2018

State of Alaska
State Hazard Mitigation Plan

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Executive Summary

The 2018 Alaska State Hazard Mitigation Plan (Alaska SHMP) is the culmination of a cooperative partnership between the Alaska Division of Homeland Security and Emergency Management (DHS&EM), the State Hazard Mitigation Advisory Committee (SHMAC), the Federal Emergency Management Agency (FEMA), and other state and federal agencies, education centers, and community agencies. The Alaska SHMP serves as the strategy document for Alaska's hazard mitigation program while meeting FEMA requirements for a five-year State Hazard Mitigation Plan update under the Stafford Act. The Alaska SHMP is a living document that is continually refined as new information is obtained and is updated annually. DHS&EM acknowledges the participation of local communities, governmental agencies, and subject specialists throughout the update. Their contributions are incorporated into this document.

Alaska is a vast state with many severe hazards, therefore it is vital to have a proactive and comprehensive mitigation strategy. Mitigation measures save lives, reduce injuries, and decrease financial losses. Mitigation measures range from public education and land use planning to specific construction actions that reduce hazard losses. Alaska's hazards, vulnerabilities, and mitigation strategy are incorporated into this plan along with data accumulated from 177 local and 49 tribal approved hazard mitigation plan's data.

DHS&EM formed the SHMAC, initially formed in 2002, comprised of multiagency and private sector mitigation experts in Alaska. The SHMAC played a key role to update and review this plan update and continues to provide Alaska-specific mitigation planning and project review and validation to DHS&EM.

Successful mitigation is a community-wide effort involving an informed public, dedicated community leaders, and active agencies who jointly strive to prevent, reduce, or eliminate natural hazard impacts. This 2018 SHMP update includes contributions from Alaska's boroughs, communities, universities, private sector partnerships, and the public.

Local community, jurisdictional and tribal hazard mitigation plans (HMPs) include:

Multi-Jurisdictional or Local HMPs:

Approved	*Pending Adoption*	*Awaiting Revision*	*In-Progress*	*Expired*	*Total*
134	25	10	8	58	***235***

Tribal HMPs:

Approved	*Pending Adoption*	*Awaiting Revision*	*In-Progress*	*Expired*	*Total*
38	9	5	5	0	***57***

Alaska local and tribal plans (Appendix 13.17), in coordination with this State plan, embody the State of Alaska's mitigation strategy.

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1. INTRODUCTION

This section briefly describes hazard mitigation planning requirements, associated grants, and this 2018 Standard State Hazard Mitigation Plan (SHMP) update's composition.

HMPs define natural hazards, their nature or characteristics, historical events, potential structure and infrastructure impacts, and the State's strategy to guide future activities. It acts as a roadmap to reduce or prevent natural hazard damage impacts. Mitigation actions are best if taken pre-disaster or before emergency, injury, death occurs. However, mitigation actions also occur post-disaster in historically unlikely locations. Either pre- or post-disaster activities seek to reduce future disaster damage probability.

1.1. PURPOSE

The Alaska SSHMP identifies and coordinates risk mitigation efforts with State, Federal, and local partners to fulfill the requirements outlined in the Code of Federal Regulations, Title 44 "Emergency Management and Assistance," Part 201 "Mitigation Planning", Subsection 4 "Standard State Mitigation Plans." (44 CFR 201.4):

> *Hazard mitigation is any sustained action taken to reduce or eliminate long-term risk to people and property from natural hazards and their effects. This definition distinguishes actions that have a long-term impact from those that are more closely associated with immediate preparedness, response, and recovery activities. Hazard mitigation is the only phase of emergency management specifically dedicated to breaking the cycle of damage reconstruction, and repeated damage. As such, States, Territories, Indian Tribal governments, and communities are encouraged to take advantage of funding provided by HMA programs in both the pre- and post-disaster timeframes. Source: FEMA 2018*

1.2. AUTHORITIES

On October 30, 2000, Congress passed the Disaster Mitigation Act of 2000 (DMA 2000) (P.L. 106-390) which amended the Robert T. Stafford Disaster Relief and Emergency Assistance Act (Stafford Act) (Title 42 of the United States Code [USC] 5121 et seq.) by repealing the act's previous mitigation planning section (409) and replacing it with a new mitigation planning section (322). Section 322 directs state, tribal, and local entities to closely coordinate mitigation planning and implementation efforts. Additionally, it establishes the hazard mitigation plan requirement for Federal Emergency Management Agency's (FEMA) Hazard Mitigation Assistance (HMA). Specific information regarding the Stafford Act may be found at https://www.fema.gov/media-library/assets/documents/15271.

On October 2, 2015, FEMA published the Mitigation Planning Final Rule in the Federal Register, [Docket ID: FEMA-2015-0012], 44 Code of Federal Regulations (CFR) Part 201, effective November 2, 2015. Planning requirements for local and tribal entities are described in detail in Section 201.6 and Section 201.7 The Alaska SHMP addresses and fulfills these planning requirements in appropriate sections throughout this SHMP. Locally adopted and FEMA approved local and tribal hazard mitigation plans qualify jurisdictions for several Federal Hazard Mitigation Assistance (HMA) grant programs. This Alaska SHMP complies with the 2018 Title 44 CFR and applicable FEMA guidance documents. Additional statutory and regulatory authorities for this plan are listed in Appendices 13.22 and 13.23.

The Code of Federal Regulations (CFR), Title 44 *Emergency Management and Assistance*, states that Hazard Mitigation planning:

> *…is for State, local, and Indian tribal governments to identify the natural hazards that impact them, to identify actions and activities to reduce any losses from those hazards, and to establish a coordinated process to implement the plan, taking advantage of a wide range of resources. Source: eCFR 44 2018*

FEMA describes hazard mitigation as:

> *… the effort to reduce loss of life and property by lessening the impact of disasters. In order for mitigation to be effective we need to take action now—before the next disaster—to reduce human and financial consequences later (analyzing risk, reducing risk, and insuring against risk). It is important to know that disasters can happen at any time and any place and if we are not prepared, consequences can be fatal.*
>
> *Effective mitigation requires that we all understand local risks, address the hard choices, and invest in long-term community well-being. Without mitigation actions, we jeopardize our safety, financial security and self-reliance.*
>
> > *Disasters can happen at anytime and anyplace; their human and financial consequences are hard to predict.*
> >
> > *The number of disasters each year is increasing but only 50% of events trigger Federal assistance.*
> >
> > *FEMA's mitigation programs help reduce the impact of events—and our dependence on taxpayers and the Treasury for disaster relief.*
>
> *FEMA's Federal Insurance and Mitigation Administration (FIMA) manages the National Flood Insurance Program (NFIP) and implements a variety of programs authorized by Congress to reduce losses that may result from natural disasters. Effective mitigation efforts can break the cycle of disaster damage, reconstruction, and repeated damage. FEMA's mitigation and insurance efforts are organized into three primary activities that help states, tribes, territories and localities achieve the highest level of mitigation: Risk Analysis, Risk Reduction, and Risk Insurance. Through these activities and FEMA's day-to-day work across the country, communities are able to make better mitigation decisions before, during, and after disasters. Source: FEMA 2018*

