPP, 2006). • Restrict motorized access into areas where hazardous fuels exist on public lands (Moose Pass Area CWPP, 2006). Fire Department Concerns: • Increased response capacity, education, fuel reduction, and ignition source management. • Fuels Hazards • Beetle kill throughout the interface both developed and undeveloped areas • Goals, in order of importance: o Training o Hazardous fuels reduction o Ecological management

Figure D.27. USFS camp sites adjacent to the polygon could create ignition hazards under dry conditions.

KENAI PENINSULA BOROUGH
WILDLAND URBAN INTERFACE COMMUNITIES
RIDGEWAY POLYGON SUMMARY STATISTICS

Community Description

Ridgeway is an unincorporated community located on the Sterling Highway on the Kenai Peninsula. It is adjacent to the cities of Kenai, Soldotna and Sterling. Ridgeway is in the Kenai Recording District. The area encompasses 16.4 square miles of land. Central Emergency Services, volunteer fire departments, and the Alaska Division of Forestry provide fire protection to Ridgeway residents (KPB, 2009b). Additional information about community background and demographics can be found in the community CWPP (KPB, 2009b).

Community Polygon Summary		
Community Polygon Name: Ridgeway	**Total Score:** 70	**Rating:** Moderate-High
Town: Ridgeway		
Land Area (*mi.^{2}*): 16.4		
Population Density (people/*mi.^{2}*)$_1$: 124.6		
Home Density (housing units/ *mi.^{2}*)$_2$: 82.5		

Percent of Community Classified by Wildland Urban Interface (WUI) Types
Acres (*mi.^{2}*): 17.7
Percent: 100%

Percent of Community by Modeled Wildfire Related Loss

Low	Medium - Low	Medium	Medium – High	High
1.9%	8.8%	10.9%	22.1%	0.0%

Dominant Fuel Type

Grass	Grass/Shrub	Shrub	Timber Understory	Timber Litter
1.6		SH5	TU1, TU3, TU5	

Percent of Community by Modeled/Calculated Wildfire Risk Inputs

Flame Length	Dist. From Fire Station
0-4 (ft): 71%	0-0.5 (mi.): 4%
4-8 (ft): 54%	0.5-1.0 (mi.): 12%
8-12 (ft): 1%	1.0-1.5 (mi.): 21%
>12 (ft): 0%	>1.5 (mi.): 62%

Fire Department Statistics: Central Emergency Services				
Communities Served: **Soldotna, Ridgeway, Sterling, Kasilof, Kalifornsky Beach, Cohoe, Clam Gulch, Funny River**				
Fulltime Firefighters: 46	On-call Firefighters: 0		Volunteer Firefighters: ~ 20	
Water Tender:			Wildland Engines	
Type 1:	0	Total Number:	4WD/AWD:	Brush Breaker:
Type 2:	4-7	Type 3: 1-3	1-3	0
Type 3:	0	Type 4: ----	0	0
Structure Engines:		Type 5: 1-3	1-3	0
Type 1:	8-10, 1-3 have 4WD	Type 6: ----	0	0
Type 2:	0	Type 7: ----	0	0
Port-A-Tanks:	Only within the road system, Forestry often asks that tanks be left on-scene, which creates a shortage for additional responses.			
Portable Pumps:	5			

Recent Fires within the polygon:

- Swanson River, 1969

Fire Management Options:	
Critical Protection around urban areas: **78%**	Full Protection around WUI: **22%**

Current Fire and Fuel Management Programs and Plans

- 2018 ALAH Action Plan
- 2019 Kenai Peninsula Borough Hazard Mitigation Plan
- 2009 Soldotna Ridgeway Area Community Wildfire Protection Plan

Community Polygon NFPA 1144 Survey Summary

Positive Attributes (Low Scores)

- Ingress and egress: good turnaround space
- Street signs: visible and reflective
- Previous fire history: low
- Topography: some moderate slope
- Potential for severe weather potential: low
- Separation of adjacent structures: good, larger lots
- Water: hydrants
- Fire protection: Ridgeway Fire Dept in community

Negative Attributes (High Scores)

- Ingress and egress: one road in and out; some areas unsurfaced
- Vegetation type: timber and understory high fire danger; spruce bark beetle mortality
- Defensible space: limited
- Building construction: combustible siding
- Decking and fencing: combustible
- Utility placement: aboveground

Suggested Mitigation Focus Area

Areas of Concern

- Beetle killed trees
- Kasilof/Cohoe, Funny River, and Tustumena.

Summary of Mitigation Needs (for details, see Recommendation Matrices in main document)

- Increase fire prevention and mitigation outreach to public, with a focus on defensible space, structure hardening, home ignition zone and safe debris disposal.
- Reduce heavy fuel loads on a landscape scale (inter-agency), target dead beetle killed trees, create additional fuel breaks around community.
- Connect with Sterling fuel break
- Increase outreach to the community on the status and progress of the Sterling Fuel Break
- Support Firewise programs
- Provide solutions for debris removal- chipper, incinerator etc.
- Assess electric grid in subdivisions and need for electric generators
- Pre-season fire planning to identify critical infrastructure where point protection should be applied
- Continue Firewise home assessment project (Soldotna Ridgeway Area CWPP, 2009).
- Develop a CWPP media action plan (Soldotna Ridgeway Area CWPP, 2009).
- Provide incentives for Firewise landscaping (Soldotna Ridgeway Area CWPP, 2009).
- Provide 100 ft buffers along main roads for safe evacuation (Soldotna Ridgeway Area CWPP, 2009).
- Provide additional wildland engine for CES (Soldotna Ridgeway Area CWPP, 2009).
- Implement an evacuation planning project for the CWPP area (Soldotna Ridgeway Area CWPP, 2009).
- Joint training and exercises for fire agencies and the public (Soldotna Ridgeway Area CWPP, 2009).

Fire Department Concerns:

- Need a maneuverable squad truck
- Concerned about reduction in VFA grant funding
- Need a training solution where agency trainers can come to community.
- Need additional funding to support training

Figure D.28. Example of heavy vegetation along roadways.

KENAI PENINSULA BOROUGH
WILDLAND URBAN INTERFACE COMMUNITIES
SALAMATOF POLYGON SUMMARY STATISTICS

Community Description

Salamatof is on the Kenai Peninsula, on the east shore of Cook Inlet at the mouth of Salamatof Creek, 5.5 miles northwest of the City of Kenai. It lies at approximately 60.618890° north latitude and -151.3425° west longitude. Salamatof is in the Kenai Recording District. The area encompasses 8 square miles of land. Winter temperatures range from 4˚ F to 22˚ F; summer temperatures vary from 46˚ F to 65˚ F. Average annual precipitation is 20 inches. The Nikiski Fire Department (NFD) and Alaska Division of Forestry provide fire protection to Salamatof area residents. NFD firefighters are state-certified at the Firefighter I, II, or Fire Officer I levels (KPB, 2006g). Additional information about community background and demographics can be found in the community CWPP (KPB, 2006g).

Community Polygon Summary		
Community Polygon Name: Salamatof	**Total Score:** 71	**Rating:** **High**
Town: Salamatof		
Land Area (*mi.²*): 8.0		
Population Density (people/*mi.²*)1: 132.8		
Home Density (housing units/ *mi.²*)2: 67.1		

Percent of Community Classified by Wildland Urban Interface (WUI) Types
Acres (*mi.²*): 8.1
Percent: 94%

Percent of Community by Modeled Wildfire Related Loss				
Low	Medium - Low	Medium	Medium – High	High
5.9%	25.8%	15.8%	3.6%	0.0%
Dominant Fuel Type				
Grass	Grass/Shrub	Shrub	Timber Understory	Timber Litter
			TU3, TU5	

Percent of Community by Modeled/Calculated Wildfire Risk Inputs	
Flame Length	Dist. From Fire Station
0-4 (ft): 91%	0-0.5 (mi.): 7%
4-8 (ft): 5%	0.5-1.0 (mi.): 17%
8-12 (ft): 3%	1.0-1.5 (mi.): 23%
>12 (ft): 0%	>1.5 (mi.): 52%

Fire Department Statistics: Nikiski Fire Department					
Communities Served: **Nikiski*, Beluga, Tyonek**					
Fulltime Firefighters: 25		On-call Firefighters: 0		Volunteer Firefighters: 30	
Water Tender:			Wildland Engines		
Type 1:	4-7	Total Number:	4WD/AWD:	Brush Breaker:	
Type 2:	0	Type 3: ----	0	0	
Type 3:	0	Type 4: ----	0	0	
Structure Engines:		Type 5: ----	0	0	
Type 1:	4-7	Type 6: 1-3	1-3	0	
Type 2:	0	Type 7: ----	0	0	
Port-A-Tanks:	10				
Portable Pumps:	0				
Recent Fires within the polygon: N/A					
Fire Management Options:					
Critical Protection around urban areas: **94%**			Full Protection around WUI: **6%**		

* USFWS lands within Nikiski are supported by the Kenai National Wildlife Refuge.

Current Fire and Fuel Management Programs and Plans

- 2018 ALAH Action Plan
- 2019 Kenai Peninsula Borough Hazard Mitigation Plan
- 2006 Nikiski/Salamatof Community Wildfire Protection Plan

Community Polygon NFPA 1144 Survey Summary

Positive Attributes (Low Scores)

- Ingress and egress: main highway paved
- Street signs: visible and reflective
- Vegetation type: timber understory is dominant.
- Building construction: metal and composite roofs dominant
- Slopes: less than 9%
- Water source: hydrants

Negative Attributes (High Scores)

- Building construction: combustible siding
- Defensible space: poor
- Utility placement: aboveground
- Decking and fencing: combustible
- Separation of adjacent structures: minimal

Suggested Mitigation Focus Area

Areas of Concern:

- Structures needing defensible space clearing and maintenance of fuel breaks, especially emergency shelters (Nikiski/Salamatof CWPP 2006).
- Lisburne/Pipeline is a very long road, and access problems will occur if traffic is backed up along Lisburne to Basteen. Improve section of Basteen (Nikiski/Salamatof CWPP 2006).
- The Grey Cliffs area is rapidly increasing in population and does not have road access (Nikiski/Salamatof CWPP 2006).
- Investigate access issues including turn-around and access areas for Puppy Dog Lake, Tauriainan Trail, Goode Lake, Beck Lake, Bishops Creek, and Northwoods subdivision at Bishop Creek Bar, Halibouty Road (Nikiski/Salamatof CWPP 2006).
- Empty/abandoned buildings and vehicles pose a fire/safety hazard and should be removed (Nikiski/Salamatof CWPP 2006).

- Captain Cook State Park mitigation and fuel reduction. Create defensible space/safe zones (Nikiski/Salamatof CWPP 2006).
- Include Cottonwood Lane and Admiralty Drive (Nikiski/Salamatof CWPP 2006).
- Empty/abandoned buildings and vehicles pose a fire/safety hazard and should be removed (Nikiski/Salamatof CWPP 2006).
- Have access to a chipper and air curtain incinerator for slash disposal (Nikiski/Salamatof CWPP 2006).
- Island Lake Area, Holt-Lamplight Area, Captain Cook State Park, and KNWR.
- Sterling, Nikiski, and Kenai

Summary of Mitigation Needs (for details, see Recommendation Matrices in main document)

- Need a lumber market and processing to support increased fuel treatments
- Industrial, commercial and residential values at risk and need to be protected
- Identify and implement (in conjunction with oil and gas operators) strategic fuels treatments around oil and gas infrastructure and Right of Ways throughout Kenai Gas Field areas.

Recommendations from Salamatof Native Association, Inc

- Salamatof Native Association, Inc (SNAI) and Cook Inlet Region, Inc, known as CIRI are partners working together to create the Sterling fuel break. SNAI may do a shaded fuel break instead of full clearance.
- Protect many cultural values at risk. Identify areas of cultural importance with broad buffers using the “known sites” database.
- Protect subsistence hunting
- Maintain and restore forest health
- Focus mitigation measures on values at risk.
- Work to address ongoing beetle infestation and removal of dead trees
  Combine fuel treatments with protection and enhancement of wildlife habitat, whenever possible.
- Inventory water availability for fire suppression resources and address deficiencies with placement of mobile units or improvements to water system infrastructure.
- Address problem of unauthorized access and potential for human ignitions resulting from access violations. Education and enforcement campaign to reduce unlawful access, tree cutting and trash dumping.
- Use appropriate channels within the native community to share educational messaging regarding fire prevention and education.
- Enhance coordination between the native corporation and fire departments on fire preparedness and fire planning.
- Use the newsletter, Raven Circle, to provide information to shareholders

Fire Department Concerns:

- There are no concerns from SNAI at this time. Communication with FMOs is very good.

Figure D.29. Example of the landscape in Salamatof.

KENAI PENINSULA BOROUGH WILDLAND URBAN INTERFACE COMMUNITIES

SELDOVIA POLYGON SUMMARY STATISTICS

Community Description

The area is primarily bordered on the north side by the southern shore of Kachemak Bay. The Seldovia area encompasses 18.4 square miles and includes the first-class city of Seldovia, Seldovia Village, Seldovia Bay, the Barabara Point area, the area along Jakolof Road towards Windy River, and McDonald Spit. Fire protection is provided to the area by the Alaska Division of Forestry and Seldovia Fire & Rescue and the Barbara Heights fire department. These departments rely on volunteers and employ part time paid administrators (TAC 2008c). Additional information about community background and demographics can be found in the community CWPP (TAC 2008c).

Community Polygon Summary (Desktop analysis only)		
Community Polygon Name: Seldovia	**Total Score:** 95	**Rating:** **High**
	Town: Seldovia	
	Land Area (*mi.^{2}*): 18.4	
	Population Density (people/*mi.^{2}*)$_1$: 16.3	
	Home Density (housing units/ *mi.^{2}*)$_2$: 22.8	

Percent of Community Classified by Wildland Urban Interface (WUI) Types
Acres (*mi.^{2}*): 8.5
Percent: 43.0%

Percent of Community by Modeled Wildfire Related Loss				
Low	Medium - Low	Medium	Medium – High	High
0.0%	0.0%	0.0%	0.0%	0.0%
Dominant Fuel Type				
Grass	Grass/Shrub	Shrub	Timber Understory	Timber Litter
				TL1

Percent of Community by Modeled/Calculated Wildfire Risk Inputs	
Flame Length	Dist. From Fire Station
0-4 (ft): 92%	0-0.5 (mi.): 3%
4-8 (ft): 21%	0.5-1.0 (mi.): 3%
8-12 (ft): 0%	1.0-1.5 (mi.):4%
>12 (ft): 0%	>1.5 (mi.): 90%

Fire Department Statistics: Seldovia Volunteer Fire and Rescue					
Communities Served: Seldovia					
Fulltime Firefighters: 0		On-call Firefighters: 0		Volunteer Firefighters: 12	
Water Tender:			Wildland Engines		
Type 1:	0	Total Number:	4WD/AWD:	Brush Breaker:	
Type 2:	0	Type 3: ----	0	0	
Type 3:	0	Type 4: ----	0	0	
Structure Engines:		Type 5: ----	0	0	
Type 1:	0	Type 6: ----	0	0	
Type 2:	1	Type 7: ----	0	0	
Port-A-Tanks:	2				
Portable Pumps:	3				
Recent Fires within the polygon: N/A					
Fire Management Options:					
Critical Protection around urban areas: **33%**		Full Protection around WUI: **13%**			

Current Fire and Fuel Management Programs and Plans

- 2018 ALAH Action Plan
- 2019 Kenai Peninsula Borough Hazard Mitigation Plan
- 2008 Seldovia Community Wildfire Protection Plan

Community Polygon NFPA 1144 Survey Summary

(No 1144 assessments completed during 2021 CWPP update. Desktop analysis only)

Positive Attributes (Low Scores)

- Vegetation type: more humid forest cover
- Building construction: metal and composite roofs dominant
- Fire History: low
- Values at risk: lower density

Negative Attributes (High Scores)

- Ingress and egress: Bad. Access by air and sea
- Topography: steep topography adjacent to community
- Separation of adjacent structures: minimal
- Building construction: combustible siding
- Decking and fencing: combustible
- Utility placement: aboveground

Suggested Mitigation Focus Area

Areas of Concern:

- Structures (residential and commercial) (Seldovia CWPP, 2006).
- Infrastructure (Seldovia CWPP, 2006).
- Cultural sites (Seldovia CWPP, 2006).
- Natural resource values (Seldovia CWPP, 2006).

Summary of Mitigation Needs (for details, see Recommendation Matrices in main document)

- The SVFD provides dispatch, EMS, and fire services. Of these, dispatch and EMS are most active, as they have low fire activity. The department is focused on maintaining current capabilities and equipment.

Fire Department Concerns:

- Construct a pond at Barabara Point fire station (Seldovia CWPP, 2006).
- Procure 2 water tender trucks to haul water (Seldovia CWPP, 2006).
- Acquire additional supplies for firefighting (Seldovia CWPP, 2006).

- Provide water tanks and equipment to stage each summer at McDonald Spit (Seldovia CWPP, 2006).
- Procure an additional ATV trailer and pump to fill foal units (Seldovia CWPP, 2006).
- Provide a program to distribute fire extinguishers and smoke detectors for residents (Seldovia CWPP, 2006).
- An incentive and retention program is necessary to keep volunteers active within the fire department (Seldovia CWPP, 2006).
- Present a mutual aid request to SOS for the use of their oil spill skiff for fire emergencies along the waterfront areas of the CWPP (Seldovia CWPP, 2006).
- Maintaining a reasonable capacity for a small community (Seldovia CWPP, 2006).
- Personal and knowledge retention; managing operational and administrative demands on personnel (Seldovia CWPP, 2006).
- Equipment upkeep (Seldovia CWPP, 2006).
- Effective utilization of and respect for scarce human capital and the competing life and community demands placed on volunteers (Seldovia CWPP, 2006).
- Reliance on key personnel who may be absent from the community during incidents (Seldovia CWPP, 2006).
- Communication difficulties (Seldovia CWPP, 2006).
- Difficulty evacuating EMS patients to definitive care at times (Seldovia CWPP, 2006).
- Managing community expectations (Seldovia CWPP, 2006).

KENAI PENINSULA BOROUGH WILDLAND URBAN INTERFACE COMMUNITIES

SEWARD POINT POLYGON SUMMARY STATISTICS

Community Description

Seward is located on Resurrection Bay, on the Kenai Peninsula. It is bordered by Lowell Point to the southwest and by Bear Creek to the northeast. Seward encompasses an area of 24.6 square miles. Seward is situated at approximately 60.105627° north latitude and -149.442973 ° west longitude. Seward is in the Seward Recording District (ADNR 2021). Winter temperatures range from 4 degrees F to 27 on average. Some winters it has been 20 below. Summer temperatures vary from 45 to 65 degrees. Annual precipitation ranges from 20 inches at the south end of the valley to 24 inches at the north end. Seward Volunteer Fire Department and the Alaska Division of Forestry provide fire protection to Seward residents (City of Seward, Alaska, 2020).

Community Polygon Summary		
Community Polygon Name: Seward	**Total Score:** 67	**Rating:** Moderate
Town: Seward		
Land Area (*mi.^{2}*): 24.6*		
Population Density (people/*mi.^{2}*)$_1$: 123.6		
Home Density (housing units/ *mi.^{2}*)$_2$: 103.7		

* After review by the Core Team the land area was changed from 14.3 to 24.6. However, the land area data provided by the KPB, were used to generate the figures in this plan and do not reflect the revised values in the text.

Percent of Community Classified by Wildland Urban Interface (WUI) Types
Acres (*mi.^{2}*): 12.3
Percent: 57.3%

Percent of Community by Modeled Wildfire Related Loss				
Low	Medium - Low	Medium	Medium – High	High
3.2%	0.1%	0.0%	0.0%	0.0%
Dominant Fuel Type				
Grass	Grass/Shrub	Shrub	Timber Understory	Timber Litter
			TL1, TL2	TU1

Percent of Community by Modeled/Calculated Wildfire Risk Inputs	
Flame Length	Dist. From Fire Station
0-4 (ft): 66%	0-0.5 (mi.): 4%
4-8 (ft): 2%	0.5-1.0 (mi.): 11%
8-12 (ft): 0%	1.0-1.5 (mi.): 16%
>12 (ft): 0%	>1.5 (mi.): 70%

Fire Department Statistics: Seward Volunteer Fire Department					
Communities Served: **City of Seward, by auto-aid Lowell Point and Bear Creek Fire service area**					
Fulltime Firefighters: 2		On-call Firefighters: 0		Volunteer Firefighters: 20	
Water Tender:			Wildland Engines		
Type 1:	0	Total Number:		4WD/AWD:	Brush Breaker:
Type 2:	0	Type 3: ----		0	0
Type 3:	0	Type 4: ----		0	0
Structure Engines:		Type 5: ----		0	0
Type 1:	1-3 4WD	Type 6: 1-3		1-3	1-3
Type 2:	0	Type 7: ----		0	0
Port-A-Tanks:	2				
Portable Pumps:	3				
Recent Fires within the polygon: N/A					
Fire Management Options:					
Critical Protection around urban areas: **33%**			Full Protection around WUI: **21%**		

Current Fire and Fuel Management Programs and Plans

- 2018 ALAH Action Plan
- 2019 Kenai Peninsula Borough Hazard Mitigation Plan
- 2020 City of Seward and Qutekcak Native Tribe Alaska, Multi-Jurisdictional Hazard Mitigation Plan

* Bear Creek, Seward, and Lowell Point Fire Departments support each other's firefighting efforts through Automatic Aid Agreements.

* Mutual Aid: In other events outside of structure fires, Seward, Bear Creek, and Lowell Point can request the assistance of neighboring jurisdictions through mutual aid.

Community Polygon NFPA 1144 Survey Summary

Positive Attributes (Low Scores)

- Street signs: visible and reflective
- Urban character with mixture of non-burnable fuels and good road network in town
- Vegetation type: more humid forest cover
- Previous fire history: low
- Potential for severe weather potential: low
- Building construction: metal and composite roofs dominant
- Water: hydrants
- Fire protection: station in community

Negative Attributes (High Scores)

- Ingress and egress: one road in and out
- Topography: steep topography adjacent to community
- Separation of adjacent structures: minimal
- Building construction: combustible siding
- Decking and fencing: combustible
- Utility placement: aboveground
- High density of values at risk

Suggested Mitigation Focus Area

Areas of Concern:

- Heavy concentration of values at risk
- Evacuation concerns
- Concern that residents don't understand the risk
- Forest Acres subdivision and the base of Mt. Marathon.