FEMA's most current State Mitigation Plan Review Guide (2015) states:

> *Hazard mitigation is sustained action to reduce or eliminate the long-term risk to human life and property from hazards. Natural hazard mitigation planning is a process used by state, tribal, and local governments to engage stakeholders, identify hazards and vulnerabilities, develop a long-term strategy to reduce risk and future losses, and implement the plan, taking advantage of a wide range of resources. A state mitigation plan demonstrates commitment to reduce risks from natural hazards and serves as a guide for decision makers for reducing the effects of natural hazards as resources are committed.*
>
> *FEMA supports hazard mitigation planning as a means to:*
>
> > *Foster partnerships for natural hazard mitigation;*
> >
> > *Promote more resilient and sustainable states and communities; and*
> >
> > *Reduce the costs associated with disaster response and recovery.*

This State Mitigation Plan Review Guide (Guide) is FEMA's official policy on and interpretation of the natural hazard mitigation planning requirements. The intended use of the Guide is to facilitate consistent evaluation and approval of state mitigation plans, as well as to facilitate state compliance with the mitigation planning requirements when updating plans. Separate local and tribal mitigation planning guidance is available from the FEMA Mitigation Planning website. Source: FEMA 2015

1.3. STATE ASSURANCES

The State supports 44 CFR 201 and assures compliance with all applicable federal statutes and regulations (Figure 1.1). The State Hazard Mitigation Officer (SHMO), with assistance from the State Hazard Mitigation Advisory Committee (SHMAC), is responsible for monitoring, evaluating, and updating the State Hazard Mitigation Plan in accordance with 44 CFR 201.4(c)(5)(i). The SHMO will monitor the plan continually, evaluate the plan annually and update the plan every 5-years, or within 90 days of a presidential declared disaster (if required), or as necessary to reflect changes in state or federal law. The Alaska SHMP Annual Progress Report and Alaska SHMP Annual Evaluation Form are used as plan review tools (Appendix 13.6). The SHMO determines when significant changes warrant an update prior to the scheduled date.

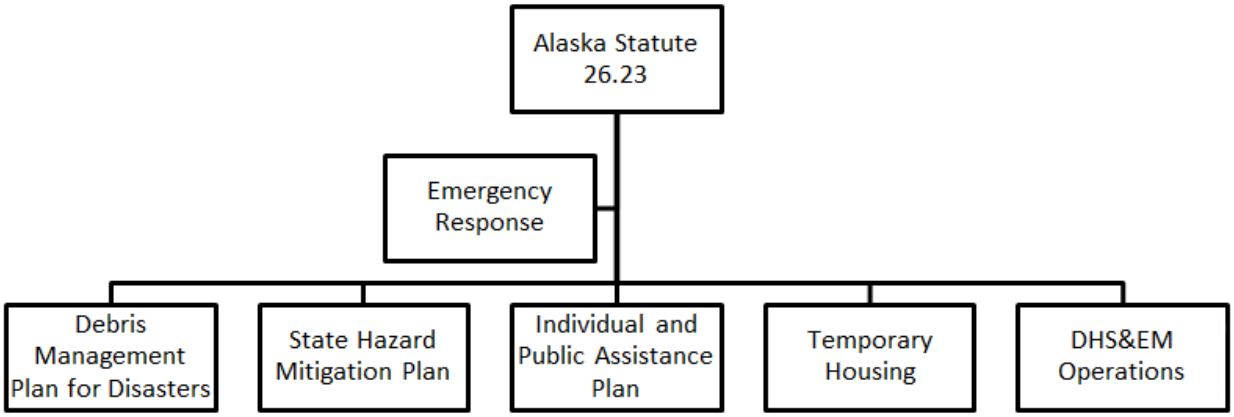

Figure 1-1 State's Emergency Management Structure

Specific FEMA programs, such as Public Assistance categories C through G, Pre-Disaster Mitigation (PDM), Flood Mitigation Assistance (FMA), and the Hazard Mitigation Grant Program (HMGP) are detailed in Chapter 6, "Resources."

1.4. TRIBAL AND LOCAL AUTHORITIES AND REQUIREMENTS

Section 322 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act (Stafford Act) 42 U.S.C. 5165, as amended by the Disaster Mitigation Act of 2000 (DMA) (P.L. 106-390), provides for state, local, and Indian tribal governments to undertake a risk-based approach to reducing risks to natural hazards through mitigation planning. The National Flood Insurance Act of 1968, 42 U.S.C. 4001 et seq., as amended, further reinforces the need and requirement for mitigation plans, linking flood mitigation assistance programs to state, tribal, and local mitigation plans.

FEMA has implemented the various hazard mitigation provisions through 44 CFR Part 201. This regulation emphasizes the need for state, local, and Indian Tribal governments to closely coordinate mitigation planning and implementation efforts, in addition to describing the requirement for a state, local, or tribal mitigation plan as a condition of pre- and post-disaster assistance.

In recognition of tribal sovereignty and the government-to-government relationship that FEMA has with Indian Tribal governments, FEMA amended 44 CFR Part 201 at 72 Fed. Reg. 61720, on October 31, 2007, and again at 74 Fed. Reg. 47471, on September 16, 2009, to consolidate and clarify the requirements for Indian Tribal governments, to establish tribal mitigation plans separately from state and local mitigation plans, and finalize the mitigation planning rule.

Indian tribal governments with an approved Tribal Mitigation Plan in accordance with 44 CFR 201.7 may apply for assistance from FEMA as a grantee. If the Indian Tribal government coordinates with the State for review of their Tribal Mitigation Plan, then the Indian Tribal government also has the option to apply as a subgrantee through a state or another tribe. A grantee is an entity such as a state, territory, or Indian Tribal government to which a grant is awarded and that is accountable for the funds provided. A subgrantee is an entity, such as a community, local, or Indian Tribal government; state-recognized tribe; or a private non-profit (PNP) organization to which a subgrant is awarded and that is accountable to the grantee for use of the funds provided.

If the Indian Tribal government is eligible as a grantee or subgrantee because it has an approved Tribal Mitigation Plan and has coordinated with the state for review, it can decide which option it wants to take on a case-by-case basis with respect to each presidential disaster declaration, and for each grant program under a declaration, but not on a project-by-project basis within a grant program. For example, an Indian Tribal government can participate as a subgrantee for Public Assistance (PA), but as a grantee for the Hazard Mitigation Grant Program (HMGP) under the same Declaration. However, the Indian Tribal government would not be able to request grantee status under HMGP for one HMGP project, then request subgrantee status for another HMGP project under the same declaration.

Under the Stafford Act and the National Flood Insurance Act, state, local, and tribal governments must have an approved, adopted hazard mitigation plan to meet the eligibility requirements for certain assistance types, which will differ depending on jurisdictional authorities and whether the jurisdictions intend to apply as a grantee or subgrantee. Table 1-1 defines mitigation plan requirements for state, tribal, and local governments applying for certain FEMA Grants.

Table 1-1 Jurisdictional Mitigation Plan Requirements

Enabling Legislation	FEMA Assistance Program		Is Mitigation Plan Required?	
			State / Tribal Applicant	Tribal / Local-Applicant
Stafford Act	Individual Assistance (IA)		No	No
	Public Assistance	Categories A and B (e.g., debris removal, emergency protective measures)	No	No
		Categories C through G (Permanent work – e.g., repairs to publicly owned buildings)	Yes	No
	Fire Management Assistance Grants (FMAG)		Yes	No
	Hazard Mitigation Grant Program (HMGP)	Planning grant	Yes+	No
		Project grant	Yes+	Yes++
	Pre-Disaster Mitigation (PDM)	Planning grant	No	No
		Project grant	Yes*	Yes**
National Flood Insurance Act	Flood Mitigation Assistance (FMA)	Planning grant	Yes*	No
		Project grant	Yes*	Yes**
Notes	+ At the time of the Presidential major disaster declaration and at the time of obligation of HMGP grant funds. ++ At the time of obligation of HMGP grant funds for mitigation projects.			
	* By the application deadline and at the time of obligation of the PDM or FMA award. ** By the application deadline and at the time of obligation of PDM or FMA grant funds for mitigation projects.			

Source: FEMA 2017

1.5. HMA Mitigation Plan Requirements Equal Risk Reduction

FEMA HMA grant programs provide funding to states, tribes, and local entities that have a FEMA-approved state, tribal, or local mitigation plan. Two of the grants are authorized under the Stafford Act and DMA 2000, while the remaining three are authorized under the National Flood Insurance Act and the Bunning-Bereuter-Blumenauer Flood Insurance Reform Act. Excerpts from FEMA's 2015 HMA Guidance, Part I, is as follows:

> *The U.S. Department of Homeland Security (DHS) FEMA HMA programs present a critical opportunity to reduce the risk to individuals and property from natural hazards, while simultaneously reducing reliance on Federal disaster funds. On March 30, 2011, the President signed Presidential Policy Directive 8 (PPD-8): National Preparedness, and the National Mitigation Framework was finalized in May 2013. The National Mitigation Framework comprises seven core capabilities, including:*
>
> - *Threats and Hazard Identification*
> - *Risk and Disaster Resilience Assessment*
> - *Planning*
> - *Community Resilience*
> - *Public Information and Warning*
> - *Long-Term Vulnerability Reduction*
> - *Operational Coordination*

HMA programs provide funding for eligible activities that are consistent with the National Mitigation Framework's Long-Term Vulnerability Reduction capability. HMA programs reduce community vulnerability to disasters and their effects, promote individual and community safety and resilience, and promote community vitality after an incident. Furthermore, HMA programs reduce response and recovery resource requirements in the wake of a disaster or incident, which results in a safer community that is less reliant on external financial assistance.

Hazard mitigation is defined as any sustained action taken to reduce or eliminate long-term risk to people and property from natural hazards and their effects. This definition distinguishes actions that have a long-term impact from those that are more closely associated with immediate preparedness, response, and recovery activities. Hazard mitigation is the only phase of emergency management specifically dedicated to breaking the cycle of damage, reconstruction, and repeated damage. Accordingly, States, territories, federally-recognized tribes, and local communities are encouraged to take advantage of funding that HMA programs provide in both the pre- and post-disaster timelines.

In addition to hazard mitigation, FEMA's Risk Mapping, Assessment, and Planning (Risk MAP) Program provides communities with education, risk communication, and outreach to better protect its citizens. The Risk MAP project lifecycle places a strong emphasis on community engagement and partnerships to ensure a whole community approach that reduces flood risk and builds more resilient communities. Risk MAP risk assessment information strengthens a local community's ability to make better and more informed decisions. Risk MAP allows communities to better invest and determine priorities for projects funded under HMA. These investments support mitigation efforts under HMA that protect life and property and build more resilient communities.

The whole community includes children, individuals with disabilities, and others with access and functional needs; those from religious, racial, and ethnically diverse backgrounds; and people with limited English proficiency. Their contributions must be integrated into mitigation/resilience efforts, and their needs must be incorporated as the whole community plans and executes its core capabilities.

WHOLE COMMUNITY

A. HMA Commitment to Resilience and Climate Change Adaptation

FEMA is committed to promoting resilience as expressed in PPD-8: National Preparedness; the President's State, Local, and Tribal Leaders Task Force on Climate Preparedness and Resilience; the Administrator's 2011 FEMA Climate Change Adaptation Policy Statement (Administrator Policy 2011-OPPA-01); and the 2014–2018 FEMA Strategic Plan. Resilience refers to the ability to adapt to changing conditions and withstand and rapidly recover from disruption due to emergencies. The concept of resilience is closely related to the concept of hazard mitigation, which reduces or eliminates potential losses by breaking the cycle of damage, reconstruction, and repeated damage. Mitigation capabilities include, but are not limited to, community-wide risk reduction projects, efforts to improve the resilience of critical infrastructure and key resource lifelines, risk reduction for specific vulnerabilities from natural hazards and climate change, and initiatives to reduce future risks after a disaster has occurred.

FEMA is supporting efforts to streamline the HMA programs so that these programs can better respond to the needs of communities nationwide that are addressing the impacts of climate change. FEMA, through its HMA programs:

- *Develops and encourages adoption of resilience standards in the siting and design of buildings and infrastructure*
- *Modernizes and elevates the importance of hazard mitigation*

FEMA has issued several policies that facilitate the mitigation of adverse effects from climate change on the built environment, structures and infrastructure. Consistent with the 2014–2018 FEMA Strategic Plan, steps are being taken by communities through engagement of individuals, households, local leaders, representatives of local organizations, and private sector employers and through existing community networks to protect themselves and the environment by updating building codes, encouraging the conservation of natural and beneficial functions of the floodplain, investing in more resilient infrastructure, and engaging in mitigation planning. FEMA plays an important role in supporting community-based resilience efforts, establishing policies, and providing guidance to promote mitigation options that protect critical infrastructure and public resources.