Summary of Mitigation Needs (for details, see Recommendation Matrices in main document):

- Need fire weather reports specific to this portion of the Peninsula.
- Targeted and coordinated public outreach campaign focused on defensible space, structure hardening etc. Utilize community events. Repeat messaging.
- Develop home assessment program using an NFPA 1144 methodology or similar.
- Develop education campaign on evacuation.
- Install a Smokey Sign for Seward with accurate weather monitoring.
- Create alternative ingress/egress route for Seward (East End Road) (Currently they only have one ingress/egress).

Fire Department Concerns:

- Evacuation concerns.
- Need increased training options for volunteers (weekends etc.) and more focus on wildland training.
- Need to inventory wildland PPE and provide appropriate equipment for all volunteers and new recruits.

Figure D.30. Homes located along forested slopes in Seward are at the greatest risk within the Seward WUI.

KENAI PENINSULA BOROUGH WILDLAND URBAN INTERFACE COMMUNITIES

SOLDOTNA POLYGON SUMMARY STATISTICS

Community Description

Soldotna is located on the Kenai Peninsula, 150 highway miles south of Anchorage, at the junction of the Sterling and Kenai Spur Highways. It lies 10 miles inland from Cook Inlet, and borders the Kenai River. It lies at approximately 60.48 degrees north latitude and 151.05 degrees west longitude. Soldotna is in the Kenai Recording District. The area encompasses 7.38 square miles of land (ADCCED 2007). Central Emergency Services and the Alaska Division of Forestry provide fire protection to Soldotna residents (KPB, 2009b). Additional information about community background and demographics can be found in the community CWPP (KPB, 2009b).

Community Polygon Summary

Community Polygon Name: Soldotna | **Total Score:** 51 | **Rating:** Moderate

Town: Soldotna

Land Area (*mi.*^{2}): 7.3*

Population Density (people/*mi.*^{2})$_1$: 596.7

Home Density (housing units/ *mi.*^{2})$_2$: 361.6

* After review by the Core Team the land area was changed from 8.61 to 7.3. However, the land area data provided by the KPB, were used to generate the figures in this plan and do not reflect the revised values in the text.

Percent of Community Classified by Wildland Urban Interface (WUI) Types

Acres (*mi.*^{2}): 7.3

Percent: 100%

Percent of Community by Modeled Wildfire Related Loss

Low	Medium - Low	Medium	Medium – High	High
7.5%	18.6%	14.0%	10.9%	0.0%

Dominant Fuel Type

Grass	Grass/Shrub	Shrub	Timber Understory	Timber Litter
			TU5	

Percent of Community by Modeled/Calculated Wildfire Risk Inputs

Flame Length	Dist. From Fire Station
0-4 (ft): 57%	0-0.5 (mi.): 10%
4-8 (ft): 40%	0.5-1.0 (mi.): 22%
8-12 (ft): 1%	1.0-1.5 (mi.): 27%
>12 (ft): 1%	>1.5 (mi.): 41%

Fire Department Statistics: Central Emergency Services					
Communities Served: **Soldotna, Ridgeway, Sterling, Kasilof, Kalifornsky Beach, Cohoe, Clam Gulch, Funny River**					
Fulltime Firefighters: 46		On-call Firefighters: 0		Volunteer Firefighters: ~ 20	
Water Tender:				Wildland Engines	
Type 1:	0		Total Number:	4WD/AWD:	Brush Breaker:
Type 2:	4-7		Type 3: 1-3	1-3	0
Type 3:	0		Type 4: ----	0	0
Structure Engines:			Type 5: 1-3	1-3	0
Type 1:	8-10, 1-3 have 4WD		Type 6: ----	0	0
Type 2:	0		Type 7: ----	0	0
Port-A-Tanks:	Only within the road system, Forestry often asks that tanks be left on-scene, which creates a shortage for additional responses.				
Portable Pumps:	5				
Recent Fires within the polygon: • Echo, 1969					
Fire Management Options:					
Critical Protection around urban areas: **100%**			Full Protection around WUI: **0%**		

Current Fire and Fuel Management Programs and Plans

- 2018 ALAH Action Plan
- 2019 Kenai Peninsula Borough Hazard Mitigation Plan
- 2009 Soldotna Ridgway Area Community Wildfire Protection Plan

Community Polygon NFPA 1144 Survey Summary

Positive Attributes (Low Scores)

- Ingress and egress: more than one road in and out
- Ingress and egress: good turnaround space
- Street signs: visible and reflective
- Previous fire history: low
- Topography: minimal
- Vegetation type: timber and understory in some areas, but mixed with grass, urban fuels
- Severe weather potential: low
- Water: hydrants
- Fire protection: no fire department in community. The community of Soldotna relies on Central Emergency Services

Negative Attributes (High Scores)

- Defensible space: limited in some areas
- Building construction: combustible siding
- Decking and fencing: combustible
- Utility placement: aboveground
- Separation of adjacent structures: limited, more urban mix with smaller lots sizes
- Heavy concentration of values at risk
- Wide-spread spruce bark beetle epidemic has killed many spruce trees

Suggested Mitigation Focus Area

Areas of Concern

- Values at risk
- Kasilof/Cohoe, Funny River, and Tustumena.

Summary of Mitigation Needs (for details, see Recommendation Matrices in main document)

- Increase fire prevention and mitigation outreach to public, with a focus on defensible space, structure hardening, home ignition zone and safe debris disposal.
- Reduce heavy fuel loads on a landscape scale (inter-agency), target dead beetle killed trees, create additional fuel breaks around community.
- Increase outreach to the community on the status and progress of existing fuel treatment work
- Support Firewise programs
- Provide solutions for debris removal- chipper, incinerator etc.
- Implement aggressive fuel breaks around population centers
- Support/foster timber industry to allow mitigation efforts while providing market for treated fuels
- Pre-season fire planning to identify critical infrastructure where point protection should be applied
- Continue Firewise home assessment project (Soldotna Ridgeway Area CWPP, 2009).
- Develop a CWPP media action plan (Soldotna Ridgeway Area CWPP, 2009).
- Provide incentives for Firewise landscaping (Soldotna Ridgeway Area CWPP, 2009).
- Provide 100 ft buffers along main roads for safe evacuation (Soldotna Ridgeway Area CWPP, 2009).
- Provide additional wildland engine for CES (Soldotna Ridgeway Area CWPP, 2009).
- Implement an evacuation planning project for the CWPP area (Soldotna Ridgeway Area CWPP, 2009).
- Joint training and exercises for fire agencies and the public (Soldotna Ridgeway Area CWPP, 2009).

Fire Department Concerns:

- Need a maneuverable squad truck
- Concerned about reduction in VFA grant funding
- Need a training solution where agency trainers can come to community.
- Need additional funding to support training
- Upgrade radios
- Seek funding to purchase a boat

Figure D.31. Example of Soldotna homes located in heavy forested areas with poor defensible space.

KENAI PENINSULA BOROUGH
WILDLAND URBAN INTERFACE COMMUNITIES

STERLING POLYGON SUMMARY STATISTICS

Community Description

Sterling is located on the Sterling Highway near the junction of the Moose and Kenai Rivers, 18 miles east of the City of Kenai. The Sterling area encompasses 77.1 square miles. It lies at approximately 60.53 degrees north latitude and 150.76 degrees west longitude. Sterling is in the Kenai Recording District. The Sterling Central Emergency Services station and the Alaska Division of Forestry provides fire protection to Sterling residents (KPB, 2009c). Additional information about community background and demographics can be found in the community CWPP (KPB, 2009c).

Community Polygon Summary

Community Polygon Name: Sterling | **Total Score:** 70 | **Rating:** Moderate

Town: Sterling

Land Area (*mi.^{2}*): 77.1

Population Density (people/*mi.^{2}*)$_1$: 75.5

Home Density (housing units/ *mi.^{2}*)$_2$: 58.5

Percent of Community Classified by Wildland Urban Interface (WUI) Types

Acres (*mi.^{2}*): 62.4

Percent: 78.4%

Percent of Community by Modeled Wildfire Related Loss

Low	Medium - Low	Medium	Medium – High	High
0.6%	10.4%	11.4%	18.9%	0.0%

Dominant Fuel Type

Grass	Grass/Shrub	Shrub	Timber Understory	Timber Litter
GR1	GS1	SH5	TU1, TU3, TU5	TL3, TL6

Percent of Community by Modeled/Calculated Wildfire Risk Inputs

Flame Length	Dist. From Fire Station
0-4 (ft): 56%	0-0.5 (mi.): 1%
4-8 (ft): 38%	0.5-1.0 (mi.): 5%
8-12 (ft): 8%	1.0-1.5 (mi.): 8%
>12 (ft): 1%	>1.5 (mi.): 87%

Fire Department Statistics: Central Emergency Services					
Communities Served: **Soldotna, Ridgeway, Sterling*, Kasilof, Kalifornsky Beach, Cohoe, Clam Gulch, Funny River**					
Fulltime Firefighters: 46		On-call Firefighters: 0		Volunteer Firefighters: ~ 20	
Water Tender:				Wildland Engines	
Type 1:	0		Total Number:	4WD/AWD:	Brush Breaker:
Type 2:	4-7		Type 3: 1-3	1-3	0
Type 3:	0		Type 4: ----	0	0
Structure Engines:			Type 5: 1-3	1-3	0
Type 1:	8-10, 1-3 have 4WD		Type 6: ----	0	0
Type 2:	0		Type 7: ----	0	0
Port-A-Tanks:	Only within the road system, Forestry often asks that tanks be left on-scene, which creates a shortage for additional responses.				
Portable Pumps:	5				

Recent Fires within the polygon:

- Card Street, 2015
- Funny River, 2014
- Kenai, 1947

Fire Management Options:	
Critical Protection around urban areas: **68%**	Full Protection around WUI: **12%**

* USFWS lands within Sterling are also supported by the Kenai National Wildlife Refuge.

Current Fire and Fuel Management Programs and Plans

- 2018 ALAH Action Plan
- 2019 Kenai Peninsula Borough Hazard Mitigation Plan
- 2009 Sterling Community Wildfire Protection Plan

Community Polygon NFPA 1144 Survey Summary

Positive Attributes (Low Scores)

- Ingress and egress: main highway paved
- Street signs: visible and reflective
- Vegetation type: timber with grass or shrub understory.
- Building construction: metal and composite roofs dominant
- Slope: 10% to 20%
- Water source: hydrants

Negative Attributes (High Scores)

- Building construction: combustible siding
- Utility placement: aboveground
- Decking and fencing: combustible
- Separation of adjacent structures: minimal
- Defensible space: poor
- History of fire occurrence: high
- Severe fire weather potential
- Only one fire station in the area, and some of the outlying areas are more than 5 miles away

Suggested Mitigation Focus Area

Areas of Concern:

- Kasilof/Cohoe, Funny River, and Tustumena.
- Sterling, Nikiski, and Kenai

Summary of Mitigation Needs (for details, see Recommendation Matrices in main document)

- Need a lumber market and processing to support increased fuel treatments
- Many standing dead bark beetle trees and need to be removed
- Morgan Landing State Park and Industrial values at risk to be protected
- Homes around river are surrounded by riparian fuels and need fuel reduction
- Potential for new growth and development. New roads have been developed, but homes not built yet. Opportunity to plan with the goal of reducing wildfire risk.
- Continue to maintain and expand Strategic Fuel Break (about 200 – 350 feet wide) including Western Extension of Sterling (Ridgeway) and Nikiski to Grey Cliffs. Maintenance already completed includes mastication to keep grass to a minimum.
- Outreach to the public about progress on the fuel break is requested by members of the public.
- Education about risk is needed.
- Support Firewise programs
- Remove hazardous fuels along Swansong Road
- Provide turnouts on the Sterling Highway and all major roads to reduce congestion in an emergency (Sterling CWPP, 2009).
- Develop project to seek funding for State Park Recreation Site(s) hazard fuels removal (Sterling CWPP, 2009).
- Develop public access program on borough, state, and federal lands. Provide for a streamlined permitting process that targets hazard fuels removal and utilization (fuel-wood cutting) (Sterling CWPP, 2009).
- Develop Sterling area road fuels reduction projects to improve access during fire situations (Sterling CWPP, 2009).
- Identify slash disposal (woodlot) sites and firewood cutting areas (Sterling CWPP, 2009).
- Identify opportunities for underground utilities to reduce ignitions (Sterling CWPP, 2009).
- Widen utility Right of Ways for use as fire breaks. Correct easement mapping errors (Sterling CWPP, 2009).
- Identify High Hazards on absentee landowner's property and coordinate woody debris disposal (Sterling CWPP, 2009).

Fire Department Concerns:

- Fuel hazards, beetle kill throughout the interface both in developed areas as well as open areas.
- Goals (in order of importance): Training, hazardous fuels reduction, ecological management

Figure D.32. Example of road conditions (narrow and unsurfaced) with limited defensible space~~.~~

KENAI PENINSULA BOROUGH WILDLAND URBAN INTERFACE COMMUNITIES

SUNRISE POLYGON SUMMARY STATISTICS

Community Description

Sunrise is located 7 miles southeast of Hope, at the mouth of Sixmile Creek, on the south shore of the Turnagain Arm of Cook Inlet. The community lies on the Hope Highway, northwest of the Seward Highway in the Kenai Peninsula Borough. It lies at approximately 60.889720° North Latitude and -149.42111° West Longitude. Sunrise is in the Seward Recording District. The area encompasses 12.9 sq. miles of land. Winter temperatures range from 14 to 27; summer temperatures vary from 45 to 65. Average annual precipitation is 20 inches. Fire protection is provided to the Sunrise area by the Hope-Sunrise Volunteer Fire Department (HSVFD). Other fire agencies, for example, USFS, Moose Pass Volunteer Fire Department, Girdwood Fire Department are at a minimum 45 minutes to one hour away. The HSVFD and the Forest Service have a joint cooperative agreement in place (E&E, 2006b). Additional information about community background and demographics can be found in the community CWPP (E&E, 2006b).

Community Polygon Summary		
Community Polygon Name: Sunrise	**Total Score:** 98	**Rating:** **High**
	Town: Sunrise	
	Land Area (*mi.^{2}*): 12.9	
	Population Density (people/*mi.^{2}*)$_1$: 0.9	
	Home Density (housing units/ *mi.^{2}*)$_2$: 2.0	

Percent of Community Classified by Wildland Urban Interface (WUI) Types
Acres (*mi.^{2}*): 6.1
Percent: 46.6%

Percent of Community by Modeled Wildfire Related Loss				
Low	Medium - Low	Medium	Medium – High	High
3.7%	0.0%	0.0%	0.0%	0.0%
		Dominant Fuel Type		
Grass	Grass/Shrub	Shrub	Timber Understory	Timber Litter
				TL1

Percent of Community by Modeled/Calculated Wildfire Risk Inputs	
Flame Length	Dist. From Fire Station
0-4 (ft): 99%	0-0.5 (mi.): 0%
4-8 (ft): 1%	0.5-1.0 (mi.): 0%
8-12 (ft): 0%	1.0-1.5 (mi.): 0%
>12 (ft): 0%	>1.5 (mi.): 0%

Fire Department Statistics: Hope-Sunrise Volunteer Fire Department					
Communities Served:					
Fulltime Firefighters: 0		On-call Firefighters: 2		Volunteer Firefighters: 7	
Water Tender: 1				Wildland Engines 1	
Type 1:	0	Total Number:	4WD/AWD:	Brush Breaker:	
Type 2:	0	Type 3: ----	0	0	
Type 3:	0	Type 4: ----	0	0	
Structure Engines:		Type 5: ----	0	0	
Type 1:	0	Type 6: ----	0	0	
Type 2:	0	Type 7: ----	0	0	
Port-A-Tanks:	0				
Portable Pumps:	2 float pumps				
Recent Fires within the polygon: N/A					
Fire Management Options:					
Critical Protection around urban areas: **9%**			Full Protection around WUI: **36%**		

Current Fire and Fuel Management Programs and Plans

- 2018 ALAH Action Plan
- 2019 Kenai Peninsula Borough Hazard Mitigation Plan
- 2006 Hope-Sunrise-Summit Lake Community Wildfire Protection Plan

Community Polygon NFPA 1144 Survey Summary

Positive Attributes (Low Scores)

- Street signs: visible and reflective
- Vegetation type: timber litter and hardwood mixture, moving into shrub at higher elevation
- Slope: less than 9%
- Building construction: metal and composite roofs dominant
- Water source: hydrants

Negative Attributes (High Scores)

- Ingress and egress: one road in and out
- Building construction: combustible siding
- Utility placement: aboveground
- Decking and fencing: combustible
- Separation of adjacent structures: minimal
- Defensible space: poor
- Topographic features: steep terrain and potential for channeling of winds

Suggested Mitigation Focus Area

Areas of Concern:

- N/A

Summary of Mitigation Needs (for details, see Recommendation Matrices in main document)

- Need a lumber market and processing to support increased fuel treatments
- Clear powerline right-of-way to the maximum extent possible as it parallels Hope Highway, coordinate with Chugach Electric, DOT, and USFS (Hope-Sunrise-Summit Lake CWPP, 2006).

Fire Department Concerns:

- Increase firefighting training
- Purchase chipper for green waste disposal

- Increasing population, new tracts of land have been developed and sold. Fire department does not have a good road map of where everyone lives, nor up-to-date records on new tracts of land.
- No street numbers on new homes
- Many homes do not have defensible space
- Community doesn't have fire break zones
- Need to improve and expand working relationship to increase training opportunities and work with other departments throughout the peninsula
- Coordinating resources and equipment throughout the peninsula. (Fire department has trucks they can loan).
- Fire Department needs an administrator and is currently seeking funding.

Figure D.33. Example of the landscape in Sunrise.

KENAI PENINSULA BOROUGH
WILDLAND URBAN INTERFACE COMMUNITIES
TYONEK POLYGON SUMMARY STATISTICS

Community Description

Tyonek Point is located on the Kenai Peninsula, across from Point Possession. It is bordered by Beluga to the northeast and encompasses an area of 66.8 square miles. Tyonek Point is situated at approximately 61.068580° north latitude and -151.224956° west longitude. Tyonek Point is in the Anchorage Recording District (ADNR, 2021). Winter temperatures range from -10˚ F to 35˚ F; summer temperatures vary from 45˚ F to 65˚ F. Average annual precipitation is 24 inches. Tyonek Volunteer Fire Department and the Nikiski Fire Service provide fire protection to Tyonek residents (KPB, 2021b).

Community Polygon Summary
(Desktop analysis only)

Community Polygon Name: Tyonek | **Total Score:** 105 | **Rating:** **High**

Town: Tyonek

Land Area (*mi.*^{2}): 66.8

Population Density (people/*mi.*^{2})$_1$: 2.6

Home Density (housing units/ *mi.*^{2})$_2$: 1.4

Percent of Community Classified by Wildland Urban Interface (WUI) Types

Acres (*mi.*^{2}): 17.5

Percent: 25.4%

Percent of Community by Modeled Wildfire Related Loss

Low	Medium - Low	Medium	Medium – High	High
0.2%	0.4%	0.0%	0.0%	0.0%

Dominant Fuel Type

Grass	Grass/Shrub	Shrub	Timber Understory	Timber Litter
GR1 GR5	GS1 GS2 GS3	SH2	TU2, TU3, TU5	TL2

Percent of Community by Modeled/Calculated Wildfire Risk Inputs

Flame Length	Dist. From Fire Station
0-4 (ft): 93%	0-0.5 (mi.): 1%
4-8 (ft): 10%	0.5-1.0 (mi.): 2%
8-12 (ft): 0%	1.0-1.5 (mi.): 3%
>12 (ft): 0%	>1.5 (mi.): 93%

Fire Department Statistics: Nikiski Fire Department				
Communities Served: **Nikiski, Beluga*, Tyonek**				
Fulltime Firefighters: 25		On-call Firefighters: 0		Volunteer Firefighters: 30
Water Tender:			Wildland Engines	
Type 1:	4-7	Total Number:	4WD/AWD:	Brush Breaker:
Type 2:	0	Type 3: ----	0	0
Type 3:	0	Type 4: ----	0	0
Structure Engines:		Type 5: ----	0	0
Type 1:	4-7	Type 6: 1-3	1-3	0
Type 2:	0	Type 7: ----	0	0
Port-A-Tanks:	10			
Portable Pumps:	0			
Recent Fires within the polygon: - Tyonek, 2014				
Fire Management Options:				
Critical Protection around urban areas: **0%**		Full Protection around WUI: **25%**		

* The Tyonek Volunteer Fire Department provides fire response support.

Current Fire and Fuel Management Programs and Plans

- 2018 ALAH Action Plan
- 2019 Kenai Peninsula Borough Hazard Mitigation Plan

Community Polygon NFPA 1144 Survey Summary

Positive Attributes (Low Scores)

- Values at risk: Low population density
- Separation of adjacent structures: good
- Slope: area has minimal slope
- Street signs: visible and reflective
- Building construction: metal and composite roofs dominant

Negative Attributes (High Scores)

- Ingress and egress: Very inaccessible. Sea and air access only
- Building construction: combustible siding
- Utility placement: aboveground
- Decking and fencing: combustible
- Vegetation type: timber understory- flammable
- Fire response from Nikiski

Suggested Mitigation Focus Area

Areas of Concern:

- Island Lake Area, Holt-Lamplight Area, Captain Cook State Park, and KNWR.
- Village of Tyonek
- Fish camps along the coast
- Historical sites along the coast
- Church and school are used as emergency shelters
- Timber camp
- 2nd Lake (primary source of drinking water)

Summary of Mitigation Needs (for details, see Recommendation Matrices in main document)

- Increase defensible space around values at risk and safety shelters including the garden, historic church, school, tribal center, historical homesteads, non-government recognized historical sites, timber camp, historical sites along the coast, and archeological sites in Shirleyville.
- Maintain significant defensible space around the fuel station and plan for periodic maintenance.
- Implement understory thinning and overall fuel reduction in areas determined to be at risk of intense fire behavior as determined by the risk assessment.
- Relocate wood piles to 100+ feet away from structures and install a fire break with a 10-foot buffer around the wood pile.
- Increase fuel free buffers along roads to prevent fire jumping the road. Remove or prune alder trees that impede on the roadways.
- Implement a backup evacuation route to prevent the Tyonek fire evacuation situation.
- Partner with logging companies to harvest and sell beetle kill wood or look for opportunities to utilize as fuel wood.
- Implement regular wildland fire training events for local volunteer fire responders.
- Increase defensible space and road access – install fuel breaks and response vehicle turn-outs along narrow roads.
- Install firebreaks around all above ground utility tanks with a 15-foot buffer.
- Distribute wildfire education resources in regard to home hardening, defensible space, structural ignitability, and how to shelter in place if you will not evacuate.
- Consider the use of prescribed fire (where appropriate) to maintain grassland areas.
- Implement fuel breaks in strategic locations to slow fire spread, for example in areas perpendicular to prevailing winds on the edge of the community.
- Need wider fuel breaks at the lakes closer to village to provide more effective fire mitigation.
- Host firefighter recruitment events.