FEMA encourages better integration of Sections 404 and 406 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act, as amended (Stafford Act), Title 42 of the United States Code (U.S.C.) 5121 et seq., to promote more resilience during the recovery and mitigation process. FEMA regulations that implement Sections 404 and 406 of the Stafford Act allow funding to incorporate mitigation measures during recovery activities. Program guidance and practice limits Section 406 mitigation to the damaged elements of a structure. This limitation to Section 406 mitigation may not allow for a comprehensive mitigation solution for the damaged facility; however, Section 404 funds may be used to mitigate the undamaged portions of a facility.

Recognizing that the risk of disaster is increasing as a result of multiple factors, including the growth of population in and near high-risk areas, aging infrastructure, and climate change, FEMA promotes climate change adaptation by:

- *Incorporating sea level rise in the calculation of Benefit-Cost Analysis (BCA)*
- *Publishing a new HMA Job Aid on pre-calculated benefits for hurricane wind retrofit measures, see HMA Job Aid (Cost Effectiveness Determination for Residential Hurricane Wind Retrofit Measures Funded by FEMA)*
- *Encouraging floodplain and wetland conservation associated with the acquisition of properties in green open space and riparian areas*
- *Reducing wildfire risks*
- *Preparing for evolving flood risk*
- *Encouraging mitigation planning and developing mitigation strategies that encourage community resilience and smart growth*
- *Encouraging the use of building codes and standards (the American Society of Civil Engineers/Structural Engineering Institute [ASCE/SEI] 24-14, Flood Resistant Design and Construction) wherever possible. Source: FEMA 2015*

1.6. HAZARD MITIGATION ASSISTANCE (HMA) GRANT PROGRAMS

Table 1-2 lists HMA eligible grant program activities:

Table 1-2 HMA Eligible Activities

Activities	HMGP	PDM	FMA
1. Mitigation Projects	✓	✓	✓
Property Acquisition and Structure Demolition	✓	✓	✓
Property Acquisition and Structure Relocation	✓	✓	✓
Structure Elevation	✓	✓	✓
Mitigation Reconstruction	✓	✓	✓
Dry Floodproofing of Historic Residential Structures	✓	✓	✓
Dry Floodproofing of Non-residential Structures	✓	✓	✓
Generators	✓	✓	
Localized Flood Risk Reduction Projects	✓	✓	✓
Non-localized Flood Risk Reduction Projects	✓	✓	
Structural Retrofitting of Existing Buildings	✓	✓	✓
Non-structural Retrofitting of Existing Buildings and Facilities	✓	✓	✓
Safe Room Construction	✓	✓	
Wind Retrofit for One- and Two-Family Residences	✓	✓	
Infrastructure Retrofit	✓	✓	✓
Soil Stabilization	✓	✓	✓
Wildfire Mitigation	✓	✓	
Post-Disaster Code Enforcement	✓		
Advance Assistance	✓		
Five Percent Initiative Projects	✓		
Miscellaneous/Other[1]	✓	✓	✓
2. Hazard Mitigation Planning	✓	✓	✓
Planning Related Activities	✓		
3. Technical Assistance			✓
4. Management Cost	✓	✓	✓

[1] Miscellaneous/Other indicates that any proposed action will be evaluated on its own merit against program requirements. Eligible projects will be approved provided funding is available.

(Source: FEMA 2015)

The Hazard Mitigation Grant Program (HMGP) is a competitive, disaster-funded, grant program. Whereas the other Unified Mitigation Assistance Programs: Pre-Disaster Mitigation (PDM) and Flood Mitigation Assistance (FMA), although competitive, rely on specific pre-disaster grant funding sources, sharing several common elements. The 2015 HMA Guidance provides the following programmatic information:

> *HMGP is authorized by Section 404 of the Stafford Act, 42 U.S.C. 5170c. The key purpose of HMGP is to ensure that the opportunity to take critical mitigation measures to reduce the risk of loss of life and property from future disasters is not lost during the reconstruction process following a disaster.*
>
> *HMGP funding is available, when authorized under a Presidential major disaster declaration, in the areas of the State requested by the Governor. Federally-recognized tribes may also submit a request for a Presidential major disaster declaration within their impacted areas (see http://www.fema.gov/media-library/assets/documents/85146). The amount of HMGP funding available to the Applicant is based on the estimated total Federal assistance, subject to the sliding scale formula outlined in Title 44 of the Code of*

Federal Regulations (CFR) Section 206.432(b) that FEMA provides for disaster recovery under Presidential major disaster declarations. The formula provides for up to 15 percent of the first $2 billion of estimated aggregate amounts of disaster assistance, up to 10 percent for amounts between $2 billion and $10 billion, and up to 7.5 percent for amounts between $10 billion and $35.333 billion. For States with enhanced plans, the eligible assistance is up to 20 percent for estimated aggregate amounts of disaster assistance not to exceed $35.333 billion.

The Period of Performance (POP) for HMGP begins with the opening of the application period and ends no later than 36 months from the close of the application period.

PDM is designed to assist States, territories, federally-recognized tribes, and local communities to implement a sustained pre-disaster natural hazard mitigation program to reduce overall risk to the population and structures from future hazard events, while also reducing reliance on Federal funding in future disasters. Congressional appropriations provide the funding for PDM.

The total amount of funds distributed for PDM is determined once the appropriation is provided for a given fiscal year. It can be used for mitigation projects and planning activities.

The POP for PDM begins with the opening of the application period and ends no later than 36 months from the date of subapplication selection.

FMA is authorized by Section 1366 of the National Flood Insurance Act of 1968, as amended (NFIA), 42 U.S.C. 4104c, with the goal of reducing or eliminating claims under the National Flood Insurance Program (NFIP). FMA was created as part of the National Flood Insurance Reform Act (NFIRA) of 1994. The Biggert-Waters Flood Insurance Reform Act of 2012 (Public Law 112-141) consolidated the Repetitive Flood Claims and Severe Repetitive Loss grant programs into FMA. FMA funding is available through the National Flood Insurance Fund (NFIF) for flood hazard mitigation projects as well as plan development and is appropriated by Congress. States, territories, and federally-recognized tribes are eligible to apply for FMA funds. Local governments are considered subapplicants and must apply to their Applicant State, territory, or federally-recognized tribe.

The POP for FMA begins with the opening of the application period and ends no later than 36 months from the date of subapplication selection. Source: FEMA 2015b

1.7. A Guide to this Plan

This plan focuses on mitigation as part of the State's emergency management efforts. The plan contains ten sections:

1. Introduction
2. State Overview
3. Planning Process
4. State Adoption (Governor's Promulgation)
5. Hazard Analysis
6. Natural Hazard Profiles
7. Other Hazards
8. Risk Analysis
9. Mitigation Strategy
10. References

11. Attachments
12. Appendices

Section 1 Introduction

This section defines the State Hazard Mitigation Plan's, purpose, requirements, and authorities. It introduces the FEMA programmatic resources, grant programs, and historical funding levels.

Section 2 Alaska Background Information

This section describes the State' general history, historical population trends, demographic, and economic conditions that have shaped it.

Section 3 Planning Process

This section describes the SHMP update's planning process, identifies the planning team members and stakeholders, and participant meetings throughout the planning process. This section explains data gathering; hazard refinement processes, and other appropriate information data utilized for SHMP development; actions the State plans to implement to assure continued guidance to local and tribal jurisdictions, state agencies, and special service area integration; and the State's methods and schedule for keeping the plan current.

This section also describes the planning team's formal plan maintenance process to ensure that the SHMP remains an active and applicable document throughout its five-year lifecycle. The process includes monitoring, reviewing, evaluating (Appendix 13.6 – Annual SHMP Review Tools and blank SHMP Maintenance Forms), updating the SHMP; and implementation initiatives.

Section 4 State Hazard Mitigation Plan Adoption (Promulgation)

This section describes the State Governor's formal SHMP adoption or promulgation. Support documents are located in Appendix 13.2

Section 5 Hazard Analysis Process

This section describes the process through which the planning team identified, screened, and selected significant hazards for profiling during the 2018 SHMP update process.

Section 6 Natural Hazards

Each hazard profile describes its characteristics or nature, previous occurrences (history), location, extent, impact, and future event recurrence probability. In addition, historical impact and hazard location figures are included where available.

Section 7 Other Hazards

This section describes other hazards no longer addressed within the SHMP

Section 8 Risk Analysis and Vulnerability Assessment

This section identifies Alaska's potentially vulnerable assets—critical facilities, and infrastructure as well as its people, residential and non-residential buildings (where available). The hazard profiles will seek to include the full range of hazardous situations that Alaskan's could face and their potential damages, social impacts, and economic losses.

Section 9 Mitigation Strategy

This section defines the State's mitigation strategy; a blueprint for reducing potential disaster event related losses identified in the vulnerability analysis. This section lists the State's governmental authorities, policies, programs, and resources.

The planning team developed a list of mitigation goals and potential actions to address the risks facing Alaska. Mitigation actions include preventive actions, property protection techniques, natural resource protection strategies, structural projects, emergency services, and public information and awareness activities. Mitigation strategies were developed to address community level National Flood Insurance Program (NFIP) activities focused to reduce flood damage to flood-prone structures while encouraging jurisdictional NFIP program participation.

Section 10 Enhanced SHMP Commitment Requirements

This section provides an overview of how easily the State could convert this Standard SHMP into an Enhanced SHMP.

Section 11 References

All project reference materials and resources were relocated to Appendix 13.26.

Section 12 Attachments

Section 13 Appendices

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2. ALASKA'S BACKGROUND INFORMATION

The State of Alaska's constitution establishes a policy of maximum self-government for its citizens. Its 16 existing boroughs are not the equivalent of county governments in the emergency management context. Emergency services in Alaska are provided by independent regional service areas throughout the state. Four of the boroughs and municipalities have government-run emergency management systems similar to county-style agencies. The remaining 12 boroughs have area-wide powers focusing on education, land-use planning, and tax assessment/collection. The boroughs cover approximately 38 percent of the land mass and encompass approximately 89 percent of the population. The remaining estimated 11 percent of the population resides in a vast, sparsely inhabited rural area called the Unorganized Borough. The state's Unorganized Borough is not politically subdivided and is managed by the Alaska Legislature in accordance with the Alaska State Constitution, Article 10, Subparagraph 6.

2.1. ALASKA'S REGIONS

The Alaska Department of Community, Commerce and Development's Division of Community and Region Affairs (DCRA) provides the Alaska Regions map depicting how Alaska is divided into eight distinct regions based upon variations in climate, terrain, and economics (Figure 2-1).

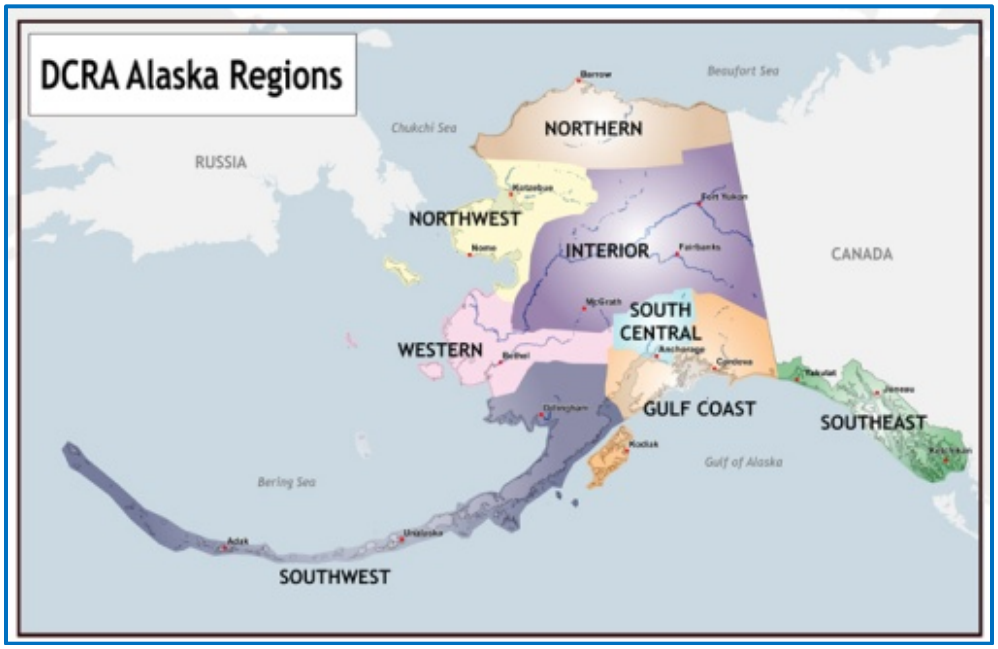

Figure 2-1 Alaska Regions Map
Source: DCRA

Figure 2-1 depicts Alaska's strategic location to Russia and the Far East. This location is vital to protecting the nation, while providing a central location for worldwide air transportation and shipping routes.

Alaska is further divided into boroughs and Regional Educational Attendance Areas (REAA); school attendance areas located in Alaska's Unorganized Borough. The borough and REAA grouping enables the state to more closely identify government responsibilities and define locational disaster impacts when requesting federal disaster declarations (Figure 2-2).