Fire Department Concerns:

- Need volunteers for local fire department
- Need training to respond to wildfire and to do prescribed burns
- Many homes have diesel fuel tanks connected to them

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APPENDIX E:

National Fire Protection Association 1144 Form

SWCA Wildfire Risk Assessment		
Community		**Notes:**
Surveyor		
Survey Date/Time		

Means of Access	
Ingress and Egress	
2 or more roads in and out score | 0	
1 road in and out | 7	
Road Width	
> 24 ft | 0	
> 20 ft < 24 ft | 2	
< 20 ft | 4	
Road Conditions	
Surfaced road, grade < 5% | 0	
Surfaced road, grade > 5% | 2	
Non-surfaced road, grade < 5% | 2	
Non-surfaced road, grade > 5% | 5	
Other than all season | 7	
Fire Access	
< 300 ft with turnaround | 0	
> 300 ft with turnaround | 2	
< 300 ft with no turnaround | 4	
> 300 ft with no turnaround | 5	
Street Signs	
Present – reflective | 0	
Present – non-reflective | 2	
Not present | 5	
Notes:	

Vegetation (Fuel Models)	
Predominant Vegetation	
Primary Predominant Vegetation	
Non-Burnable (NB) Score | 2	
Grass (GR) Score | 5	
Grass-Shrub (GS) Score | 10	
Shrub (SH) Score | 15	
Timber-Understory (TU) Score | 20	
Timber-Litter (TL) Score | 25	
Slash-Blow (TU) Score | 30	

Notes:	
Defensible Space	
> 100 ft around structure | 1	
> 70 ft < 100 ft around structure | 3	
> 30 ft < 70 ft around structure | 10	
< 30 ft around structure | 25	
Topography Within 300 ft of Structures	
Slope	
< 9% | 1	
10% to 20% | 4	
21% to 30% | 7	
31% to 40% | 8	
>41% | 10	
Additional Rating Factors (rate all that apply)	
Topographic features | 1-5	
History of high fire occurrence | 1-5	
Severe fire weather potential | 1-5	
Separation of adjacent structures | 1-5	
Notes:	
Roofing Assembly	
Roofing	
Class A - metal roof, clay/concrete tiles, slate, asphalt shingles | 0	
Class B - pressure treated composite shakes and shingles | 3	
Class C - untreated wood shingle, plywood, particle board | 15	
Unrated - Extremely poor roofing conditions | 25	
Notes:	
Building Construction	
Siding Materials (predominant)	
Non-combustible (brick/concrete) | 5	
Fire Resistive (stucco/adobe) | 10	
Combustible (wood or vinyl) | 12	
Deck and fencing (predominant)	
No deck or fence/non-combustible | 0	
Combustible deck and fence | 5	
Building Set-Back	
> 30 ft to slope | 1	
< 30 ft to slope | 5	

Notes:	
Available Fire Protection	
Water Sources	
Water Source? | yes/no	
Water Source Type | hydrant, water tank, other	
Other Water Source	
Water Source Score | Hydrant = 1 Water Tank = 3	
Organized Response	
Station < 5 mi from community | 1	
Station > 5 mi from community | 3	
Notes:	
Placement of Gas and Electric Utilities	
Both underground | 0	
One above, one below | 3	
Both above ground | 5	
Values at Risk Observations	
Forest Health Observations	
Land Use Observations	
Misc Observations	

Total Score:	

Hazard Rating Scale	**<40 Low**	**>40 Moderate**	**>70 High**	**>112 Extreme**

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APPENDIX F:

Funding Sources

FEDERAL FUNDING INFORMATION

Source: Pre-disaster Mitigation (PDM) Grant Program

Agency: Department of Homeland Security (DHS) Federal Emergency Management Agency (FEMA)

Website: http://www.fema.gov/government/grant/pdm/index.shtm

Description: The DHS includes FEMA and the U.S. Fire Administration. FEMA's Federal Mitigation and Insurance Administration is responsible for promoting pre-disaster activities that can reduce the likelihood or magnitude of loss of life and property from multiple hazards, including wildfire.
The Disaster Mitigation Act of 2000 created a requirement for states and communities to develop pre-disaster mitigation plans and established funding to support the development of the plans and to implement actions identified in the plans. This competitive grant program, known as PDM, has funds available to state entities, tribes, and local governments to help develop multi-hazard mitigation plans and to implement projects identified in those plans. **The Pre-Disaster Mitigation program is currently in process of transitioning to the Building Resilient Infrastructure and Communities (BRIC) program.** BRIC will support states, local communities, tribes, and territories as they undertake hazard mitigation projects, reducing the risks they face from disasters and natural hazards. The BRIC program guiding principles are supporting communities through capability- and capacity-building; encouraging and enabling innovation; promoting partnerships; enabling large projects; maintaining flexibility; and providing consistency. You can find more information on the BRIC program here: https://www.fema.gov/grants/mitigation/building-resilient-infrastructure-communities

Source: Infrastructure Investments and Jobs Act

Agency: Secretary of the Interior and the Secretary of Agriculture

Website: https://www.congress.gov/bill/117th-congress/house-bill/3684

Description: There is authorized to be appropriated to the Secretary of the Interior and the Secretary of Agriculture, acting through the Chief of the Forest Service, for the activities described in subsection (c), $3,369,200,000 for the period of fiscal years 2022 through 2026.

- Subsection (c):
  - (1) $20,000,000 shall be made available for entering into an agreement with the Administrator of the National Oceanic and Atmospheric Administration to establish and operate a program that makes use of the Geostationary Operational Environmental Satellite Program to rapidly detect and report wildfire starts in all areas in which the Secretary of the Interior or the Secretary of Agriculture has financial responsibility for wildland fire protection and prevention, of which—
    - (A) $10,000,000 shall be made available to the Secretary of the Interior; and
    - (B) $10,000,000 shall be made available to the Secretary of Agriculture;
  - (2) $600,000,000 shall be made available for the salaries and expenses of Federal wildland firefighters
  - (3) $10,000,000 shall be made available to the Secretary of the Interior to acquire technology and infrastructure for each Type I and Type II incident management team to maintain interoperability with respect to the radio frequencies used by any responding agency;

- (4) $30,000,000 shall be made available to the Secretary of Agriculture to provide financial assistance to States, Indian Tribes, and units of local government to establish and operate Reverse-911 telecommunication systems;
- (5) $50,000,000 shall be made available to the Secretary of the Interior to establish and implement a pilot program to provide to local governments financial assistance for the acquisition of slip-on tanker units to establish fleets of vehicles that can be quickly converted to be operated as fire engines;
- (6) $1,200,000 shall be made available to the Secretary of Agriculture, in coordination with the Secretary of the Interior, to develop and publish, not later than 180 days after the date of enactment of this Act, and every 5 years thereafter, a map depicting at-risk communities (as defined in section 101 of the Healthy Forests Restoration Act of 2003 (16 U.S.C. 6511) including Tribal at-risk communities;
- (7) $100,000,000 shall be made available to the Secretary of the Interior and the Secretary of Agriculture for—
  - preplanning fire response workshops that develop
    - (I) potential operational delineations; and
    - (II) select potential control locations; and
    - (ii) workforce training for staff, non-Federal firefighters, and Native village fire crews for—
      - (I) wildland firefighting; and
      - (II) increasing the pace and scale of vegetation treatments, including training on how to prepare and implement large landscape treatments
- (8) $20,000,000 shall be made available to the Secretary of Agriculture to enter into an agreement with a Southwest Ecological Restoration Institute established under the Southwest Forest Health and Wildfire Prevention Act of 2004 (16 U.S.C. 6701 et seq.)
- (9) $20,000,000 shall be available for activities conducted under the Joint Fire Science Program
- (10) $100,000,000 shall be made available to the Secretary of Agriculture for collaboration and collaboration-based activities, including facilitation, certification of collaboratives, and planning and implementing projects under the Collaborative Forest Landscape Restoration Program established under section 4003 of the Omnibus Public Land Management Act of 2009 (16 U.S.C. 7303)
- (11) $500,000,000 shall be made available to the Secretary of the Interior and the Secretary of Agriculture for—
  - (i) conducting mechanical thinning and timber harvesting in an ecologically appropriate manner that maximizes the retention of large trees, as appropriate for the forest type, to the extent that the trees promote fire-resilient stands; or
  - (ii) precommercial thinning in young growth stands for wildlife habitat benefits to provide subsistence resources
    - (12) $500,000,000 shall be made available to the Secretary of Agriculture, in cooperation with States, to award community wildfire defense grants to at-risk communities in accordance with subsection (f)
    - (13) $500,000,000 shall be made available for planning and conducting prescribed fires and related activities

- (14) $500,000,000 shall be made available for developing or improving potential control locations, in accordance with paragraph (7)(A)(i)(II), including installing fuelbreaks (including fuelbreaks studied under subsection (i)), with a focus on shaded fuelbreaks when ecologically appropriate
- (15) $200,000,000 shall be made available for contracting or employing crews of laborers to modify and remove flammable vegetation on Federal land and for using materials from treatments to the extent practicable, to produce biochar and other innovative wood products, including through the use of existing locally based organizations that engage young adults, Native youth, and veterans in service projects, such as youth and conservation corps
- (16) $200,000,000 shall be made available for post-fire restoration activities that are implemented not later than 3 years after the date that a wildland fire is contained
- (17) $8,000,000 shall be made available to the Secretary of Agriculture—
  - (A) to provide feedstock to firewood banks; and
  - (B) to provide financial assistance for the operation of firewood banks; and
- (18) $10,000,000 shall be available to the Secretary of the Interior and the Secretary of Agriculture for the procurement and placement of wildfire detection and real-time monitoring equipment, such as sensors, cameras, and other relevant equipment, in areas at risk of wildfire or post-burned areas.

Source: RAISE Discretionary Grants

Agency: U.S. Department of Transportation (DOT)

Website: https://www.transportation.gov/RAISEgrants and https://www.transportation.gov/sites/dot.gov/files/2021-06/FR%20NOFO%20RAISE.pdf

Description: The Rebuilding American Infrastructure with Sustainability and Equity (RAISE) Discretionary Grant Program provides for the DOT to invest in road, rail, transit, and port projects. Applications for projects to build and repair critical portions of the nation's transportation networks are reviewed by the DOT and chosen based on merit. Eligible applicants include state, local, tribal, and U.S. territory governments. Grants for this program are available up to $25 million.

Source: Rural Opportunities to Use Transportation for Economic Success (ROUTES)

Agency: U.S. Department of Transportation (DOT)

Website: https://www.transportation.gov/rural

Description: The goal of the ROUTES Initiative is to improve how rural areas use DOT discretionary grants and credits for infrastructure projects. Since many commodities are produced in rural areas of the country, it is imperative that these areas be provided with opportunities to enhance the condition of their transportation infrastructure. This initiative seeks to provide support to rural applicants to help with their understanding of grant programs and the associated funding processes. The initiative engages with stakeholders to better understand needs and challenges, collects data on needs and benefits of rural infrastructure, and provides information and technical assistance to assist stakeholders in the grant application process.

Source: Build America Bureau

Agency: U.S. Department of Transportation (DOT)

Website: https://www.transportation.gov/buildamerica/

Description: The Build America Bureau is responsible for streamlining transportation infrastructure development projects. The Bureau is able to assist funding candidates with credit and grant opportunities as well as technical assistance. As the point of contact for states, municipalities, and project sponsors, the Bureau can provide support for federal transportation credit program applications and access to private funding opportunities. The Bureau utilizes Transportation Infrastructure Finance and Innovation Act (TIFIA) and Railroad Rehabilitation and Improvement Financing (RRIF) loan programs, private activity bonds, and INFRA grant programs to help fund projects.

Source: Hazard Mitigation Grant Program (HMGP)

Agency: FEMA

Website: https://www.fema.gov/grants/mitigation/hazard-mitigation

Description: The HMGP provides funding to state, local, tribal, or territorial governments (and individuals or businesses if the community applies on their behalf) to rebuild with the intentions to mitigate future losses due to potential disasters. This grant program is available *after* a presidentially declared disaster.

Source: Hazard Mitigation Grant Program (HMGP) – Post Fire

Agency: FEMA

Website: https://www.fema.gov/grants/mitigation/post-fire

Description: The HMGP Post Fire grant program provides assistance to communities for the purpose of implementing hazard mitigation measures following a wildfire. Mitigation measures may include:

- Soil stabilization
- Flood diversion
- Reforestation

Source: General Assistance Program

Agency: EPA

Website: https://www.epa.gov/r10-tribal/region-10-indian-environmental-general-assistance-program-gap

Description: In 1992, Congress passed the Indian Environmental General Assistance Program Act. Through this act, the EPA was authorized to administer General Assistance Program (GAP) grants to federally recognized tribes. Grants can be used by tribes for the purposes of planning, developing, and establishing environmental protection programs in Indian country. Additionally, grants can be applied to the development and implementation of solid and hazardous waste programs. While the majority of qualified applicants may request between $75,000 and $125,000, larger tribes have the ability to request higher levels of funding.

Source: Multipurpose Grants to States and Tribes

Agency: EPA

Website: https://www.epa.gov/grants/multipurpose-grants-states-and-tribes

Description: In 2016, Congress established the Multipurpose Grant (MPG) program to allow states and tribes to fund high-priority environmental activities at their own discretion. The EPA encourages grant recipients to use these funds to address pre- and polyfluoroalkyl substances (PFAS).

However, funds may also be used for activities such as promoting environmental justice and taking measures to address climate change. Applicants can receive a base amount of $25,000 and an additional amount of funding based on funding received in Fiscal Year 2020.

Source: Public Assistance Grant Program

Agency: FEMA

Website: https://www.fema.gov/assistance/public/program-overview

Description: FEMA's Public Assistance Program provides supplemental grants to state, tribal, territorial, and local governments, and certain types of private non-profits so that communities can quickly respond to and recover from major disasters or emergencies. FEMA also encourages protection of these damaged facilities from future events by providing assistance for hazard mitigation measures during the recovery process. More detailed information is provided in the FEMA Public Assistance Program and Policy Guide.

Source: Flood Mitigation Assistance Grant

Agency: FEMA

Website: https://www.fema.gov/grants/mitigation/floods

Description: The Flood Mitigation Assistance Program is a competitive grant program that provides funding to states, local communities, federally recognized tribes, and territories. Funds can be used for projects that reduce or eliminate the risk of repetitive flood damage to buildings insured by the National Flood Insurance Program. FEMA chooses recipients based on the applicant's ranking of the project and the eligibility and cost-effectiveness of the project.

Source: Funding for Fire Departments and First Responders

Agency: DHS, U.S. Fire Administration

Website: https://www.usfa.fema.gov/grants/

Description: Includes grants and general information on financial assistance for fire departments and first responders. Programs include the Assistance to Firefighters Grant Program, Reimbursement for Firefighting on Federal Property, State Fire Training Systems Grants, and National Fire Academy Training Assistance.

Source: Emergency Management Performance Grant (EMPG)

Agency: FEMA

Website: https://www.fema.gov/grants/preparedness/emergency-management-performance

Description: The EMPG program provides funding to state, local, tribal, and territorial emergency management agencies with the overall goal of creating a safe and resilient nation. The two main objectives of the program are 1) closing capability gaps that are identified in the state or territory's most recent Stakeholder Preparedness Review (SPR); and 2) building or sustaining those capabilities that are identified as high priority through the Threat and Hazard Identification and Risk Assessment (THIRA)/SPR process and other relevant information sources. The grant recipient and Regional Administrator must come to an agreement on program priorities, which are crafted based on National, State, and regional priorities.

Source: Emergency Watershed Protection (EWP) Program

Agency: Natural Resources Conservation Service (NRCS)

Website: https://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/landscape/ewpp/

Description: The program offers technical and financial assistance to help local communities relieve imminent threats to life and property caused by floods, fires, windstorms, and other natural disasters that impair a watershed.

Eligible sponsors include cities, counties, towns, conservation districts, or any federally recognized Native American tribe or tribal organization. Interested public and private landowners can apply for EWP Program recovery assistance through one of those sponsors.

EWP Program covers the following activities.

- Debris removal from stream channels, road culverts, and bridges
- Reshape and protect eroded streambanks
- Correct damaged drainage facilities
- Establish vegetative cover on critically eroded lands
- Repair levees and structures
- Repair conservation practices

Source: Emergency Conservation Program (ECP)

Agency: USDA Farm Service Agency (FSA)

Website: https://www.fsa.usda.gov/programs-and-services/conservation-programs/emergency-conservation/index

Description: The Emergency Conservation Program (ECP) helps farmers and ranchers to repair damage to farmlands caused by natural disasters and to help put in place methods for water conservation during severe drought. The ECP does this by giving ranchers and farmers funding and assistance to repair the damaged farmland or to install methods for water conservation. The grant could be used for restoring conservation structures (waterways, diversion ditches, buried irrigation mainlines, and permanently installed ditching system).

Source: Regional Catastrophic Preparedness Grants

Agency: FEMA

Website: https://www.fema.gov/grants/preparedness/regional-catastrophic

Description: The Regional Catastrophic Preparedness Grant program provides funding to increase collaboration and capacity in regard to catastrophic incident response and preparation.

Source: Specific EPA Grant Programs

Agency: Environmental Protection Agency (EPA)

Website: https://www.epa.gov/grants/specific-epa-grant-programs

Description: Various grant programs are listed under this site. Listed below are examples of grants offered:

- Multipurpose Grants to States and Tribes: https://www.epa.gov/grants/multipurpose-grants-states-and-tribes
- Environmental Education Grants: https://www.epa.gov/education/grants
- Environmental Justice Grants: https://www.epa.gov/environmentaljustice/environmental-justice-grants-funding-and-technical-assistance

Source: Environmental Quality Incentives Program (EQIP)

Agency: National Resource Conservation Service (NRCS)

Website: https://www.nrcs.usda.gov/wps/portal/nrcs/main/co/programs/financial/eqip/

Description: The Environmental Quality Incentives Program (EQIP) is a voluntary program authorized under the Agricultural Act of 2014 (2014 Farm Bill) that helps producers install measures to protect soil, water, plant, wildlife, and other natural resources while ensuring sustainable production on their farms, ranches, and working forest lands.

Source: Conservation Innovation Grants (CIG)

Agency: National Resource Conservation Service (NRCS)

Website: https://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/financial/cig/

Description: CIG State Component. CIG is a voluntary program intended to stimulate the development and adoption of innovative conservation approaches and technologies while leveraging federal investment in environmental enhancement and protection, in conjunction with agricultural production. Under CIG, Environmental Quality Incentives Program (EQIP) funds are used to award competitive grants to non-federal governmental or nongovernmental organizations, tribes, or individuals. CIG enables the Natural Resources Conservation Service (NRCS) to work with other public and private entities to accelerate technology transfer and adoption of promising technologies and approaches to address some of the nation's most pressing natural resource concerns. CIG will benefit agricultural producers by providing more options for environmental enhancement and compliance with federal, state, and local regulations. The NRCS administers the CIG program. The CIG requires a 50/50 match between the agency and the applicant. The CIG has two funding components: national and state. Funding sources are available for water resources, soil resources, atmospheric resources, and grazing land and forest health.

Source: Volunteer Fire Assistance Program

Agency: U.S. Forest Service

Website: https://www2.illinois.gov/dnr/conservation/Forestry/Pages/VolunteerFireAssistanceProgram.aspx

Description: U.S. Forest Service funding will provide assistance, through the states, to volunteer fire departments to improve communication capabilities, increase wildland fire management training, and purchase protective fire clothing and firefighting equipment. For more information, contact your state representative; contact information can be found on the National Association of State Foresters website.

Source: Urban and Community Forestry Program, 2021 National Urban and Community Forestry Challenge Cost Share Grant Program

Agency: U.S. Forest Service

Website: https://www.fs.usda.gov/managing-land/urban-forests/ucf

Description: U.S. Forest Service funding will provide for Urban and Community Forestry Programs that work with local communities to establish climate-resilient tree species to promote long-term forest health. The other initiative behind this program is to promote and carry out disaster risk mitigation activities, with priority given to environmental justice communities. For more information, contact a Forest Service Regional Program Manager.

Source: Fire Management Assistance Grant (FMAG)

Agency: FEMA

Website: https://www.fema.gov/assistance/public/fire-management-assistance

Description: Fire Management Assistance is available to state, local, and tribal governments for the mitigation, management, and control of fires on publicly or privately owned forests or grasslands, which threaten such destruction as would constitute a major disaster. The Fire Management Assistance declaration process is initiated when a state submits a request for assistance to the FEMA Regional Director at the time a "threat of major disaster" exists. The entire process is accomplished on an expedited basis and a FEMA decision is rendered in a matter of hours. Before a grant can be awarded, a state must demonstrate that total eligible costs for the declared fire meet or exceed either the individual fire cost threshold, which applies to single fires, or the cumulative fire cost threshold, which recognizes numerous smaller fires burning throughout a state.

Source: Clearinghouse of Federal Funding Sources; Land Resources

Agency: Multiple

Website: https://ordspub.epa.gov/ords/wfc/f?p=165:512:6325285542034:::512::

Description: The Land Finance Clearing House is a catalog of Federal funding sources for all things land related.