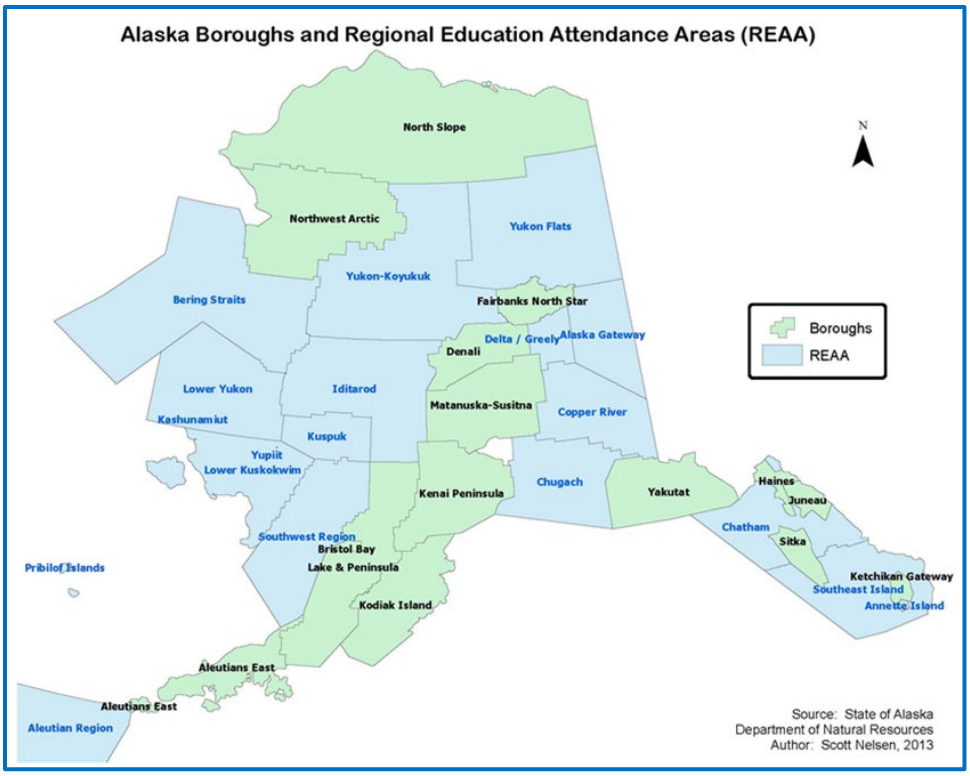

Figure 2-2 Alaska Boroughs and REAA Map
This map excludes, Anchorage, Skagway, Wrangell, and Petersburg. Source: DNR 2013

2.2. General Facts

Population: Alaska's 2017 population estimate is 739,795 with a median age estimated as 33.6 years old. This is roughly two-tenths of one percent (0.2 percent) of the total United States (U.S.) population.

Land Area: With 656,425 square miles, Alaska is the largest state in the U.S. and is approximately one-fifth the size of the lower, contiguous 48 states. There are roughly 1.3 people per square mile in Alaska compared to the national average of 91 people per square mile.

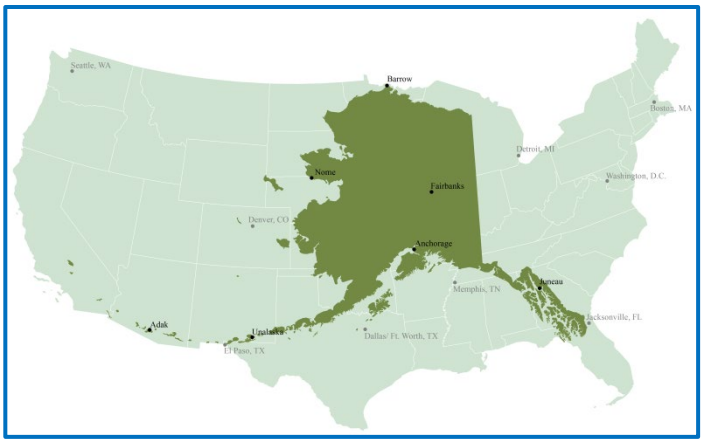

Figure 2-3 Alaska's Geographic Extent Compared to Contiguous 48 States *Source: AECOM*

Highest Point: At 20,320 feet, Denali is the tallest mountain in North America. Alaska has 39 mountain ranges containing 17 of the 20 highest peaks in the U.S.

Geographic Center: Alaska's geographic center is N 63.83, 152.00 W and is ~60 miles NW of Mount Denali.

Largest natural freshwater lake: At ~1,012 square miles, Lake Iliamna is the largest freshwater lake in Alaska. Alaska has 94 lakes with surface areas greater than 10 square miles among Alaska's more than 3 million lakes.

Longest river: The Yukon River is 2,298 miles long and 1,875 miles of it flows through Alaska. There are more than 3,000 rivers in the state. The Yukon River ranks as the third longest in the U.S., behind the Mississippi and Missouri rivers.

Largest island: At 3,588 square miles, Kodiak Island in the Gulf of Alaska is the largest in the State. It is larger than Rhode Island and Delaware. There are 1,800 named islands in the state, 1,000 of which are located in Southeast Alaska.

Largest glacier: According to the Bering Glacier Portal the Bering Glacier is the largest (area of 2,008 square miles) and longest (~118 miles) glacier in North America.

Largest city in population: Anchorage, population 294,356.

Largest city in area: The City and Borough of Sitka is the largest city in the state with an area of approximately 4,811.4 square miles (40 percent of this area is water).

Geographic Extent: Alaska is not just large; it is also widespread, with the Southeast panhandle and Aleutian Islands extending its geographic scope (Figure 2-4). From north to south, it measures 1,420 miles, about the distance between Denver, Colorado and Mexico City, Mexico; from east to west Alaska measures nearly 2,400 miles, about the distance from Savannah, Georgia to Santa Barbara, California.

Rural Myth: Contrary to widely held perceptions, in 2017 Alaska's three largest cities with over 30,000 people comprise about 49 percent of the state's population.

Figure 2-4 Alaska vs. Continuous "Lower" 48-States *Source: AECOM*

Land Ownership: Including federal and state land ownership, nearly 90 percent of the land in Alaska is publicly owned.

Education: The 2013 Department of Education and Early Development (DEED) lists 53 school district locations that provide public educational services in the state. There are 18 borough, 19 Regional Educational Attendance Areas (REAAs), and 16 city districts established by the Alaska Legislature in cooperation with regional corporations established under the Alaska Native Claims Settlement Act (ANSCA). (https://education.alaska.gov/esea/titlei-c/docs/doe2013map.pdf)

Cities and Boroughs generally participate singly or jointly in developing local or multi-jurisdictional plans. REAAs and unorganized communities within the Unorganized Borough are included within the State Hazard Mitigation Plan. The State is the governmental jurisdiction for unincorporated communities in the Unorganized Borough; as such the SHMP is their governing plan. As substantiated by FEMA's 2008 Unorganized Borough Waiver, REAAs and unorganized

jurisdictions within the Unorganized Borough need only identify hazard threats, their infrastructure vulnerabilities, and location specific mitigation actions.

Figure 2-5 displays Alaska's Land Management and Ownership map.

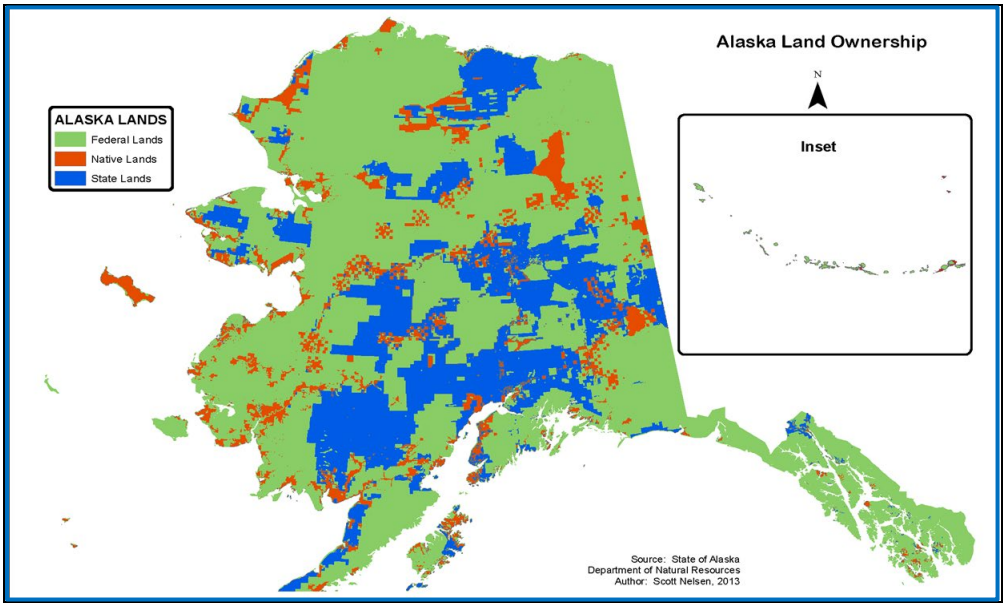

Figure 2-5 Legacy 2013 HMP AK Land Management and Ownership Map
Source: DNR 2012

Table 2-1 Figure 2-5 Map Key Defined

Federal Lands	**237.8 million acres**
	Five different agencies manage federal lands in Alaska: the Bureau of Land Management (82.5 million acres), U. S. Fish and Wildlife Service (78.8 million acres), the National Park Service (52.4 million acres), U. S. Forest Service (22.3 million acres), and the Department of Defense (1.7 million acres).
Alaska Native Lands	**44 million acres**
	On December 18, 1971, P. L. 92-203, the Alaska Native Claims Settlement Act (ANCSA) was signed into law. The purpose of ANCSA was to legislate the terms by which Alaska Natives could acquire title to their lands. This claim had been unresolved for more than 100 years since the United States purchased Alaska from Russia in 1867. Native lands are private lands. ANCSA mandated the creation of regional and village Native corporations to manage 44 million acres and payment of 1 billion dollars. 13 regional corporations were created for the distribution of ANSCA land and money; 12 of those shared in selection of 16 million acres. The 13th corporation, based in Seattle, received a cash settlement only. 224 village corporations of 25 or more residents shared 26 million acres. The remaining acres, which include historical sites and existing Native-owned lands, went into a land pool to provide land to small villages of less than 25 people.
State of Alaska Lands	**105 million acres**
	Under the terms of the Alaska Statehood Act of 1959, the federal government granted the new state 28% ownership of its total area. Approximately 103,350,000 acres were to be elected under three types of grants: 1) Community – 400,000 acres 2) National Forest Community – 400,000 acres 3) General – 102, 550,000 acres Additional territorial grants for schools, university and mental health trust lands totaling 1.2 million acres were confirmed with statehood.

Table 2-2 lists US Census, Fact Finder population and total land area.

Table 2-2 2017 AK Population Statistics US Census Fact Finder

Area	Population	Area (mi2)
Alaska	**737,795**	**663,268**
Anchorage/Mat-Su Economic Region		
Anchorage, Municipality of	297,483	1,961
Matanuska-Susitna Borough	106,532	25,258
Gulf Coast Economic Region		
Kenai Peninsula Borough	58,617	24,752
Kodiak Island Borough	13,488	12,022
Valdez-Cordova Census Area	9,278	40,340
Interior Economic Region		
Denali Borough	2,074	12,777
Fairbanks North Star Borough	99,703	7,444
Southeast Fairbanks Census Area	6,888	25,059
Yukon-Koyukuk Census Area	5,365	147,805
Northern Economic Region		
Nome Census Area	9,921	28,278
North Slope Borough	9,430	94,796
Northwest Arctic Borough	7,684	40,749
Southeast Economic Region		
Haines Borough	2,526	2,726
Hoonah-Angoon Census Area	2,145	10,914
Juneau, City and Borough of	32,094	3,254
Ketchikan Gateway Borough	13,856	6,654
Petersburg Borough	3,281	3,829
Prince of Wales - Hyder Census Area	6,643	7,683
Sitka, City and Borough of	8,689	2,870
Skagway, Municipality of	1,157	464
Wrangell, City and Borough of	2,521	3,462
Yakutat, City and Borough of	605	9,463
Southwest Economic Region		
Aleutians East Borough	3,370	15,010
Aleutians West Census Area	5,763	14,116
Bethel Census Area	18,076	45,504
Bristol Bay Borough	867	888
Dillingham Census Area	4,932	20,915
Kusilvak Census Area	8,202	19,673

Source: 2017 Census Estimates

Figure 2-6 displays the Alaska Department of Labor's (DOL) statistical economic events that directly influenced Alaska's population growth from 1946 through 2017.