Examples of the types of grants found at this site are:

- Forest and Woodlands Resource Management Grant: https://sam.gov/fal/a798ad78cac749639b48270db3e86fdc/view?index=cfda&page=2&organization_id=100011100
- Environmental Education Grant: https://www.epa.gov/education/grants
- Public Assistance Grant Program: https://www.fema.gov/assistance/public
- Hazard Mitigation Grant: https://www.fema.gov/grants/mitigation/hazard-mitigation

Source: Clearinghouse of Federal Funding Sources; Water Resources

Agency: Multiple

Website: https://ordspub.epa.gov/ords/wfc/f?p=165:12:10439242675971:::12::

Description: The Water Finance Clearing House is a catalog of Federal funding sources for all things water related.

Examples of the types of grants found at this site are:

- Water Conservation Field Services Program: https://www.usbr.gov/waterconservation/
- Forestry on Indian Lands Grant: https://www.bia.gov/

Source: Emergency Forest Restoration Program (EFRP)

Agency: USDA Farm Service Agency (FSA)

Website: https://www.fsa.usda.gov/programs-and-services/disaster-assistance-program/emergency-forest-restoration/index

Description: The Emergency Forest Restoration Program (EFRP) helps the owners of non-industrial private forests restore forest health damaged by natural disasters. The EFRP does this by authorizing payments to owners of private forests to restore disaster damaged forests. The local FSA County Committee implements EFRP for all disasters with the exceptions of drought and insect infestations. Eligible practices may include debris removal, such as down or damaged trees; site preparation, planting materials, and labor to replant forest stand; restoration of forestland roads, fire lanes, fuel breaks, or erosion-control structures; fencing, tree shelters; wildlife enhancement.

To be eligible for EFRP, the land must have existing tree cover; and be owned by any nonindustrial private individual, group, association, corporation, or other private legal entity.

Source: Firewise Communities

Agency: Multiple

Website: http://www.firewise.org

Description: Many different Firewise Communities activities are available to help homes and whole neighborhoods become safer from wildfire without significant expense. Community cleanup days, awareness events, and other cooperative activities can often be successfully accomplished through partnerships among neighbors, local businesses, and local fire departments at little or no cost.

The kind of help you need will depend on who you are, where you are, and what you want to do. Among the different activities that individuals and neighborhoods can undertake, the following often benefit from seed funding or additional assistance from an outside source:

- Thinning/pruning/tree removal/clearing on private property—particularly on very large, densely wooded properties
- Retrofit of home roofing or siding to non-combustible materials
- Managing private forest
- Community slash pickup or chipping
- Creation or improvement of access/egress roads
- Improvement of water supply for firefighting
- Public education activities throughout the community or region

Source: The National Fire Plan (NFP)

Agency: DOI & USDA

Website: https://www.federalgrantswire.com/national-fire-plan--rural-fire-assistance.html#.YUJ_Fp1KhPY and https://www.federalgrantswire.com/national-fire-plan-wildland-urban-interface-community-fire-assistance.html#.YUT1uCuSlPZ

Description: Many states are using funds from the NFP to provide funds through a cost-share with residents to help them reduce the wildfire risk to their private property. These actions are usually in the form of thinning or pruning trees, shrubs, and other vegetation and/or clearing the slash and debris from this kind of work. Opportunities are available for rural, state, and volunteer fire assistance.

Source: Staffing for Adequate Fire and Emergency Response (SAFER)

Agency: FEMA

Website: https://www.fema.gov/grants/preparedness/firefighters/safer

Description: The purpose of SAFER grants is to help fire departments increase the number of frontline firefighters. The goal is for fire departments to increase their staffing and deployment capabilities and ultimately attain 24-hour staffing, thus ensuring that their communities have adequate protection from fire and fire-related hazards. The SAFER grants support two specific activities: (1) hiring of firefighters and (2) recruitment and retention of volunteer firefighters. When the program is used for the hiring of firefighters, it provides grants to pay for part of the salaries of newly hired firefighters over the five-year program.

Source: The Fire Prevention and Safety Grants (FP&S)

Agency: FEMA

Website: https://www.fema.gov/grants/preparedness/firefighters/safety-awards#:~:text=Awards%20%20%20%20Organization%20%20%20,%20%20%241%2C499%2C957%20%2016%20more%20rows%20

Description: FP&S offers support to projects that enhance the safety of the public and firefighters who may be exposed to fire and related hazards. The primary goal is to target high risk populations and mitigate high incidences of death and injury. Examples of the types of projects supported by FP&S include fire-prevention and public-safety education campaigns, juvenile fire-setter interventions, media campaigns, and arson prevention and awareness programs. In fiscal year 2005, Congress reauthorized funding for FP&S and expanded the eligible uses of funds to include firefighter safety research and development.

Source: GSA-Federal Excess Personal Property (FEPP)

Agency: USFS

Website: https://gsaxcess.gov/

Description: The Federal Excess Personal Property (FEPP) program refers to Forest Service-owned property that is loaned to State Foresters for the purpose of wildland and rural firefighting. Most of the property originally belonged to the Department of Defense (DoD). Once acquired by the Forest Service, it is loaned to State Cooperators for firefighting purposes. The property is then loaned to the State Forester, who may then place it with local departments to improve local fire programs. State Foresters and the USDA Forest Service have mutually participated in the FEPP program since 1956.

Source: Assistance to Firefighters Grants (AFG)

Agency: FEMA

Website: https://www.fema.gov/grants/preparedness/firefighters.

Description: The AFG program provides resources to assist fire departments in attaining critical resources such as training and equipment.

STATE AND PRIVATE FUNDING INFORMATION

Source: Western Bark Beetle Initiative Grant Program (WBBI)

Agency: Alaska Department of Natural Resources, Division of Forestry

Website: http://www.forestry.alaska.gov/insects/grants

Description: The Western Bark Beetle Initiative (WBBI) is a cost-share program established for non-federal landowners within the state of Alaska for the purposes of bark beetle prevention, suppression, and restoration activities. This program provides grants for individual private landowners as well as larger non-federal landholders. A minimum of five acres is required for eligibility for this program. Additionally, a group of individual private landowners with contiguous properties of less than five acres can pool their properties together to meet the minimum requirement by submitting a package of individual applications.

Source: Western Wildland-Urban Interface (WUI) Grants

Agency: Alaska Department of Natural Resources, Division of Forestry

Website: http://www.forestry.alaska.gov/fire/wuigrants

Description: The National Fire Plan (NFP) that was enacted by Congress in 2000 was initiated to address the increased severity and impacts of wildland fires. Through the NFP, the State Fire Assistance (SFA) program was developed to fund hazard mitigation projects in the Wildland-Urban Interface. The Western Wildland-Urban Interface (WUI) grants are funding opportunities provided by the SFA program to assist communities in the accomplishment of the following four goals: improved wildfire prevention, reduction of hazardous fuels, restoration of fire-adapted ecosystems, and promotion of community assistance. State and local governments, native entities, and non-profits are eligible to apply for assistance through these grants.

Source: Community Forestry Grants

Agency: Alaska Department of Natural Resources, Division of Forestry

Website: http://www.forestry.alaska.gov/community/grants

Description: Several community forestry grants are available to communities within the state to promote the planting of trees. Communities can receive $100 per tree to remove invasive chokecherry trees and replace them with native species under one grant opportunity. Next, the Alaska Community Forest Council is offering Arbor Day grants in the $200-$500 range that can be used to plant trees or shrubs or support other activities that promote Arbor Day in Alaska. These grants are intended for local governments, schools, and nonprofit organizations. Additionally, the National Association of State Foresters (NASF) is offering cost-reimbursement grants up to $400 for schools to plant trees on school grounds or even indoors at the school. The NASF Centennial School Tree Challenge was launched to celebrate NASF's centennial anniversary by having 100 schools plant trees in commemoration of Arbor Day. Lastly, the Alaska Division of Forestry is teaming up with Project Learning Tree (PLT) to provide program applicants with a free curriculum to connect students with the trees on their school's property or within their communities.

Source: Private Landowner Assistance Grant

Agency: Alaska Department of Natural Resources, Division of Forestry

Website: http://www.forestry.alaska.gov/stewardship/index

Description: The Forest Stewardship Program assists private landowners in the active management of forests, keeping lands productive, and increasing economic and environmental benefits. Eligible applicants are Alaska Native Corporations, landowners with seven or more acres capable of producing trees, and, potentially, homeowners who are at risk of wildfire with two or more acres.

Source: Alaska Firewise

Agency: National Wildfire Coordinating Group (NWCG)

Website: http://forestry.alaska.gov/fire/firewise

Description: Firewise is a certification process through which communities can take steps to become better prepared for wildfire. The goal of this opportunity is to encourage communities to develop protections against wildfire and to acknowledge them for doing so. The following steps need to be taken to become certified as a Firewise community: complete an assessment to determine if the community is at risk, create a Firewise Board, develop a Community Wildfire Protection Plan, sponsor a Firewise event within the community each year, and invest a minimum of $2 per capita in Firewise projects each year. After these steps are completed, a community can apply for certification as a Firewise community. Obtaining a certification as a Firewise community can increase chances for grant funding as preference is sometimes given to communities with the designation.

Source: Hazard Mitigation Planning Assistance

Agency: Adapt Alaska

Website: https://adaptalaska.org/resource/get-help-with-hazard-mitigation-planning/

Description: States and federally recognized tribes can apply directly through FEMA for assistance with hazard mitigation planning. Alternatively, tribes, cities, and boroughs can apply as sub-applicants of the State of Alaska. Grants provided by this program are to be used for Hazard Mitigation Assistance (HMA) projects. Applicants are required to have FEMA-approved hazard mitigation plans in order to receive assistance on HMA projects. The State of Alaska also provides guidance to tribes and local governments through the Division of Homeland Security and Emergency Management. For additional information, please visit: https://adaptalaska.org/resources/.

Source: Serve Alaska

Agency: Alaska Division of Community and Regional Affairs

Website: https://www.commerce.alaska.gov/web/dcra/ServeAlaska.aspx

Description: Through a partnership with the Corporation for National and Community Service (CNCS), Serve Alaska facilitates funding opportunities provided by AmeriCorps within the State of Alaska. The AmeriCorps grants focus on four areas: disaster services, economic opportunity, education, and environmental stewardship. Non-federal entities such as tribal organizations, higher education institutions, local governments, nonprofit organizations, and states are eligible to apply. Grantees are required to match funds based on the number of years that they have received funding from AmeriCorps.

Source: Community Assistance Program (CAP)

Agency: Alaska Division of Community and Regional Affairs

Website: https://www.commerce.alaska.gov/web/dcra/GrantandFunding/CommunityRevenueSharing.aspx

Description: In FY16, the Alaska Legislature officially renamed Community Revenue Sharing to the Community Assistance Program (CAP). CAP was designed to provide Alaska's boroughs, cities, and unincorporated communities with funds necessary for the delivery of essential public services. These funds can be used for any public purpose that has been deemed a priority by the funding recipient to include funding fire-related activities. Payments made to eligible entities are based on the entity's classification and its population.

Source: Community Development Block Grants – Alaska

Agency: Alaska Division of Community and Regional Affairs

Website: https://www.commerce.alaska.gov/web/dcra/GrantsSection/CommunityDevelopmentBlockGrants.aspx

Description: The Alaska Community Development Block Grant Program (CDBG) is designed to provide funding to communities for public facilities and planning activities that address issues affecting the health and safety of residents as well as those that reduce the cost of essential community services. CDBG grants are competitive single-purpose project grants with a maximum amount of $850,000 per community. Funding is provided for three categories: community development, planning, and Special Economic Development. With the exception of Anchorage, any Alaskan municipality is eligible to apply.

Source: Community Development Block Grants – Mitigation - Alaska

Agency: Alaska Division of Community and Regional Affairs

Website: https://www.commerce.alaska.gov/web/dcra/GrantsSection/CDBG-MIT.aspx

Description: The Community Development Block Grant Mitigation (CDBG-MIT) Program provides funding to eligible communities that have experienced a qualifying natural disaster. Grants are intended to be used for mitigation activities that increase resilience to disasters, reduce risk and damage to property, and lessen hardship through the minimization of impacts of future disasters. Grantees are required to submit an action plan prior to utilizing program funds.

Source: Community Development Block Grants – Disaster Recovery - Alaska

Agency: Alaska Division of Community and Regional Affairs

Website: https://www.commerce.alaska.gov/web/dcra/GrantsSection/CDBG-DR.aspx

Description: In response to severe disasters, Congress has occasionally appropriated additional funds into the CDBG program for the purposes of recovery. In these instances, funds are allocated to state or local governments for the explicit purpose of filling unmet needs following the disaster. Funds must be used for necessary expenses associated with disaster relief, long-term recovery efforts, and restoration of infrastructure and housing. Additionally, funds can only be used in areas that have been Presidentially-declared disaster areas. As these funds are appropriations rather than programmatic funds, they are temporary and will not be annually renewed.

Source: Alaska Climate Change Impact Mitigation Program (ACCIMP)

Agency: Alaska Division of Community and Regional Affairs

Website: https://www.commerce.alaska.gov/web/dcra/PlanningLandManagement/ACCIMP.aspx

Description: The Alaska Climate Change Impact Mitigation Program (ACCIMP) was established to help climate-impacted communities develop plans to protect their shorelines and relocate buildings or villages as needed. The overall goal of the ACCIMP is to create climate-resilient communities through the provision of technical assistance and funding opportunities. The program uses a two-step process to accomplish its goals. First, hazard impact assessments are conducted to identify and assess hazards within a community and then to develop recommendations for mitigation. The second step is to provide community planning grants for communities to carry out some of the recommended mitigation actions developed in the assessments. For certain communities, grants are awarded on a non-competitive basis in the range of $10,000 to no more than $50,000 due to their status as being imminently threatened by climate change. However, once funds have been distributed to these communities, remaining funds are awarded on a competitive basis up to $150,000 per community. To be eligible for funds, a community must have a village council or incorporated nonprofit organization that is capable of receiving and dispensing funds in accordance with program requirements.

Source: Alaska Risk MAP Program

Agency: Alaska Division of Community and Regional Affairs and FEMA

Website: https://www.commerce.alaska.gov/web/dcra/PlanningLandManagement/RiskMAP.aspx

Description: The Alaska Risk MAP Program is funded through FEMA's Cooperative Technical Partner Program and was established to increase community resilience to natural disasters. This program provides communities with hazard information, risk assessment tools, and local outreach support to help residents understand local risks, inform decision-making related to risk management, and guide local actions to reduce risk. Risk MAP is a collaborative process to help stakeholders make risk management decisions and take action to reduce the risk of hazards.

Source: Matching Awards Program (MAP)

Agency: National Forest Foundation (NFF)

Website: https://www.nationalforests.org/grant-programs/map

Description: The NFF is soliciting proposals for its Matching Awards Program (MAP) to provide funds for direct on-the-ground projects benefitting America's National Forests and Grasslands. By pairing federal funds provided through a cooperative agreement with the U.S. Forest Service with non-federal dollars raised by award recipients, MAP measurably multiplies the resources available to implement stewardship projects that benefit the National Forest System.

Source: Patagonia Environmental Grants and Support

Agency: Patagonia

Website: https://www.patagonia.com/how-we-fund/

Description: Patagonia supports innovative work that addresses the root causes of the environmental crisis and seeks to protect both the environment and affected communities. Patagonia focuses on places where they have built connections through outdoor recreation and through their network of retail stores, nationally and internationally.

Source: Leonardo DiCaprio Foundation Grants

Agency: Leonardo DiCaprio Foundation

Website: https://www.rewild.org/

Description: The foundation supports projects around the world that build climate resiliency, protect vulnerable wildlife, and restore balance to threatened ecosystems and communities.

Source: U.S. Endowment for Forestry and Communities

Agency: U.S. Environmental Protection Agency, Natural Resources Conservation Service (NRCS), U.S. Forest Service, U.S. Department of Defense, U.S. Economic Development Agency

Website: https://www.usendowment.org/

Description: As the nation's largest public charity dedicated to keeping our working forests working and ensuring their bounty for current and future generations, the Endowment deploys the creativity and power of markets to advance their mission: The Endowment works collaboratively with partners in the public and private sectors to advance systemic, transformative and sustainable change for the health and vitality of the nation's working forests and forest-reliant communities.

Source: State Farm Good Neighbor Citizen Grants

Agency: State Farm

Website: https://www.statefarm.com/about-us/corporate-responsibility/community-grants/good-neighbor-citizenship-grants

Description: State Farm funding is directed at:

- Auto and roadway safety
- Teen Driver Education
- Home safety and fire prevention
- Disaster preparedness
- Disaster recovery

Source: State and Private Forestry Programs - NASF

Agency: National Association of State Foresters (NASF)

Website: https://www.stateforesters.org/appropriations/

Description: The National Association of State Foresters recommends that funds become available through a competitive grant process on Wildland Urban Interface hazard mitigation projects. State fire managers see opportunities to use both the State Fire Assistance Program and the Volunteer Fire Assistance Program to improve the safety and effectiveness of firefighters in the interface, as well as in other wildland fire situations. To ensure firefighter safety, minimize property and resource loss, and reduce suppression costs, land management agencies, property owners, local leaders, and fire protection agencies must work cooperatively to mitigate interface fire risks, as well as to ensure that wildland firefighters receive the training, information, and equipment necessary to safely carry out their responsibilities.

Source: The Urban Land Institute (ULI)

Website: http://www.uli.org

Description: ULI is a 501(c)(3) nonprofit research and education organization supported by its members. The institute has more than 22,000 members worldwide, representing the entire spectrum of land use and real estate development disciplines, working in private enterprise and public service. The mission of the ULI is to provide responsible leadership in the use of land to enhance the total environment. ULI and the ULI Foundation have instituted Community Action Grants (http://www.uli.org/Content/NavigationMenu/MyCommunity/CommunityActionGrants/Community_Action_Gr.htm) that could be used for Firewise Communities activities. Applicants must be ULI members or part of a ULI District Council. Contact actiongrants@uli.org or review the web page to find your District Council and the application information.

Source: Environmental Systems Research Institute (ESRI)

Website: http://www.esri.com/grants

Description: ESRI is a privately held firm and the world's largest research and development organization dedicated to geographic information systems. ESRI provides free software, hardware, and training bundles under ESRI-sponsored Grants that include such activities as conservation, education, and sustainable development, and posts related non-ESRI grant opportunities under such categories as agriculture, education, environment, fire, public safety, and more. You can register on the website to receive updates on grant opportunities.

Source: StEPP Foundation

Website: https://steppfoundation.org/

Description: StEPP is a 501(c)(3) organization dedicated to helping organizations realize their vision of a clean and safe environment by matching projects with funders nationwide. The StEPP Foundation provides project oversight to enhance the success of projects, increasing the number of energy efficiency, clean energy, and pollution prevention projects implemented at the local, state, and national levels for the benefit of the public. The website includes an online project submittal system and a Request for Proposals page.

OTHER FUNDING INFORMATION

The following resources may also provide helpful information for funding opportunities:

- USDA Information Center: https://www.nal.usda.gov/main/information-centers
- Forest Service Fire Management website: http://www.fs.fed.us/fire/
- Insurance Services Office Mitigation Online (town fire ratings): http://www.isomitigation.com/
- National Fire Protection Association: https://www.nfpa.org/
- National Interagency Fire Center, Wildland Fire Prevention/Education: https://www.nifc.gov/fire-information/fire-prevention-education-mitigation
- Department of Homeland Security U.S. Fire Administration: https://www.usfa.fema.gov/index.html

APPENDIX G:

Additional Resources

COMMUNITY WILDFIRE MITIGATION HOMEOWNERS GUIDE

This guide has been developed to provide a document that can be tailored to serve individual communities across the Peninsula. It is a resource for future education and outreach efforts. The guide 1) suggests specific measures that can be taken by homeowners to reduce structure ignitability and 2) enhances overall preparedness in the planning area by consolidating preparedness information from several organizations.

BEFORE THE FIRE—PROTECTION AND PREVENTION

Reducing Structure Ignitability

Structural Materials

Roofing—The more fire-resistant the roofing material, the better. The roof is the portion of the house that is most vulnerable to ignition by falling embers, known as firebrands. Metal roofs afford the best protection against ignition from falling embers. Slate or tile roofs are also non-combustible, and Class-A asphalt shingles are recommended as well. The most dangerous type of roofing material is wood shingles. Removing debris from roof gutters and downspouts at least twice a year will help to prevent fire, along with keeping them functioning properly.

Siding—Non-combustible materials are ideal for the home exterior. Preferred materials include stucco, cement, block, brick, and masonry.

Windows—Double-pane windows are most resistant to heat and flames. Smaller windows tend to hold up better within their frames than larger windows. Tempered glass is best, particularly for skylights, because it will not melt as plastic will.

Fencing and trellises—Any structure attached to the house should be considered part of the house. A wood fence or trellis can carry fire to the home siding or roof. Consider using nonflammable materials or use a protective barrier such as metal or masonry between the fence and the house.

If designing a new home or remodeling the existing one, do it with fire safety as a primary concern. Use nonflammable or fire-resistant materials and have the exterior wood treated with UL-approved fire-retardant chemicals. More information on fire-resistant construction can be found at http://www.firewise.org.

Screen off the Area Beneath Decks and Porches

The area below an aboveground deck or porch can become a trap for burning embers or debris, increasing the chances of the fire transferring to the home. Screen off the area using screening with openings no larger than one-half inch. Keep the area behind the screen free of all leaves and debris.

Firewood, Kindling, and other Flammables

Although convenient, stacked firewood on or below a wooden deck adds fuel that can feed a fire close to the home. Be sure to move all wood away from the home during the fire season. Stack all firewood uphill, at least 30 feet and preferably 100 feet from the home.

When storing flammable materials such as paint, solvents, or gasoline, always store them in approved safety containers away from any sources of ignition such as hot water tanks or furnaces. The fumes from highly volatile liquids can travel a great distance after they turn into a gas. If possible, store the containers in a safe, separate location away from the main house.

Chimneys and Fireplace Flues

The chimney and damper should be inspected at least twice a year and have the chimney cleaned every year before first use. Have the spark arrestor inspected and confirm that it meets the latest safety code. Local fire departments will have the latest edition of National Fire Prevention Code 211 covering spark arrestors. Make sure to clear away dead limbs from within 15 feet of chimneys and stovepipes.

Fireplace and Woodstove Ashes

Never take ashes from the fireplace and put them into the garbage or dump them on the ground. Even in winter, one hot ember can quickly start a grass fire. Instead, place ashes in a metal container, and as an extra precaution, soak them with water. Cover the container with its metal cover and place it in a safe location for a couple of days. Then either dispose of the cold ash with other garbage or bury the ash residue in the earth and cover it with at least 6 inches of mineral soil.

Propane Tanks

A propane tank has many hundreds of gallons of highly flammable liquid that could become an explosive incendiary source in the event of a fire. The propane tank should be located at least 30 feet from any structure. Keep all flammables at least 10 feet from the tank. Learn how to turn the tank off and on. In the event of a fire, turn the gas off at the tank before evacuating, if safety and time allow.

Smoke Alarms

A functioning smoke alarm can help warn a person of a fire in or around the home. Install smoke alarms on every level of the residence. Test and clean smoke alarms once a month and replace batteries at least once a year. Replace smoke alarms once every 10 years.

Fire-safe Behavior

- If a person smokes, always use an ashtray in the car and at home.
- Store and use flammable liquids properly.
- Keep doors and windows clear as escape routes in each room.

Defensible Space

The removal of dense, flammable foliage from the area immediately surrounding the house reduces the risk of structure ignition and allows firefighters access to protect the home. The pruning and limbing of trees along with the selective removal of trees and shrubs is recommended to create a minimum defensible space area of 30 feet. Steep slopes require increased defensible space because fire can travel quickly uphill.

Within the minimum 30-foot safety zone, plants should be limited to fire-resistant trees and shrubs. Focus on fuel breaks such as concrete patios, walkways, rock gardens, and irrigated garden or grass areas within this zone. Use mulch sparingly within the safety zone, and focus use in areas that will be watered regularly. In areas such as turnarounds and driveways, nonflammable materials such as gravel are much better than wood chips or pine needles.

Vegetative debris such as dead grasses or leaves provide important erosion protection for soil but also may carry a surface fire. It is simply not feasible to remove all the vegetative debris from around the property. However, it is a good idea to remove any accumulations within the safety zone and extending out as far as possible. This is particularly important if leaves tend to build up alongside the house or outbuildings. Removing dead vegetation and leaves and exposing bare mineral soil are recommended in a 2-foot-wide perimeter along the foundation of the house. Also, be sure to regularly remove all dead vegetative matter including grasses, flowers, and leaf litter surrounding the home and any debris from gutters, especially during summer months. Mow the lawn regularly and promptly dispose of the cuttings properly. If possible, maintain a green lawn for 30 feet around the home.

All trees within the safety zone should have lower limbs removed to a height of 6–10 feet. Remove any branches within 15 feet of the chimney or overhanging any part of the roof. Ladder fuels are short shrubs or trees growing under the eaves of the house or under larger trees. Ladder fuels carry fire from the ground level onto the house or into the tree canopy. Be sure to remove all ladder fuels within the safety zone first. The removal of ladder fuels within about 100 feet of the house will help to limit the risk of crown fire around the home. More information about defensible space is provided at http://www.firewise.org.

Fire Retardants

For homeowners who would like home protection beyond defensible space and fire-resistant structural materials, fire-retardant gels and foams are available. These materials are sold with various types of equipment for applying the material to the home. They are similar to the substances applied by firefighters in advance of wildfire to prevent ignition of homes. Different products have different timelines for application and effectiveness. The amount of product needed is based on the size of the home, and prices may vary based on the application tools. Prices range from a few hundred to a few thousand dollars. An online search for "fire blocking gel" or "home firefighting" will provide a list of product vendors. Residents should research and consider environmental impacts of chemicals.

Address Posting

Locating individual homes is one of the most difficult tasks facing emergency responders. Every home should have the address clearly posted with numbers at least three inches high. The colors of the address posting should be contrasting or reflective. The address should be posted so that it is visible to cars approaching from either direction.

Access

Unfortunately, limited access may prevent firefighters from reaching many homes in the planning area. Many of the access problems occur at the property line and can be improved by homeowners. First, make sure that emergency responders can get in the gate. This may be important not only during a fire but also to allow access during any other type of emergency response. If a person will be gone for long periods during fire season, make sure a neighbor has access, and ask them to leave the gate open in the event of a wildfire in the area.

Ideally, gates should swing inward. A chain or padlock can be easily cut with large bolt cutters, but large automatic gates can prevent entry. Special emergency access red boxes with keys are sold by many gate companies but are actually not recommended by emergency services. The keys are difficult to keep track of and may not be available to the specific personnel that arrive at the home. An alternative offered by some manufacturers is a device that opens the gate in response to sirens. This option is preferred by firefighters but may be difficult or expensive to obtain.

Beyond the gate, make sure the driveway is uncluttered and at least 12 feet wide. The slope should be less than 10%. Trim any overhanging branches to allow at least 13.5 feet of overhead clearance. Also make sure that any overhead lines are at least 14 feet above the ground. If any lines are hanging too low, contact the appropriate phone, cable, or power company to find out how to address the situation.

If possible, consider a turnaround within the property at least 45 feet wide. This is especially important if the driveway is more than 300 feet in length. Even small fire engines have a hard time turning around and cannot safely enter areas where the only means of escape is by backing out. Any bridges must be designed with the capacity to hold the weight of a fire engine.

Neighborhood Communication

It is important to talk with neighbors about the possibility of wildfire in the community. Assume that a person will not be able to return home when a fire breaks out and may have to rely on neighbors for information and assistance. Unfortunately, it sometimes takes tragedy to get people talking to each other. Don't wait for disaster to strike. Strong communication can improve the response and safety of every member of the community.

Phone Trees

Many neighborhoods use phone trees to keep each other informed of emergencies within and around the community. The primary criticism is that the failure to reach one person high on the tree can cause a breakdown of the system. However, if neighbors are willing and able, particularly those that are at home during the day, the creation of a well-planned phone tree can often alert residents to the occurrence of a wildfire more quickly than media channels. Talk to the neighborhood association about the possibility of designing an effective phone tree.

Neighbors in Need of Assistance

Ask mobility-impaired neighbors if they have notified emergency responders of their specific needs. It is also a good idea for willing neighbors to commit to evacuating a mobility-impaired resident in the event of an emergency. Make sure that a line of communication is in place to verify the evacuation.

Absentee Owners

Absentee owners are often not in communication with their neighbors. If a home nearby is unoccupied for large portions of the year, try to get contact information for the owners from other neighbors or the neighborhood association. The absentee neighbors would probably appreciate notification in the event of an emergency. Also, it may be helpful to contact them to suggest that they move their woodpile or make sure that the propane line to the house is turned off.

Household Emergency Plan

A household emergency plan does not take much time to develop and will be invaluable in helping a family deal with an emergency safely and calmly. One of the fundamental issues in the event of any type of emergency is communication. Be sure to keep the phone numbers of neighbors accessible rather than at home.

It is a good idea to have an out of state contact, such as a family member. When disaster strikes locally, it is often easier to make outgoing calls to a different area code than local calls. Make sure everyone in the family has the contact phone number and understands why they need to check in with that person in the event of an emergency. Also, designate a meeting place for the family. Having an established meeting site helps to ensure that family members know where to go, even if they can't communicate by phone.

Children

Local schools have policies for evacuation of students during school hours. Contact the school to get information on how the process would take place and where the children would likely go.

The time between when the children arrive home from school and when other family members return home from work is the most important time frame to address. Fire officials must clear residential areas of occupants to protect lives and to allow access for fire engines and water drops from airplanes or helicopters. If the area is evacuated, blockades may prevent people from returning home to collect children. It is crucial to have a plan with a neighbor for them to pick up children if evacuation is necessary.

Pets and Livestock

Some basic questions about pets and livestock involve whether a person has the ability to evacuate the animals on their own and where to take them. Planning for the worst-case scenario may save animals. An estimated 90% of pets left behind in an emergency do not survive. Don't expect emergency service personnel to prioritize pets in an emergency. Put plans in place to protect furry family members.

Pets

Assemble a pet disaster supply kit and keep it handy. The kit should contain a three-day supply of food and water, bowls, a litter box for cats, and a manual can opener if necessary. It is also important to have extra medication and medical records for each pet. The kit should contain a leash for each dog and a carrier for each cat. Carriers of some kind should be ready for birds and exotic pets. In case a pet must be left at a kennel or with a friend, also include an information packet that describes medical conditions, feeding instructions, and behavioral problems. A photo of each pet will help to put the right instructions with the right pet.

In the event of a wildfire a person may be prevented from returning home for their animals. Talk to neighbors and develop a buddy system in case people are not home when fire threatens. Make sure a neighbor has a key and understands what to do with pets should they need to be evacuated.

Learn of locations that will accept people and pets. Contact friends and family in advance to ask whether they would be willing to care for pets. Contact hotels and motels in the area to find out which ones accept pets. Boarding kennels may also be an option. Make sure the pets' vaccinations are up-to-date if they need to be boarded.

Once pets are evacuated, continue to provide for their safety by keeping them cool and hydrated. Try to get pets to an indoor location rather than leaving them in the car. Do not leave pets in the vehicle without providing shade and water. It is not necessary to give pets water while driving but be sure to offer water as soon as the final destination is reached.

Livestock

Getting livestock out of harm's way during a wildfire is not easy. People may not be able or allowed to return home to rescue the stock during a wildfire evacuation. Talk with neighbors about how to deal with an evacuation. If livestock are encountered by emergency responders, they will be released and allowed to escape the fire on their own. Make sure livestock have some sort of identification. Ideally, the owner's contact information should be included on a halter tag or ear tag so that they could be reached if an animal is encountered.

If planning to evacuate the livestock, have a plan in place for a destination. Talk to other livestock owners in the area to find out whether they would be willing to board the stock in the event of an emergency. Often in large-scale emergencies, special accommodations can be made at fair and rodeo grounds, but personal arrangements may allow a person to respond more quickly and efficiently.

If a person does not own a trailer for horses or other livestock, talk to a neighbor who does. Find out whether they would be willing to assist in the evacuation of the animals. If a person does own a trailer, make sure it is in working condition with good, inflated tires and functioning signal lights. Keep in mind that even horses that are accustomed to a trailer may be difficult to load during an emergency. Practicing may be a good idea to make sure the animals are as comfortable as possible when being loaded into the trailer.

House and Property

Insurance companies suggest that a person make a video that scans each room of the house to help document and recall all items within the home. This video can make replacement of the property much easier in the unfortunate event of a large insurance claim. See more information on insurance claims in the "After the Fire" section below.

Personal Items

During fire season, the items one would want to take during an evacuation should be kept in one readily accessible location. As an extra precaution, it may be a good idea to store irreplaceable mementos or heirlooms away from the home during fire season.

It is important to make copies of all important paperwork, such as birth certificates, titles, and so forth, and store them somewhere away from the home, such as in a safe deposit box. Important documents can also be protected in a designated firesafe storage box within the home.

IN THE EVENT OF A FIRE

Notification

In the event of a wildfire, announcements from the local Emergency Management office will be broadcast over local radio and television stations. Media notification may be in the form of news reports or the Emergency Alert System (EAS). On television, the emergency management message will scroll across the top of the screen on local channels. The notice is not broadcast on non-local satellite and cable channels.

One good way to stay informed about wildfire is to use a National Oceanic and Atmospheric Administration weather alert radio. The radios can be purchased at most stores that carry small appliances, such as Target, Sears, or Radio Shack. The radio comes with instructions for the required programming to tune the radio to the local frequency. The programming also determines the types of events for which one wants to be alerted. The weather alert radio can be used for any type of large incident (weather, wildfire, hazardous materials, etc.), depending on how it is programmed. Local fire personnel can assist with programming if needed.

When Fire Threatens

Before an evacuation order is given for the community, there are several steps a person can take to make the escape easier and to provide for protection of the home. When evaluating what to do as fire threatens, the most important guideline is: DO NOT JEOPARDIZE LIFE.

Back the car into the garage or park it in an open space facing the direction of escape. Shut the car doors and roll up the windows. Place all valuables to take in the vehicle. Leave the keys in the ignition or in another easily accessible location. Open the gate.

Close all windows, doors, and vents, including the garage door. Disconnect automatic garage openers and leave exterior doors unlocked. Close all interior doors as well.

Move furniture away from windows and sliding glass doors. If there are lightweight curtains, remove them. Heavy curtains, drapes, and blinds should be closed. Leave a light on in each room.

Turn off the propane tank or shut off gas at the meter. Turn off pilot lights on appliances and furnaces.

Move firewood and flammable patio furniture away from the house or into the garage.

Connect garden hoses to all available outdoor faucets and make sure they are in a conspicuous place. Turn the water on to "charge," or fill the hoses and then shut off the water. Place a ladder up against the side of the home, opposite the direction of the approaching fire, to allow firefighters easy access to the roof.

Evacuation

When evacuation is ordered, a person needs to go ***immediately***. Evacuation not only protects lives but also helps to protect property. Some roads are too narrow for two-way traffic, especially with fire engines. Fire trucks often can't get into an area until the residents are out. Also, arguably the most important tool in the WUI toolbox is aerial attack. Airplanes and helicopters can be used to drop water or retardant to help limit the spread of the fire, but these resources cannot be used until the area has been cleared of civilians.

Expect emergency managers to designate a check-out location for evacuees. This process helps to ensure that everyone is accounted for and informs emergency personnel as to who may be remaining in the community. Every resident should check out at the designated location before proceeding to any established family meeting spot.

A light-colored sheet closed in the front door serves as a signal to emergency responders that the family has safely left. This signal saves firefighters precious time, as it takes 12–15 minutes per house to knock on each door and inform residents of the evacuation.

AFTER THE FIRE

Returning Home

First and foremost, follow the advice and recommendations of emergency management agencies, fire departments, utility companies, and local aid organizations regarding activities following the wildfire. Do not attempt to return to the home until fire personnel have deemed it safe to do so.

Even if the fire did not damage the house, do not expect to return to business as usual immediately. Expect that utility infrastructure may have been damaged and repairs may be necessary. When a person returns to the home, check for hazards, such as gas or water leaks and electrical shorts. Turn off damaged utilities if they were not previously turned off. . Have the fire department or utility companies turn the utilities back on once the area is secured.

Insurance Claims

The insurance agent is the best source of information about the actions to take in order to submit a claim. Here are some things to keep in mind. The insurance claim process will be much easier if a person photographed the home and valuable possessions before the fire and kept the photographs in a safe place away from the home. Most, if not all, of the expenses incurred during the time a person was forced to live outside the home could be reimbursable. These could include, for instance, mileage driven, lodging, and meals. Keep all records and receipts. Don't start any repairs or rebuilding without the approval of a claims adjuster. Beware of predatory contractors looking to take advantage of anxious homeowners wanting to rebuild as quickly as possible. Consider all contracts very carefully, take time to decide, and contact the insurance agent with any questions. If it appears to be a large loss, consider whether it makes sense to should hire a public adjuster that is licensed by the state department of insurance who will represent and advocate for the policyholder in appraising and negotiating the claimant's insurance claim to ensure the best outcome and recovery from the insurance company. Most public adjusters charge a small percentage of the settlement that is set by the state and primarily they appraise the damage, prepare an estimate and other claim documentation, read the policy of insurance to determine coverages, and negotiate with the insurance company's claims handler.

Post-fire Rehabilitation

Homes that may have been saved in the fire may still be at risk from flooding and debris flows. Burned Area Emergency Rehabilitation (BAER) teams are inter-disciplinary teams of professionals who work to mitigate the effects of post-fire flooding and erosion. These teams often work with limited budgets and manpower. Homeowners can assist the process by implementing treatments on their own properties as well as volunteering on burned public lands to help reduce the threat to valuable resources. Volunteers can assist BAER team members by planting seeds or trees, hand mulching, or helping to construct straw-bale check dams in small drainages.

Volunteers can help protect roads and culverts by conducting storm patrols during storm events. These efforts dramatically reduce the costs of such work as installing trash racks, removing culverts, and re-routing roads.

Community volunteers can also help scientists to better understand the dynamics of the burned area by monitoring rain gauges and monitoring the efficacy of the installed BAER treatments.

A GUIDE TO TREE MANAGEMENT OPTIONS FOR HOME AND WOODLOT OWNERS; SPRUCE BEETLES

COOPERATIVE EXTENSION SERVICE UNIVERSITY OF ALASKA FAIRBANKS PMC-10067

Spruce Beetles

A Guide to Tree Management Options for Home and Woodlot Owners

Spruce beetles can be a very serious cause of tree mortality in the spruce forests of Alaska. They occur statewide, though historically, the majority of damage has occurred in Southcentral Alaska. Spruce beetles are always present in the environment, though their activity is not always noticed. Spruce beetles are not restricted to forest stands; high-value ornamental trees in yards or community settings are also susceptible to spruce beetle.

What do spruce beetles do?

Adult spruce beetles emerge from their host tree during early summer, usually between mid-May and July. This period is referred to as the adult flight period. Once they emerge, they seek out new hosts to attack in the surrounding area. Beetles prefer to attack the lower portions of the trunk, with the majority of attacks occurring within the first 15 feet.

Adults bore through the bark into the phloem, a layer of cells just inside the bark that carries sugars created in the needles to the roots of the tree for energy. Here, the female lays eggs in a tunnel, called a gallery, that is chewed parallel to the wood. When the eggs hatch, the larvae feed outward from the gallery, severing the phloem and disrupting the transport of sugars from the needles to the roots of the tree. The tree is killed when the phloem is severed around the entire circumference of the tree.

Does it matter what species of spruce I have on my property?

Spruce beetles prefer to attack white, Sitka and Lutz spruce (the hybrid cross Sitka x white), but they rarely attack black spruce. Spruce beetles can also attack ornamental spruce species such as Norway, Engelmann and Colorado blue spruce. Spruce beetles do not attack hardwood tree species like birch or cottonwood.

Does it matter how big my trees are?

Typically, spruce beetles attack trees larger than about 12 inches in diameter, though under certain circumstances they will attack trees as small as 4 inches in diameter. Large-diameter older trees are particularly susceptible, especially if they have been stressed by lack of water or mechanical damage to the bark or roots. Crowded tree stands can be stressed as a result of competition with other trees for water and nutrients, making them more susceptible to attack.

How do I determine if my trees have been attacked?

Trees that have been attacked by spruce beetles may exhibit the following signs and symptoms:

1. **Boring dust:** A fine, reddish-brown, sawdust-like dust that is produced by the beetles as they chew entrance holes into the bark. It accumulates in cracks and crevices of the bark and around the base of the tree.
2. **Pitch tubes:** Live attacked trees will usually exhibit globules of pitch at the site of a spruce beetle entrance hole as the tree attempts to "pitch out" the attacking beetle. The pitch can range from creamy white in color to reddish-brown and is often mixed with the boring dust.
3. **Needle color change:** Live attacked trees will start to exhibit a change in needle color the year following a spruce beetle attack. Needles typically change from green to yellow to reddish-brown before falling off the tree.

Keep in mind that evidence of a spruce beetle attack may not always be visible. Trees that are severely drought-stressed may not produce enough pitch for pitch tubes, or heavily infested trees may not exhibit needle color change before the needles drop. Inspect your trees fully and if you are unsure, contact your local Extension office or a tree care professional for help with diagnosis.

How do spruce beetles affect trees?

Trees are typically killed within the first few weeks of a severe spruce beetle attack, but it may take a year or more for the needles to begin changing color and falling off. Trees that have been killed by spruce beetles are subject to advancing stem and root rot infection and being blown over or falling down. The length of time these dead trees have until they fall varies from site to site, depending on factors such as ground moisture and wind patterns. Dead trees become an increasing hazard to structures and people, and it is recommended that concerned landowners have their trees examined by a forester or tree care specialist.

Downed trees with bark on them can also serve as host material for spruce beetles and could lead to further infestation of healthy trees nearby.

What do I do with my trees?

First, examine your tree(s) to determine if there appears to be any spruce beetle activity as previously described. Then, use the following information as a guide for managing spruce beetles based on the tree conditions described below.

The tree appears unattacked

The tree has green needles. There is no reddish-brown boring dust present in the crevices of the bark, especially at eye level and below, or on the ground at the base of the tree. No pitch tubes are evident, especially at eye level or below, including at the base of the tree or along any above-ground roots. If the tree is unattacked, use the steps below to prevent an attack.

Maintain health and vigor of trees.

Spruce beetles prefer to attack weaker trees or ones that have fallen down, so maintaining the health and vigor of your trees is important. Tree care practices such as watering and fertilizing early in the growing season will help develop and maintain healthy trees. Removal of weakened or damaged trees and downed trees with bark on them may need to be considered to protect the health of other trees on the property. Removed material should be processed using the guidelines in the following sections.

Be careful about accidentally importing the beetles to your home or lot.

Firewood or logs brought to your property may be a source of future infestation. Beetles can develop through different life stages under the bark and may emerge and attack other trees in the immediate area. Removing the bark and burning it will help ensure limited impact from spruce beetle-infested firewood or logs.

Do not damage the trees.

Be careful not to damage the trees on your lot during any construction, landscaping or tree management activities since damaged trees are more susceptible to infestation.

Thinning forest stands may reduce competition for water and nutrients by your desired trees.

Optimum stocking for tree vigor is dependent upon tree species, age and size, and growing site conditions. Select trees for removal based on evidence of physical damage, insect damage and tree form. Contact the Alaska Division of Forestry for more information. When thinning stands, process the material as described below to reduce host material in the stand. Avoid thinning trees during the adult flight period of May-July.

Prune lower branches for fully crowned trees.

Pruning should be done in the fall or winter and the branches removed from the site. Research has shown that pruning the lower branches of the tree can reduce the risk of infestation as a result of changing the environmental conditions in this portion of the tree. Avoid pruning trees during the adult flight period of May-July.

Apply a registered insecticide to prevent spruce beetle attacks.

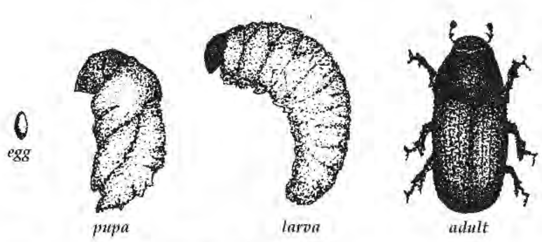
Insecticides can be used to protect trees from spruce beetle attack. Insecticides are **preventive only** because of the nature and location of spruce beetle damage. There are two ways to apply insecticides for spruce beetle prevention. The first is by **spraying**. Spraying should be done in spring by early May in order to protect the tree prior to the beetles' emergence and adult flight period. Two active ingredients are registered and effective as sprays for spruce beetle: *carbaryl* and *permethrin*. These active ingredients may be sold under several trade names for different uses. Sprays should be applied to the trunk of the tree from the ground up until the tree is 5 inches in diameter. If that height cannot be reached, applications should be made to at least the first 25 feet of the trunk. In this case, know that beetles may attack above the spray line.

The second way to apply insecticides is by **injection**. New product formulations and application technology allow for the direct injection of insecticides into a tree to control spruce beetles. Active ingredients registered for injection for spruce beetle control are *emamectin benzoate* and *abamectin*. These active ingredients may also be sold under several trade names for different uses. Studies on the use of these products are beginning in Alaska to determine the correct timing for our growing conditions. Recent work in other spruce beetle systems indicates that emamectin benzoate needs to be applied approximately 12 months before a trees is attacked by beetles for it to be fully protected. This is because of time needed to move the product within the tree. We hope to have more specific timing recommendations for Alaska soon. Injection applications should be made low on the trunk to maximize transport of the insecticide upward through the tree.

If you choose to use an insecticide, be sure that the product you purchase is registered for your specific use. Some products may be registered for ornamental trees or forest settings or both. **Be sure to read and follow all label directions. The label is the law!**

Due to the cost of application equipment and protective gear, it may be more economical to hire a certified pesticide applicator.

If you have any questions about any aspect of the use of insecticides for spruce beetle control, contact your local Extension office.



Life cycle of the spruce bark beetle.

The tree appears to be attacked

See the varying descriptions below.

Tree has green needles and evidence of pitch tubes and/or boring dust is present on the bark.
The tree was attacked within the past year. One or a few beetle attack sites on the bark doesn't mean that the tree will die immediately, but an initial attack may mean that the tree will experience a larger attack the following year. An attacked tree may also harbor a source population that will further infest the area in the following years. A careful assessment of the existing damage and treatment alternatives by a qualified professional may be needed. Surviving attacked trees should be cared for to increase their vigor by watering during the growing season and fertilizing. Preventive measures should be considered for surrounding unattacked trees.

If the tree has been heavily attacked, it should be removed and processed before the following May in order to prevent further infestation of surrounding trees.

Tree has faded yellow or bright red needles and evidence of pitch tubes and/or boring dust is still present on the bark.
The tree was attacked last season. Evidence of spruce beetle life stages is easy to find under the bark. Bark is relatively easy to peel and may exhibit evidence of woodpecker activity. These trees may be the source of new infestations for the present season and possibly the next since beetles can have either a one- or a two-year life cycle. Remove these trees before May and debark or otherwise process the trees immediately upon felling.

Tree has no needles remaining on twigs and there is evidence of prior beetle attacks.
The tree was attacked last season or before and may still have evidence of prior beetle attacks, such as pitch tubes on the bark. Adult emergence holes are also present on the bark; they are approximately ⅛ inch in diameter. Many smaller holes may begin to appear in the bark as a result of secondary pests moving into the tree. Beetle larvae may not be present under the bark, although there may be some adults. Large portions of the bark may be removed by woodpecker activity. These trees may harbor source populations for the next season's infestation. Remove a section of the bark to determine if adult beetles are

3

present. If adults are present, fell the tree prior to mid-May and debark or otherwise process the tree immediately upon felling.

Tree has no needles, branches appear "droopy" and tree color appears silver-gray.
These trees have been attacked at least three or more seasons ago. They will generally have loose bark with evidence of bark beetle activity on the undersides of the bark. These trees will have no spruce beetles remaining under the bark although other insects and wood decomposers may be present. You may choose to fell the tree for firewood or other uses or leave the tree standing for wildlife habitat. Depending on soil moisture, the presence of root rot and wind patterns, these trees may have only five or more years before they will be at risk of falling down. If they could endanger people or property, they should be removed.

Removing and processing trees

Trees that need to be removed, whether they are living or have been attacked by spruce beetles, should be processed to eliminate spruce beetle habitat. Once the tree is felled, process the material by splitting, debarking or chipping the material. Stumps should not extend above the ground and should be debarked down to 2 inches below the ground or mechanically ground down.

If splitting the wood for firewood, burn material with bark before the following spring. Wood without bark can be stored longer for later use. Stack firewood loosely to encourage air movement and rapid drying. Do not stack spruce firewood near living spruce trees.

Processing should be done soon after the tree is down and ideally before the flight period from mid-May to July.

Dead trees and fire concerns

The link between beetle-killed trees and wildfire is complex and there are often many factors involved that can make generalizations difficult. A dead tree that is closer to a structure than one and a half times its height should be removed to reduce risk of fire or falling. Pruning off dead branches from the lower portion of trees can reduce the risk of fire moving up the tree. For more information on wildfire, contact the Alaska Division of Forestry.

Is there anything I can do to prevent future outbreaks of bark beetles on my property?

Maintaining a mixture of native tree species and age classes is a good approach to maintaining a healthy and pest-resilient forest area. Landowners and homeowners should be cautious about leaving fresh spruce firewood on their property and especially about stacking it against or near living spruce trees. Spruce firewood with bark can bring beetles onto your property if the wood is infested. If bringing in spruce firewood, store only enough for a single winter's use or debark the material for longer-term storage.

For more information on managing spruce beetles, contact your local Cooperative Extension Service.

For more information

"Spruce Beetle in Alaska's Forests," www.alaskasprucebeetle.org

"What's Bugging Alaska's Forests? Spruce Bark Beetle Facts and Figures," Alaska Department of Natural Resources, Division of Forestry, http://forestry.alaska.gov/insects/sprucebarkbeetle.htm

Forest and Grassland Health, "Spruce Beetle," U. S. Forest Service, www.fs.usda.gov/detailfull/r10/forest-grasslandhealth/?cid=FSEPRD536861&width=full

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www.uaf.edu/ces or 1-877-520-5211

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APPENDIX H:

Public Involvement and Outreach

PUBLIC INVOLVEMENT

Engaging interested parties is critical in the CWPP process; substantive input from the public will ensure that the final document reflects the highest priorities of the local community. A key element in the CWPP process is the meaningful discussions it generates among community members regarding their priorities for local fire protection and forest management (Society for American Foresters [SAF] 2004). Public meetings were convened throughout the development of the CWPP. Meetings were held throughout the peninsula to collect ideas and suggestions from the public for use in the CWPP.

The Core Team offered multiple public engagement opportunities including public meetings, surveys, social media announcements, story map provide content, as well as an opportunity to submit questions and receive answers through the story map or via email. In addition, the Draft Kenai Peninsula Community Wildfire Protection Plan Update was available for public comment from January 24 to February 4, 2022. Public comments were reviewed and incorporated into the Final Plan, as possible.

The Core Team hosted 5 public meetings from July 20 to July 24, 2021, throughout the Borough (see Table H.1 for dates and locations). The public meetings were designed using an Open House format to encourage interactive communication with stakeholders. In communities that had not previously received significant wildfire mitigation outreach, a public meeting presentation about the project before the Open House was provided. This two-way communication was intended to increase understanding and build trust, rather than simply provide information. The goal of the public engagement was to inform the public about the Kenai Peninsula Community Wildfire Protection Plan Update and to gather feedback about specific topics related to this project, as well as general wildfire concerns. The Open House had four stations, each hosted by a subject matter expert, to provide information on the following themes:

1. CWPP Overview

   Purpose: Provide background information about CWPPs and direct people to information at other stations at open house.

2. Resilient Landscapes

   Purpose: Gather information and describe the role of fire on the landscape related to forest health and resiliency and maintenance of fire-adapted ecosystems

3. Fire Adapted Communities

   Purpose: Provide information and practices for protecting homes, communities, and other values at risk

4. Safe and Effective Wildfire Response

   Purpose: Gather information and communicate how to effectively respond to wildfire

The Core Team encouraged participants to share their concerns related to wildfire, questions about the plan, the planning process, the risk assessment, project recommendations, or other issues (Figures H.1 and H.2). Facilitators specifically asked community members to provide input about community values at risk, project recommendations and fire response resources needs. During the public meetings people could provide this information by completing a community survey or submitting a comment card. Flip charts with various questions were placed throughout the room and people were encouraged to write answers to these questions on the flip charts. Maps displaying the Risk Assessment and identifying evacuation routes were presented and people were asked to identify areas of concern.

In addition to the public meetings, the Core Team also hosted a booth at the Soldotna Progress Days annual festival. The KPB and interagency partners purchased a mobile educational trailer (Figures H.3 and H.4) with wildfire mitigation themed graphics, designed to be easily transported and permanently host educational printed materials about Fire Adapted Communities, Firewise, Preparing for Wildfire and a range of other related subjects to be distributed to the public. The trailer was transported to each public meeting and the Soldotna Progress Days to provide information to the public.

Information gathered through the public engagement process was used to support wildfire response, fuel management planning, revisions to land and resource management plans and public education and outreach.

Table H.1. Public Meeting Schedule

Date	Location	Meeting Format	Time
Tuesday, July 20, 2021	**Seward Community Library & Museum** 239 6th Avenue Seward	Informal Open House	6–8 p.m.
Wednesday, July 21, 2021	**Cooper Landing School Gym** 19030 Bean Creek Road Cooper Landing	Public Meeting Presentation followed by Informal Open House	6–8 p.m.
Thursday, July 22, 2021	**Soldotna Progress Days** Soldotna Creek Park 251 States Avenue Soldotna *Look for the Kenai Peninsula Prevention Coop Trailer	Informational Booth at Soldotna Progress Days	4–6 p.m.
Friday, July 23, 2021	**West Homer Elementary School Gym** 995 Soundview Avenue, Suite 1 Homer	Informal Open House	4–6 p.m.
Saturday, July 24, 2021	**Banquet Room, Nikiski Community Recreation Center** 50097 Kenai Spur Hwy (located at mile 23.4) Nikiski	Public Meeting Presentation followed by Informal Open House	6–8 p.m.

Furthermore, several local meetings were held to solicit feedback from the Draft CWPP. Below is the list of additional scheduled outreach efforts which took place during the planning process.

- 1/19/22: KPB Local Emergency Planning Commission meeting
    - This commission meets quarterly at a public venue. They were asked to review the CWPP and provide comments at the January meeting. No comments were submitted.
- 01/21/22: Kenai Peninsula Fire Chiefs Association January Meeting
- 01/24/22: Facebook KPB Alerts
- 01/24/22: KPB Seward Bear Creek Flood Service Area Board
- 01/24/22: KPB Planning Commission

- 01/26/22: KBBI Public Radio interview
- 01/31/22: Facebook KPB Alerts, including Borough main page and all KPB fire service area pages (see table H.2 for a list)
- 02/01/22: Assembly meeting – Mayor's Report

In addition, Advisory Panning Commissions (APCs) were asked to provide input regarding the draft CWPP at their meetings in the following ways: (1) add CWPP as an agenda item for the February meetings (meetings held 9th or 10th); (2), schedule a special meeting, or (3) review CWPP at their March meetings on March meetings are 16 or 17. It was also encouraged that the APCs host special meetings in February. Furthermore, recommendations provided by the APCs are to be included in the March 21, 2022, planning commission resolution. The schedule for the APC meetings is listed below.

- Anchor Point: 02/10 and 03/17
- Cooper Landing: 02/9 and 03/16
- Funny River: 03/17
- Kalifornski: Beach 02/9 and 03/16
- Hope: 02/9 or 03/16
- Moose Pass: 02/17 and 3/17
- Kachemak Bay: 02/10 and 03/17

Figure H.1. Public meeting in Cooper Landing.

Figure H.2. Public meeting in Homer.

Figure H.3. The mobile education trailer.

Figure H.4. Inside the mobile public education trailer.

PUBLIC OUTREACH ANNOUNCEMENTS

Below is a list of the public outreach announcements provided as part of the CWPP development (Table H.2).

Table H.2. Announcements of Public Outreach

Resource Description	Location	Figure Number
KPB Alerts: Fast Five Minutes (to complete a survey)	KPB Alerts	H.5
Public Meeting Announcement	GOVdelivery	H.6
Public Meeting Announcements	Kenai Peninsula Facebook pages: • KPB Alerts • Kenai Peninsula Borough • Bear Creek Volunteer FD • Nikiski FD • Kenai Peninsula Wildland Fire Education Cooperative • Central Emergency Services • North Peninsula Recreation Service Area • Western Emergency Services	H.7
Email to KPB Listerv with Public Meeting Announcement	KPB Listerv (sent to 1753 subscribers)	H.8
Newspaper Publications	Peninsula Clarion, Anchorage Daily News	H.9

Resource Description	Location	Figure Number
Story Map and Hub site	https://kenai-cwpp-hub-kpb.hub.arcgis.com/	H.10–H.113

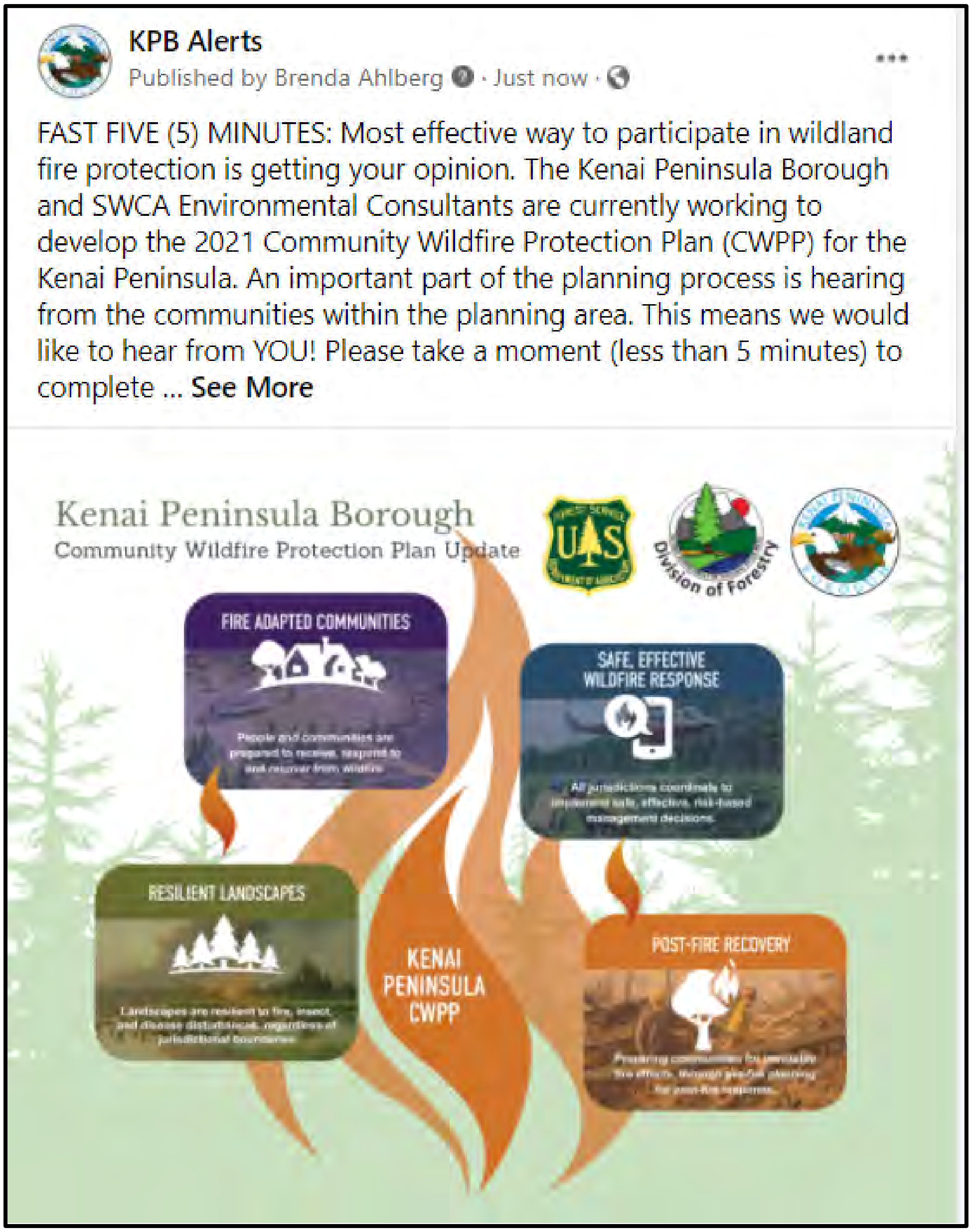


Figure H.5. CWPP social media post.

[RELEASED 07/13/21]: You are invited to a public meeting for the Kenai Peninsula Borough Community Wildfire Protection Plan (CWPP). Communities develop CWPPs to address **wildfire planning, response, and recovery.** We want to ensure that this plan represents your community's preferences for **emergency management, education and outreach, and fuels reduction activities to effectively lower wildfire risk.** We welcome community members to join the planning process and let us know what matters to you. See the July meeting matrix below.

NOTE: Meetings for off-road communities and central peninsula communities are being scheduled for August dates.

Date/Time	*Location*	*Meeting Format*
Tuesday 6-8PM July 20th, 2021	**EAST PENINSULA COMMUNITIES** **Seward Community Library & Museum** 239 6th Avenue, Seward AK	Informal Open House
Wednesday 6-8PM July 21st, 2021	**Cooper Landing School Gym** 19030 Bean Creek Rd., Cooper Landing	Public Meeting Presentation followed by Informal Open House
Thursday 4-6PM July 22nd, 2021	**Soldotna Progress Days** Soldotna Creek Park 251 States Avenue Soldotna	Look for Smokey Bear and the Kenai Peninsula Prevention Coop Information Trailer
Friday 4-6PM July 23rd, 2021	**SOUTH PENINSULA COMMUITIES** **West Homer Elementary School Gym** 995 Soundview Ave., Ste. 1, Homer AK	Informal Open House
Saturday 6-8PM July 24th, 2021	**NORTHWEST COMMUNITIES** **Banquet Room, Nikiski Community Recreation Center** 50097 Kenai Spur Hwy (located at mile 23.4) Nikiski AK	Public Meeting Presentation followed by Informal Open House

Background: From 2006 to 2009, communities located throughout the Kenai Peninsula developed 17 unique CWPPs. Building on the foundation of information provided in these plans, the 2018 All Lands/All Hands Action Plan considers recommendations from the plans and reflects new approaches based on federal guidance. Currently, the Kenai Peninsula Borough is leading an effort to develop a borough-wide CWPP update that encompasses all communities in collaboration with the All Lands/All Hands Interagency Group (ALAH Group) to ensure the plan is current and best serves the communities it is designed to protect. Members from this group include municipal, state, federal, and tribal land management agencies to make up the Core Team. This team is tasked with driving the planning and decision-making process for this project.

CWPP Update: Now it is time to review, revise, and refocus previously proposed implementation measures to ensure that the borough-wide CWPP remains active and effective. During the planning process, the public will be invited to review CWPP planning materials and provide input to identify areas where efforts should be focused to reduce wildfire threat. For more information, visit the story map www.kpb.us/cwpp. A story map (an interactive project website designed to tell a story with maps) will be used as primary two-way communication tool to provide information and gather community input about the project. the future, the public will be invited to provide feedback on the Draft Plan. The Core Team will work together to review and revise the original CWPP to ensure the plan is applicable to the communities it is designed to serve. The goal is that all recommended projects are designed to greatly reduce wildfire risk to residents and ensure that communities can live safely in this fire-prone environment.

The CWPP is yours and your engagement in the process will be invaluable. The update is also guiding document for fire and emergency managers, as well as agencies who manage land within the Kenai Peninsula. For more information, please contact Brenda Ahlberg, Kenai Peninsula Borough Office of Emergency Management, bahlberg@kpb.us or 907-714-2153, or Emily Geery, Project Manager, at egeery@swca.com.

This project is funded in part by the Kenai Peninsula Borough, Alaska Division of Forestry and Department of Natural Resources pursuant to USDA Forest Service Award No. 2018-DG-110106-810.

Figure H.6. CWPP public meeting announcement distributed via GovDelivery.

What is a CWPP and what's happening? A Community Wildfire Protection Plan addresses wildfire planning, response and recovery. The borough is updating the 2006-2009 CWPPs. This effort encompasses input on all lands with funding assistance in cooperation with the AK Division of Forestry and U.S. Forest Service. This is your plan that will reflect your input on emergency management, outreach, fuels reduction projects and much more. Be on the lookout for upcoming public meetings in your area end-July and August. We cannot wait to hear from you!

Learn more about this project at http://www.kpb.us/cwpp

#Firewise #FireAdapted #kenaipeninsula #Alaska #alllandsallhands #wildfirepreparedness #readysetgo

Figure H.7. CWPP social media announcement distributed via Facebook.

Good evening all:
Fast FYI on a project that the borough is making great strides toward completing. The borough is updating the 2006-2009 CWPPs with SWCA Environmental Consultants. What is a CWPP and what's happening? The Community Wildfire Protection Plan addresses wildfire planning, response and recovery. This effort encompasses public input on all lands with funding assistance in cooperation with the AK Division of Forestry and U.S. Forest Service. This is your plan that will reflect your input on emergency management, outreach, fuels reduction projects and much more. Be on the lookout for upcoming public meetings in your area end-July and August. We cannot wait to hear from you!

SAVE THE DATE FOR JULY MEETINGS THAT HAVE BEEN CONFIRMED (more details to come):

Date	***Location***
Tuesday, July 20th, 2021	**Seward Community Library & Museum** 239 6th Avenue Seward
Wednesday, July 21st, 2021	**Cooper Landing School Gym** 19030 Bean Creek Road Cooper Landing
Thursday, July 22nd, 2021	**Soldotna Progress Days** Soldotna Creek Park 251 States Avenue Soldotna *Look for the Kenai Peninsula Prevention Coop Trailer
Friday, July 23rd, 2021	**West Homer Elementary School Gym** 995 Soundview Avenue, Suite 1 Homer
Saturday, July 24th, 2021	**Banquet Room, Nikiski Community Recreation Center** 50097 Kenai Spur Hwy (located at mile 23.4) Nikiski

To learn more about this project be sure to visit the project story map at http://www.kpb.us/cwpp

Figure H.8. Public Meeting Announcement distributed via KPB listerv.

KENAI PENINSULA BOROUGH

Kenai Peninsula Borough Request for Public Input

2022 Community Wildfire Protection Plan (CWPP)

The Borough requests your input on the updated CWPP that encompasses all the unincorporated communities and six municipalities. The CWPP serves two audiences: 1) provides recommended projects designed to greatly reduce wildfire risk to residents, ensuring that communities live safely in this fire prone environment; and 2) provides guidance to fire and emergency managers, as well as agencies who manage large land holdings. Visit www.kpb.us/cwpp to review the draft CWPP and to provide your comments. Public review period is January 24 – February 4, 2022.

This project is funded in part by the Kenai Peninsula Borough, Alaska Division of Forestry and Department of Natural Resources pursuant to USDA Forest Service Award No. 2018-DG-110106-810.

Verified Publications:

Peninsula Clarion
Date(s) Published: January 23, 2022 and February 1, 2022

Anchorage Daily News
Date(s) Published: January 24, 2022 and January 31, 2022

Brenda Ahlberg, Emergency Manager ________________

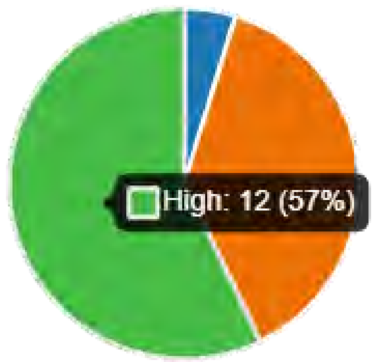
Figure H.9. Newspaper Publication, released on 1/23/22, 1/24/22, 1/31/22, and 2/1/22.

COMMUNITY SURVEY FINDINGS

A total of 23 responses were tallied for the community surveys. A quarter of the respondents stated Cooper Landing as the closest community to where they live. In terms of wildfire risk, the majority of respondents (57%) rated their homes as high risk. The top two concerns for residents, with respect to home vulnerability, were surrounding fuels (i.e., dense vegetation, wood piles, grass, shrubs, dead and downed trees) on their property and on neighboring properties. Most respondents (61%) stated that they do not participate in community wildfire risk mitigation activities (e.g., Firewise Alaska). Lastly, 70% of respondents felt that costs associated with tree removal and fuels treatment around their properties was the biggest challenge to making their homes fire safe.

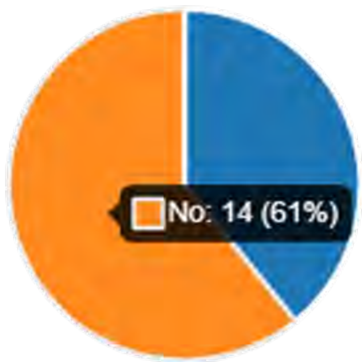
Survey highlights are summarized below:

Survey Question: *"How would you rate your house in terms of risk from wildfire? (Consider the proximity of your house to tracts of undeveloped land, vegetated land, emergency response and access)."*



- The most common response was high (12), medium (8), then low (1).

Survey Question: *Are you engaged in any community wildfire mitigation (such as Firewise USA or Ready, Set, Go!) to reduce the risk of wildfire in your community?*



- 14% of respondents said no (14), 9% of respondents yes (9).

Survey Question: *My home is vulnerable to wildfire because of…*

- The top two choices were:
  - Surrounding fuels on neighboring property - (i.e., dense vegetation, wood piles, dead and downed trees): 18 responses
  - Surrounding fuels on your property - (i.e., live and dead trees, shrubs, grass, wood piles): 15 responses

Survey Question: *My biggest challenge to making my home fire safe is…*

- 70% of respondents selected: Costs to remove trees and other flammables around my home

STORY MAP

The Borough developed the CWPP story map (online content, link in Table H.2) to accommodate engagement with the public. The story map provides opportunities for both information sharing and gathering between the public and the Core Team. The story map has several tabs, each demonstrating information from various chapters in the CWPP document. The introductory tab presents the purpose of the story map, project history, instructions for navigating the content, and the National Cohesive Wildland Fire Management Strategy framework (Figure H.10). Next, the public involvement tab invites viewers to participate in the CWPP community survey, review the CWPP informational flyer and press release, and watch several educational videos. The fire environment, valued resources and assets, WUI hazard and risk assessment, mitigation strategies, and monitoring and evaluation strategies tabs present the bulk of the CWPP content (Figures H.10–H.12). These tabs introduce the WUI concept, fire regimes and fire history in the Borough, information regarding fire planning and response, valued resources and assets, areas with high versus low risk, wildfire mitigation actions, and monitoring strategies for applied treatments.

The figures below (H.10–H.12) demonstrate the spatial information that is conveyed through the story map. Each map is interactive, with several clickable layers providing information on numerous aspects of wildfire, including but not limited to communities in high-risk areas, vegetation and fuels, current mitigation projects, and fire behavior.

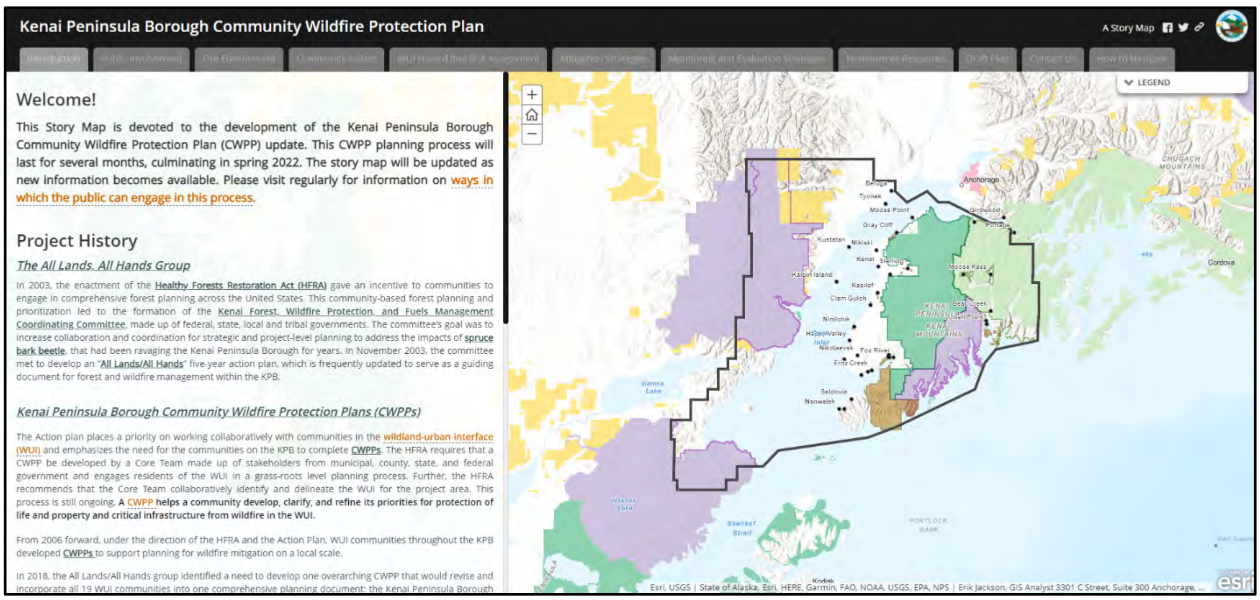


Figure H.10. CWPP story map introduction tab sample.

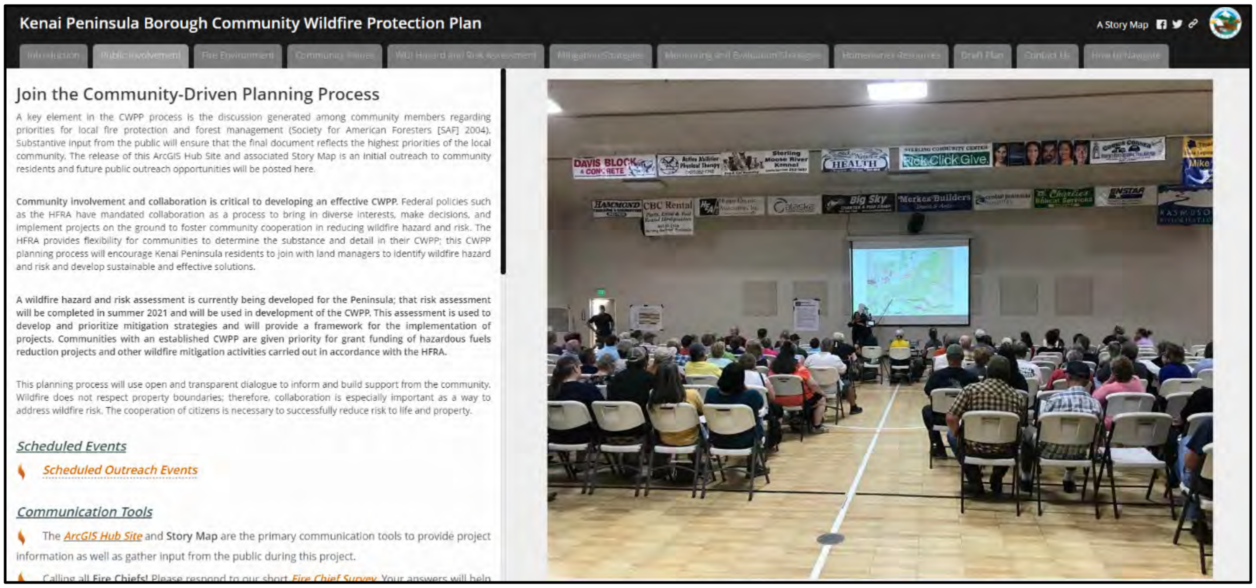


Figure H.11. Story map public involvement tab sample.

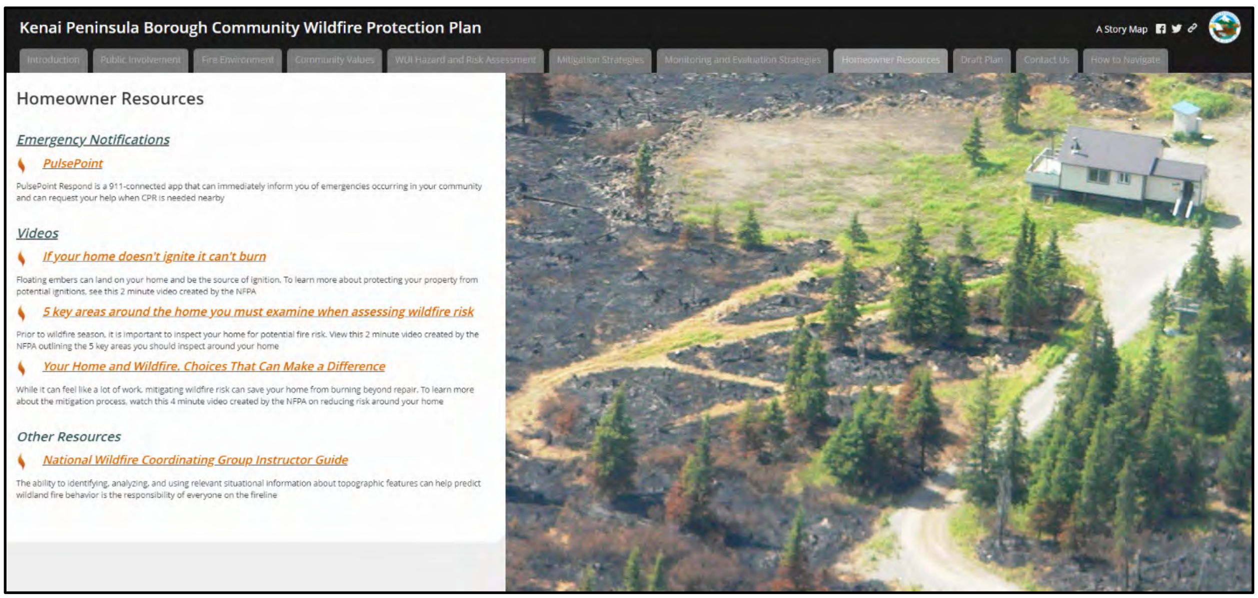


Figure H.12. Story map homeowner resources tab sample.

The story map tool allowed the project team to assess the number of views per day. Figure H.13 shows the average number of views per day and related graphical information. The number of views from January 24 (when the story map was originally posted for Core Team review) through February 4 , was 637, and the average number of views per day was just under 58 (see Figure H.12).

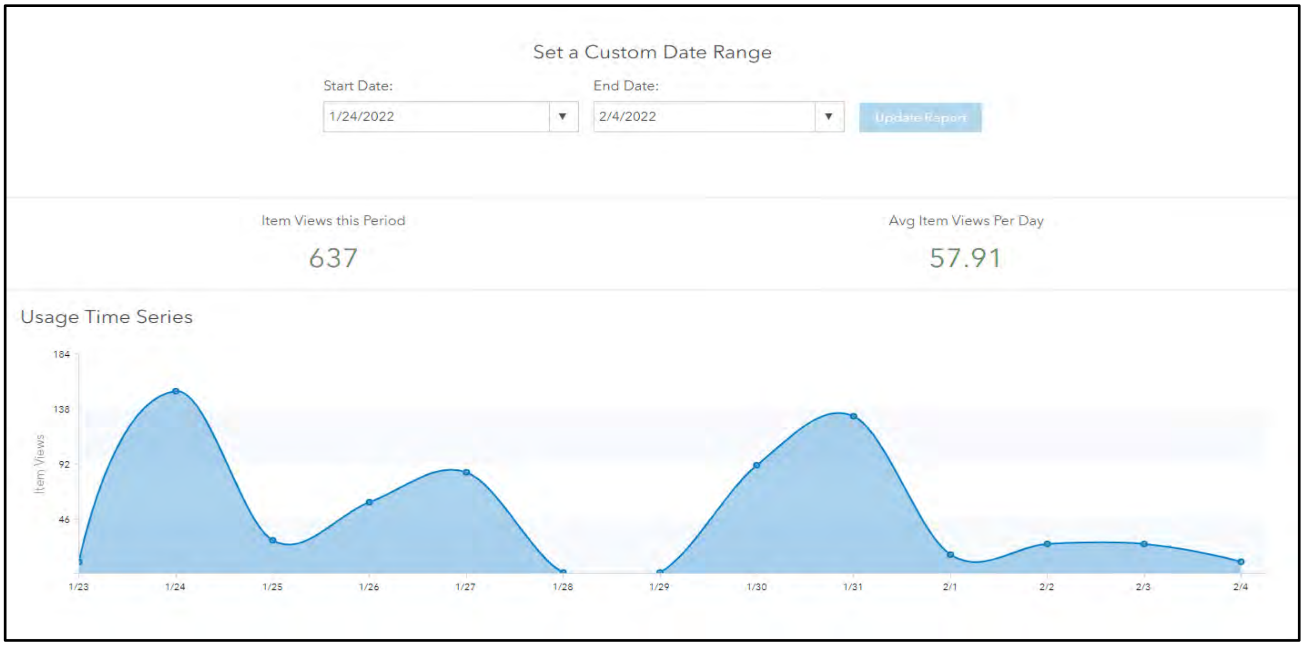


Figure H.13. Story map views from January 24th through February 4th, 2022.

EDUCATIONAL 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 2021c). 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. The program is available to provide forestry-related technical advice for private landowners regardless of property size. 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 H.14).

Figure H.14. Defensible space standards from the IBHS.

APPENDIX I:

Strategic Infrastructure Recommendations

SWCA

STRATEGIC INFRASTRUCTURE RECOMMENDATIONS

Table I.1. Recommendations for Vegetation Management

Project Description	Location	Land Ownership/ Lead Agency	Methodology/Approach	Serves to:	Timeline for Action	Priority (H, M, L)	Monitoring or Maintenance Requirements	Funding Sources
Homer Electric Association Vegetation Management Program	HEA jurisdictional ROW	Various	• Clear vegetation to reduce contact with lines • Maintain access through utility corridors • Review ROW clearance schedules • Work with land management agency to monitor hazard trees outside of ROW	• Reduce potential ignition potential associated with conductors • Reduce potential damage to infrastructure from external fire spread	Spring 2022 Hazard tree mitigation outside ROW should be targeted for summer 2023 & 2024	H	• Annual maintenance program would be followed	• Internal budgets • Fuel reduction agency grants • Pre-disaster Mitigation (PDM) Grant Program • General Assistance Program • Public Assistance Grant Program • Emergency Forest Restoration Program (EFRP) • Matching Awards Program • U.S. Endowment for Forestry and Communities • Firewise Communities • The National Fire Plan (NFP) • Serve Alaska (volunteer program to bring AmeriCorps programs to AK) • Western Wildland-Urban Interface (WUI) Grants • Private Landowner Assistance Grant • Hazard Mitigation Planning Assistance • Community Development Block Grants – Mitigation – Alaska
Hilcorp Hazardous Fuels Reduction to protect infrastructure	Swanson, Beaver creek, Kenai gas field	FWS, CIRI, KPB, private	• Hazardous fuel reduction along key roads, utility corridors, pipelines • Remove SBB trees and other fuels • Allow for aerial inspection of lines and ROWs	• Protect infrastructure • Keep utilities flowing	Early winter 2022 and each following winter	M	• Continuous	• Internal budgets • Fuel reduction agency grants • Pre-disaster Mitigation (PDM) Grant Program • General Assistance Program • Public Assistance Grant Program • Emergency Forest Restoration Program (EFRP) • Matching Awards Program • U.S. Endowment for Forestry and Communities • Firewise Communities • The National Fire Plan (NFP) • Serve Alaska (volunteer program to bring AmeriCorps programs to AK) • Western Wildland-Urban Interface (WUI) Grants • Private Landowner Assistance Grant • Hazard Mitigation Planning Assistance • Community Development Block Grants – Mitigation – Alaska

Project Description	Location	Land Ownership/ Lead Agency	Methodology/Approach	Serves to:	Timeline for Action	Priority (H, M, L)	Monitoring or Maintenance Requirements	Funding Sources
Marathon Hazardous Fuels Reduction	Kenai refinery	Marathon	• Create fuel break around refinery 300 ft • Remove SBB trees and other fuels • Use private logging operation	• Protect refinery operations	Over next 5 years	H	• Continuous	• Internal budgets • Fuel reduction agency grants Private • Grants • Pre-disaster Mitigation (PDM) Grant Program • General Assistance Program • Public Assistance Grant Program • Emergency Forest Restoration Program (EFRP) • Matching Awards Program • U.S. Endowment for Forestry and Communities • Firewise Communities • The Urban Land Institute (ULI) • The National Fire Plan (NFP) • Serve Alaska (volunteer program to bring AmeriCorps programs to AK) • Western Wildland-Urban Interface (WUI) Grants • Private Landowner Assistance Grant • Hazard Mitigation Planning Assistance • Community Development Block Grants – Mitigation – Alaska

Table I.2. Recommendations for Structure/System Hardening

Project Description	Location	Land Ownership/ Lead Agency	Methodology/Approach	Serves to:	Timeline for Action	Priority (H, M, L)	Monitoring or Maintenance Requirements	Funding Sources
DOT Bridge improvements Highway widening	Sterling Highway Funny River Bridge	DOT ROW	• Develop better egress/evacuation access • Identify Sterling Hwy corridor narrow points • Assess fuel near roads and communities • Look for bridges that are choke points (Soldotna bridge, Kenai bridge, others)	• Enhance ingress and egress • Protect life and property	Over next 5 years	L	• Continuous	• Agency budgets • Federal hazard mitigation grants • Pre-disaster Mitigation (PDM) Grant Program • Building Resilient Infrastructure and Communities (BRIC) program • Hazard Mitigation Grant Program (HMGP) • Emergency Management Performance Grant (EMPG) • Firewise Communities • National Fire Protection Association • RAISE Discretionary Grants • Rural Opportunities to Use Transportation for Economic Success (ROUTES) • Driving Infrastructure for Rebuilding America • Infrastructure For Rebuilding America • Hazard Mitigation Planning Assistance • Community Assistance Program • Community Development Block Grants – Alaska • Community Development Block Grants – Mitigation - Alaska

Project Description	Location	Land Ownership/ Lead Agency	Methodology/Approach	Serves to:	Timeline for Action	Priority (H, M, L)	Monitoring or Maintenance Requirements	Funding Sources
Homer Electric Association System hardening	Throughout service territory	Various landowners HEA ROW	• Carry out fire behavior analysis to identify vulnerable sections of line and prioritize actions. • Explore where metal structures can be installed to reduce fire damage to poles / structures. • Continue to look for opportunities to improve maintenance. • Seek funding to support system hardening efforts.	• Mitigate fire impacts to infrastructure • Retain / maintain service to communities	Over next 5 years	H	• Continuous	• Internal budgets • Legislature Grants • Fuel reduction agency grants • Pre-disaster Mitigation (PDM) Grant Program • Building Resilient Infrastructure and Communities (BRIC) program • Hazard Mitigation Grant Program (HMGP) • Emergency Management Performance Grant (EMPG) • Firewise Communities • National Fire Protection Association • Hazard Mitigation Planning Assistance • Community Assistance Program • Community Development Block Grants – Alaska • Community Development Block Grants – Mitigation - Alaska
Fish and Wildlife Service Structure Hardening	Throughout Peninsula	FWS	• Firewise all facilities • Outreach to public to protect private homes	• Maintain service and access by protecting vulnerable bridges • Protect FWS values at risk	Over next 5 years	M	• Continuous	• Agency budgets • Pre-disaster Mitigation (PDM) Grant Program • Building Resilient Infrastructure and Communities (BRIC) program • Hazard Mitigation Grant Program (HMGP) • Emergency Management Performance Grant (EMPG) • Firewise Communities • National Fire Protection Association • Environmental Systems Research Institute (ESRI) • National Interagency Fire Center, Wildland Fire Prevention/Education • Environmental Education Grants • The Fire Prevention and Safety Grants (FP&S) • Hazard Mitigation Planning Assistance • Community Assistance Program • Community Development Block Grants – Alaska • Community Development Block Grants – Mitigation – Alaska • Alaska Firewise • Private Landowner Assistance Grant • Community Forestry Grants

Project Description	Location	Land Ownership/ Lead Agency	Methodology/Approach	Serves to:	Timeline for Action	Priority (H, M, L)	Monitoring or Maintenance Requirements	Funding Sources
Hilcorp Hazardous Fuel Reduction	Swanson, Beaver creek, Kenai gas field	Various agencies and operators	• Develop defensible space around facilities • Develop standard clearing thresholds (defensible space zones) based on fire behavior analysis and facility type.	• Protect critical infrastructure	Late 2021	M	• Annual vegetation monitoring and maintenance	• Grants • Internal budgets • Fuel reduction agency grants • Private Grants • Pre-disaster Mitigation (PDM) Grant Program • General Assistance Program • Public Assistance Grant Program • Emergency Forest Restoration Program (EFRP) • Matching Awards Program • U.S. Endowment for Forestry and Communities • Firewise Communities • The Urban Land Institute (ULI) • The National Fire Plan (NFP) • Western Wildland-Urban Interface (WUI) Grants • Private Landowner Assistance Grant • Hazard Mitigation Planning Assistance • Community Development Block Grants – Mitigation - Alaska
KPB/OEM Ingress/Egress improvements	Throughout Peninsula	KPB	• Identify alternative escape routes for communities with poor ingress/egress • Increase maintenance of escape route roads- determine feasibility of paving the existing gravel North Kenai escape route	• Provide safe evacuation for staff and visitors	Over next 5 years	M	• Continuous	• Agency budgets • Pre-disaster Mitigation (PDM) Grant Program • Hazard Mitigation Grant Program (HMGP) – Post Fire • General Assistance Program • Multipurpose Grants to States and Tribes • Funding for Fire Departments and First Responders • Regional Catastrophic Preparedness Grants • Firewise Communities • State Farm Good Neighbor Citizen Grants • State and Private Forestry Programs – NASF • National Fire Protection Association • RAISE Discretionary Grants • Rural Opportunities to Use Transportation for Economic Success (ROUTES) • Driving Infrastructure for Rebuilding America • Infrastructure For Rebuilding America • Hazard Mitigation Planning Assistance • Community Assistance Program • Community Development Block Grants – Alaska • Community Development Block Grants – Mitigation - Alaska

Project Description	Location	Land Ownership/ Lead Agency	Methodology/Approach	Serves to:	Timeline for Action	Priority (H, M, L)	Monitoring or Maintenance Requirements	Funding Sources
Improved wireless Infrastructure	KPB area wide but with a focus on low signal areas like Nikiski	KPB/ working with Private companies to improve services	• Strategic placement of mobile hotspots in event of emergency • Public access to internet and communications • Work with emergency service providers to identify needs • Increase communication providers for emergency services • Mobile hotspots during emergencies • Providing charging stations during incident	• Aid and assist emergency providers with additional secondary means of communications • Assist community access to telecom and internet services during emergency	Over next 3 years	H M	• Audit low signal / poor communication areas to continue to provide / expand services to these areas	• Pre-disaster Mitigation (PDM) Grant Program • Hazard Mitigation Grant Program (HMGP) • Emergency Management Performance Grant (EMPG) • Regional Catastrophic Preparedness Grants • Conservation Innovation Grants (CIG) • Environmental Systems Research Institute (ESRI) • Department of Homeland Security U.S. Fire Administration • Hazard Mitigation Planning Assistance • Community Assistance Program • Community Development Block Grants – Alaska • Community Development Block Grants – Mitigation - Alaska
DOT New Roads & Road Expansion	Highways and expand commerce	DOT, KPB, municipalities	• Allocation of funding • Contractual or internal work • Increase signage to address potential increased ignitions.	• Increase security of ingress and egress	Next ten years	H	• Regular maintenance, initial planning for development	• DOT (Fed/State funds), KPB, municipalities • Internal budgets • Pre-disaster Mitigation (PDM) Grant Program • Building Resilient Infrastructure and Communities (BRIC) program • Hazard Mitigation Grant Program (HMGP) • Emergency Management Performance Grant (EMPG) • RAISE Discretionary Grants • Rural Opportunities to Use Transportation for Economic Success (ROUTES) • Driving Infrastructure for Rebuilding America • Infrastructure For Rebuilding America • Regional Catastrophic Preparedness Grants • Hazard Mitigation Planning Assistance • Community Assistance Program • Community Development Block Grants – Alaska • Community Development Block Grants – Mitigation - Alaska

Project Description	Location	Land Ownership/ Lead Agency	Methodology/Approach	Serves to:	Timeline for Action	Priority (H, M, L)	Monitoring or Maintenance Requirements	Funding Sources
DOT /KPB Road Paving	Gravel roads in the community that serve as a secondary route	DOT, KPB, municipalities	• Carryout feasibility and cost/benefit analysis to determine if road paving would reduce risk to communities. • Allocation of funding • Contractual or internal work	• Increase security of roads • Increase safety during period of high traffic	Next 5 years	M	• Regular Maintenance	• DOT, KPB, municipalities • Internal budgets • Pre-disaster Mitigation (PDM) Grant Program • Building Resilient Infrastructure and Communities (BRIC) program • Hazard Mitigation Grant Program (HMGP) • Emergency Management Performance Grant (EMPG) • RAISE Discretionary Grants • Rural Opportunities to Use Transportation for Economic Success (ROUTES) • Driving Infrastructure for Rebuilding America • Infrastructure For Rebuilding America • Regional Catastrophic Preparedness Grants • Hazard Mitigation Planning Assistance • Community Assistance Program • Community Development Block Grants – Alaska • Community Development Block Grants – Mitigation - Alaska

Table I.3. Recommendations for Improved Situational Awareness

Project Description	Location	Land Ownership/ Lead Agency	Methodology/Approach	Serves to:	Timeline for Action	Priority (H, M, L)	Monitoring or Maintenance Requirements	Funding Sources
Homer Electric Association Enhance communications and preparedness	Throughout service territory	Various landowners HEA ROW	• Develop response and readiness plan/fire mitigation plan to include preparedness, response, communication protocols and best practices • Convene meetings of pertinent agencies/stakeholders before each fire season (early in the year) • Review lessons learned and plan for coming season • Build redundancy into communications systems for example satellite phones and redundant communications systems should be used to insure real-time communications between the various entities.	• Enhance preparedness and response	Next 3 years	H	• Annual review of progress towards goals	• Internal budgets • Agency grants • Pre-disaster Mitigation (PDM) Grant Program • Hazard Mitigation Grant Program (HMGP) • Emergency Management Performance Grant (EMPG) • Regional Catastrophic Preparedness Grants • Conservation Innovation Grants (CIG) • Environmental Systems Research Institute (ESRI) • Department of Homeland Security U.S. Fire Administration • Western Wildland-Urban Interface (WUI) Grants • Private Landowner Assistance Grant • Alaska Firewise • Hazard Mitigation Planning Assistance • Community Assistance Program • Community Development Block Grants – Alaska • Community Development Block Grants – Mitigation - Alaska

Project Description	Location	Land Ownership/ Lead Agency	Methodology/Approach	Serves to:	Timeline for Action	Priority (H, M, L)	Monitoring or Maintenance Requirements	Funding Sources
Hilcorp Enhance communications and preparedness	Swanson, Beaver creek, Kenai gas field	Various agencies and operators	• Plan to meet fire management agencies on a regular cycle • Complete periodic drills at facilities • Have fire agencies visit facilities to improve awareness and familiarity	• Enhance preparedness and response	Annual	H	• Annual review of progress towards goals	• Internal budgets • Pre-disaster Mitigation (PDM) Grant Program • Hazard Mitigation Grant Program (HMGP) • Emergency Management Performance Grant (EMPG) • Regional Catastrophic Preparedness Grants • Conservation Innovation Grants (CIG) • Environmental Systems Research Institute (ESRI) • Department of Homeland Security U.S. Fire Administration • Funding for Fire Departments and First Responders • State and Private Forestry Programs – NASF • Volunteer Fire Assistance Program • Assistance to Firefighters Grants (AFG) • Hazard Mitigation Planning Assistance • Community Assistance Program • Community Development Block Grants – Alaska • Community Development Block Grants – Mitigation - Alaska
Marathon Enhance outreach	Kenai refinery	Marathon	• Notify neighbors when work being done and why • Identify opportunities to incorporate Firewise in community forums	• Enhance communications and transparency • Promote work in support of Firewise programs	Annual	H	• Annual review of mitigation action • Engage with local emergency planning committee	• Internal budgets • Firewise Communities • National Fire Protection Association • Environmental Systems Research Institute (ESRI) • National Interagency Fire Center, Wildland Fire Prevention/Education • Environmental Education Grants • The Fire Prevention and Safety Grants (FP&S) • Private Landowner Assistance Grant • Alaska Firewise

Table I.4. Recommendations for Inspection Procedures

Project Description	Location	Land Ownership/ Lead Agency	Methodology/Approach	Serves to:	Timeline for Action	Priority (H, M, L)	Monitoring or Maintenance Requirements	Funding Sources
Utilities and Agencies Pre-season meetings between utilities and fire response and emergency management agencies	All	All (as appropriate) HEA, ENSTAR, communications, KPB-OEM	• Initiate standing pre-fire season meeting of utilities and fire response agencies • Discuss options for maintaining supplies to communities • Educate utilities on damage repair reimbursement options • Brief fire managers on utility operations, issues, connections, contact updates, etc. • Share protocols (inspection procedures) between utilities and fire response agencies Identify special issues that could impact fire operations (planned construction, etc.)	• Enhance coordination and preparedness	Every year, starting by spring 2022	H	• Annual meeting notes • Set goals for upcoming year • After Action Reviews • Periodic monitoring and inspections	• Funding for Fire Departments and First Responders • Emergency Management Performance Grant (EMPG) • Regional Catastrophic Preparedness Grants • Volunteer Fire Assistance Program • Staffing for Adequate Fire and Emergency Response (SAFER) • Assistance to Firefighters Grants (AFG) • State and Private Forestry Programs – NASF • National Fire Protection Association • Hazard Mitigation Planning Assistance • Community Assistance Program • Community Development Block Grants – Mitigation - Alaska
Local/Gov. Agencies OEM/State Forestry/utility company Inspections	KPB Wide	State Forestry, KPB OEM, Incorporated Cities	• Training to those on routine inspection rounds or on non-emergency calls in the community to look for fire hazards or other issues	• Prevention	All time	M	• Frequent monitoring & rounds	• SOA, KPB, Incorporated cities • Volunteer Fire Assistance Program • Assistance to Firefighters Grants (AFG) • State and Private Forestry Programs – NASF • National Fire Protection Association • Firewise Communities • National Fire Protection Association • Environmental Systems Research Institute (ESRI) • National Interagency Fire Center, Wildland Fire Prevention/Education • Environmental Education Grants • The Fire Prevention and Safety Grants (FP&S) • Community Assistance Program • Community Development Block Grants – Alaska • Community Development Block Grants – Mitigation - Alaska
Homer Electric Association Enhance coordination	Throughout service territory	Various landowners, agencies, HEA ROW	• Continue ongoing practices of inspection • Address access limitations on certain state and federal lands to reduce potential for hazards to increase risk to infrastructure • Improve cooperation between landowners and utilities to facilitate maintenance of facilities and address outages and maintenance when needed. • Mitigate lack of knowledge regarding utility operations and practices • Promote visits so fire responders can see utility issues in some areas	• Enhance coordination and preparedness and identify system hazards	Ongoing	H	• Annual review of goals and protocols	• Firewise Communities • National Fire Protection Association • Environmental Systems Research Institute (ESRI) • National Interagency Fire Center, Wildland Fire Prevention/Education • Environmental Education Grants • The Fire Prevention and Safety Grants (FP&S) • Pre-disaster Mitigation (PDM) Grant Program • Hazard Mitigation Planning Assistance • Community Assistance Program • Community Development Block Grants – Alaska • Community Development Block Grants – Mitigation - Alaska

Project Description	Location	Land Ownership/ Lead Agency	Methodology/Approach	Serves to:	Timeline for Action	Priority (H, M, L)	Monitoring or Maintenance Requirements	Funding Sources
Marathon Pipeline inspections	Marathon pipeline to Anchorage	Multiple	• Annual pipeline inspections • Visual inspect for clearing	• Protect pipeline valve stations • Maintain critical delivery of supply to Anchorage	Annual	M	• Per policy	• Agency budgets • Pre-disaster Mitigation (PDM) Grant Program • Community Assistance Program • Community Development Block Grants – Alaska

Table I.5. Recommendations for Deenergizing/Closing Procedures

Project Description	Location	Land Ownership/ Lead Agency	Methodology/Approach	Serves to:	Timeline for Action	Priority (H, M, L)	Monitoring or Maintenance Requirements	Funding Sources
Utilities and Agencies General deenergizing protocols/emergency shutdown procedures	All	Utilities	• Adjust setting on automatic utility settings during high / extreme fire danger conditions o Different procedures for each utility o Turn off and turn on decisions / issues will vary	• Protect communities and infrastructure	Review policies each season	H	• Per policy	• Agency budgets • Community Assistance Program • Community Development Block Grants – Alaska
Utilities and Agencies Communications	All	Utilities	• Maintain a contact sheet shared with all stakeholders, update regularly	• Enhance emergency response and preparedness	Review policies each season	H	• Per policy	• Agency Budgets • Community Assistance Program • Community Development Block Grants – Alaska

Table I.6. Recommendations for System Improvements

Project Description	Location	Land Ownership/ Lead Agency	Methodology/Approach	Serves to:	Timeline for Action	Priority (H, M, L)	Monitoring or Maintenance Requirements	Funding Sources
DOT Emergency response	DOT ROW	DOT	• Maintain supplies to community • Traffic control - DOT for initial traffic control, need contractors to take over	• Enhance response	Review policies each season	H	• Per policy	• Emergency Management Performance Grant (EMPG) • Community Assistance Program • Community Development Block Grants – Alaska
Utilities and Agencies Enhance back-up systems for fire response	All	KPB, DOT, Utilities	• Build redundancy in power supply • Build redundancy in communication infrastructure and apparatus	• Enhance response	Review policies each season	H	• Per policy	• Emergency Management Performance Grant (EMPG) • Pre-disaster Mitigation (PDM) Grant Program • Building Resilient Infrastructure and Communities (BRIC) program • Hazard Mitigation Planning Assistance • Community Assistance Program • Community Development Block Grants – Alaska • Community Development Block Grants – Mitigation - Alaska

Project Description	Location	Land Ownership/ Lead Agency	Methodology/Approach	Serves to:	Timeline for Action	Priority (H, M, L)	Monitoring or Maintenance Requirements	Funding Sources
Homer Electric Association Resilient infrastructure	HEA, ADNR	Echo Lake to Kenai – Funny River	• Relocate overhead lines to underground facilities to eliminate the risk of fire started by trees falling on them or equipment failure starting a fire. • Carry out feasibility study to determine impact on reducing wildfire risk.	• Protect life and property	Contingent on funding	M	• Incorporate into regular HEA business	• Internal budgets • Pre-disaster Mitigation (PDM) Grant Program • Building Resilient Infrastructure and Communities (BRIC) program • Hazard Mitigation Grant Program (HMGP) • Emergency Management Performance Grant (EMPG) • RAISE Discretionary Grants • Rural Opportunities to Use Transportation for Economic Success (ROUTES) • Driving Infrastructure for Rebuilding America • Infrastructure For Rebuilding America • Regional Catastrophic Preparedness Grants • Hazard Mitigation Planning Assistance • Community Assistance Program • Community Development Block Grants – Alaska • Community Development Block Grants – Mitigation - Alaska
		Homer spit to Mc Donald spit	• The cable currently goes from Homer spit to McKean flats and then goes overhead to Seldovia from there	• Reduce overhead line in state park where it is difficult to fight fire	Contingent on funding	M	• Incorporate into regular HEA business	• Internal budgets • Pre-disaster Mitigation (PDM) Grant Program • Building Resilient Infrastructure and Communities (BRIC) program • Hazard Mitigation Grant Program (HMGP) • Emergency Management Performance Grant (EMPG) • RAISE Discretionary Grants • Rural Opportunities to Use Transportation for Economic Success (ROUTES) • Driving Infrastructure for Rebuilding America • Infrastructure For Rebuilding America • Regional Catastrophic Preparedness Grants • Hazard Mitigation Planning Assistance • Community Assistance Program • Community Development Block Grants – Alaska • Community Development Block Grants – Mitigation - Alaska

Project Description	Location	Land Ownership/ Lead Agency	Methodology/Approach	Serves to:	Timeline for Action	Priority (H, M, L)	Monitoring or Maintenance Requirements	Funding Sources
		Peterson Bay to McKean flats in Kachemak state park	• Relocate OH lines to UG & underwater • Reduce chances of overgrowth and deadfall taking down power lines and starting fires	• Reduce overhead line in state park where it is difficult to fight fire	Contingent on funding	M	• Incorporate into regular HEA business	• Internal budgets • Pre-disaster Mitigation (PDM) Grant Program • Building Resilient Infrastructure and Communities (BRIC) program • Hazard Mitigation Grant Program (HMGP) • Emergency Management Performance Grant (EMPG) • RAISE Discretionary Grants • Rural Opportunities to Use Transportation for Economic Success (ROUTES) • Driving Infrastructure for Rebuilding America • Infrastructure For Rebuilding America • Regional Catastrophic Preparedness Grants • Hazard Mitigation Planning Assistance • Community Assistance Program • Community Development Block Grants – Alaska • Community Development Block Grants – Mitigation - Alaska
All Maintain supply network to the community	Transportation system	SOA, KPB, incorporated cities, Alaska Railroad commission, DOT and Public Facilities	• Integrate supply chain impacts into the KPB Hazard Mitigation Plan update.	• Provide more security to transit of goods in and out of KPB impacted by various hazards	Next ten years	H	• Planning documents or a collaborative study	• DOT, Alaska Railroad • Internal budgets • Pre-disaster Mitigation (PDM) Grant Program • Building Resilient Infrastructure and Communities (BRIC) program • Hazard Mitigation Grant Program (HMGP) • Emergency Management Performance Grant (EMPG) • RAISE Discretionary Grants • Rural Opportunities to Use Transportation for Economic Success (ROUTES) • Driving Infrastructure for Rebuilding America • Infrastructure For Rebuilding America • Regional Catastrophic Preparedness Grants • Hazard Mitigation Planning Assistance • Community Development Block Grants – Mitigation - Alaska

Project Description	Location	Land Ownership/ Lead Agency	Methodology/Approach	Serves to:	Timeline for Action	Priority (H, M, L)	Monitoring or Maintenance Requirements	Funding Sources
All Expand egress abilities	Transportation system	SOA, KPB Road Service Area, incorporated cities, Alaska Railroad Commission, State DOT and Public Facilities	• Expand and/or reinforce the road and rail infrastructure • Update and complete the Transportation Plan • Identify and map alternate routes for ingress/egress for WUI areas as a specific part of the KPB Transportation Plan (From 2019 HMP) • Link Transportation Plan to Evacuation Section of the Emergency Operations Plan (From 2019 HMP) • Prioritize capital improvement projects based on need for response and evacuation routes (From 2019 HMP) • Rural neighborhood development in the future should have fire exit built in (From 2019 HMP)	• Ability to evacuate public and facilitate responders in the case of a natural disaster	Next ten years	M	• Planning documents or a collaborative study	• DOT, Alaska Railroad, KPB, incorporated cities, State Transportation Improvement Program, State Capital Budget Funding • Internal budgets • Pre-disaster Mitigation (PDM) Grant Program • Building Resilient Infrastructure and Communities (BRIC) program • Hazard Mitigation Grant Program (HMGP) • Emergency Management Performance Grant (EMPG) • RAISE Discretionary Grants • Rural Opportunities to Use Transportation for Economic Success (ROUTES) • Driving Infrastructure for Rebuilding America • Infrastructure For Rebuilding America • Regional Catastrophic Preparedness Grants • Hazard Mitigation Planning Assistance • Community Assistance Program • Community Development Block Grants – Alaska • Community Development Block Grants – Mitigation - Alaska

Table I.7. Recommendations for Public Safety and Notifications

Project Description	Location	Land Ownership/ Lead Agency	Methodology/Approach	Serves to:	Timeline for Action	Priority (H, M, L)	Monitoring or Maintenance Requirements	Funding Sources
All Expand communication infrastructure and enhance protections from wildfire	Area wide	KPB OEM, KPB Capital Projects Division, DOT and Public Facilities, Troopers, AK Forestry	• Audit/identify gaps in existing coverage areas and capital needs to address gaps • Implement defensible space around towers • Utilize existing infrastructure (i.e., cell towers) • Perform a Peninsula-wide assessment of communication system vulnerability (From 2019 HMP) • ALMAR site protection • Alternate ALMAR system	• Enhance communications during wildfires	Annual	H	• Annual assessment of function and gaps • Regular maintenance	• Local agencies • Infrastructure grants • KPB, AT&T, Verizon, ACS • Infrastructure For Rebuilding America • Regional Catastrophic Preparedness Grants • Pre-disaster Mitigation (PDM) Grant Program • Building Resilient Infrastructure and Communities (BRIC) program • Hazard Mitigation Grant Program (HMGP) • Emergency Management Performance Grant (EMPG) • RAISE Discretionary Grants • Hazard Mitigation Planning Assistance • Community Assistance Program • Community Development Block Grants – Alaska • Community Development Block Grants – Mitigation - Alaska
All Enhance public outreach on emergency procedures	KPB wide	KPB OEM, local FD chiefs	• Identify and leverage various public events to provide education materials • PSA during periods of high fire on various radio and TV outlets • Utilize social media platforms where appropriate • Joint info system to educate public re hazards and incident operations • Should include special information re evacuations and role of various agencies • Utilize PSA announcement opportunities	• Public and visitors to KPB	Annual	M	• Annual review by multi-discipline work group focusing on outreach	• Various Firewise related grants • Firewise Communities • National Fire Protection Association • Environmental Systems Research Institute (ESRI) • National Interagency Fire Center, Wildland Fire Prevention/Education • Environmental Education Grants • The Fire Prevention and Safety Grants (FP&S) • Hazard Mitigation Planning Assistance • Alaska Firewise