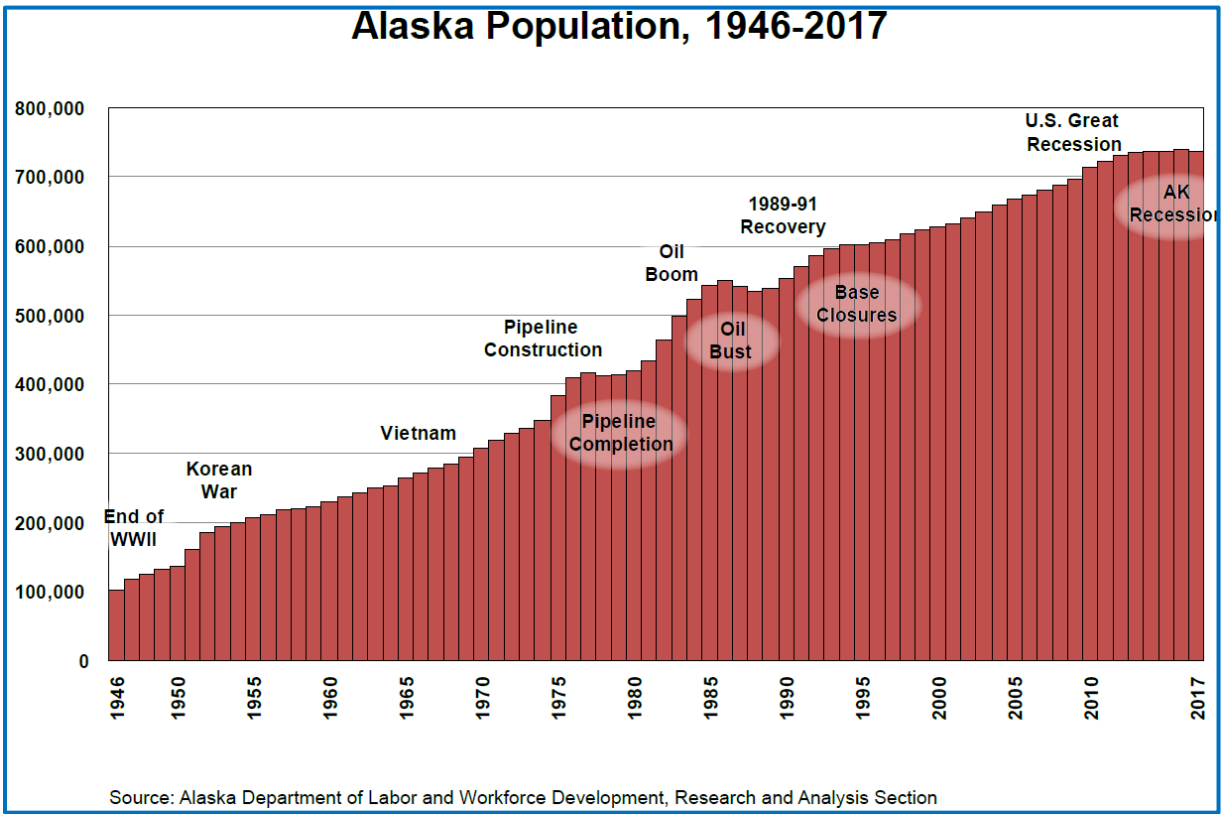

Figure 2-6 DOL's Economic Event Relationship to Population Growth
Source: DOL 2017

2.3. LAND TRANSPORTATION

Alaska DOT/PF has stated the following information has not substantially changed since 2013. Except where noted, additional statistics are from:

State of Alaska Department of Transportation and Public Facilities (DOT/PF) Fast Facts

DOT/PF Public Mileage

US Department of Transportation (USDOT), Federal Highway Administration (FHWA) highway statistics

FHWA certified centerline road miles

Road Mileage: Alaska has 13,546 paved road miles, 1,601 unpaved road miles and 3,500 Marine Highway water miles statewide. The U.S. has a total of 4,058,347 miles of paved and unpaved roads. Alaska is home to about 0.04 percent of all roads in the U.S.

Pavement: Approximately 48.5 percent of Alaska's roads are unpaved whereas only 33 percent of roads are unpaved in the rest of the U.S.

Road Density: Alaska has one mile of road for every 38 square miles of land area. The U.S. average is less than one to one.

Road Miles per Capita: Alaska has roughly 22 road miles per 1,000 people. The U.S. average is 13 road miles per 1,000 people.

Vehicles and Drivers: Alaska has 1.2 vehicles per person while the U. S. average is 0.8. Alaska has 524,158 licensed drivers.

Vehicle Miles Traveled (VMT): Alaskans often travel by air and ferry, consequently the VMT represents only 0.16 percent of the U.S. total.

Connectivity: Nearly 30 percent of Alaska's population is not connected by road or ferry to the continental road network.

Note: *Mileage does not include ramps, wyes, or proposed roads*

2.4. RAIL TRANSPORTATION

The Federal Railroad Administration provides the following information for the Alaska Railroad (ARR).

The U.S. built, owned and operated the Alaska Railroad from 1914 until 1985. The railroad was established by Congress on March 12, 1914 to facilitate economic development and access to mineral deposits in the territory of Alaska. Construction began shortly thereafter and was completed in 1923 when President Harding drove the final spike near Nenana. The railroad was under the Department of the Interior's jurisdiction until the Department of Transportation was created; at which time the railroad became part of the Federal Railroad Administration (FRA).

On January 5, 1985, pursuant to authority delegated by the Alaska Railroad Transfer Act of 1982, (45 U.S.C. 1201 et seq.) (ARTA), the State of Alaska purchased the federal government's interest in the Alaska Railroad from FRA and created the Alaska Railroad Corporation (ARRC), a public corporation of the state of Alaska, to own and operate the Alaska Railroad.

The ARRC has approximately 656 miles of track, four rail yards (Seward, Anchorage, Whittier, and Fairbanks), and three port facilities (Seward, Whittier, and Seattle, Washington). ARR is North America's northernmost railroad.

ARRC provides freight and passenger services from the ice-free southcentral Alaska ports of Whittier and Seward, and between Anchorage and Fairbanks, including key locations such as Denali National Park and military installations. Vessel and freight rail barge connections are provided from Seattle, Washington, and Prince Rupert, British Columbia.

The ARRC benefits from the State's HMGP, which provides essential funding for critical infrastructure repairs. ARRC also participates in the State's strong PDM program, striving to strengthen their statewide infrastructure damage prevention program.

2.5. AIR TRANSPORTATION

The following information is from:

Statewide Library Electronic Doorway (SLED)

DOT/PF Ted Stevens Anchorage International Airport Statistics

FAA 2012 Passenger Boarding and All-Cargo Data

Pilots: It is estimated Alaska has about six times as many pilots per capita and 16 times as many aircraft per capita as the rest of the U.S.

Commuter Air Travel: General aviation hours flown in Alaska annually are about 995,000, which is 3 percent of the U.S. total general aviation hours flown. Alaska averages 105 hours flown per pilot, while the U.S. as a whole averages 43 hours per pilot. Alaska's population

comprises only 0.2 percent of the U.S. population. yet Alaskans utilize 13 percent of all commuter airline and air taxi trips in the U.S, this means that Alaskans use commuter airlines 65 times more often than the average U.S. citizen.

Seaplane Bases: Alaska not only has the largest seaplane base in the world, Lake Hood, it also has 102 seaplane bases, far more than any other state. This is 25 percent of the U.S. total. Minnesota ranks second with 66.

Air Freight: Alaska's Ted Stevens International Airport (ANC), located in Anchorage, is the number two airport in the U.S. for total air freight by weight for 2012 (second to Memphis International Airport in Tennessee). ANC ranks fourth in the world for tonnage of cargo serviced.

Airports: Alaska has about 300 airports.

2.6. WATERBORNE TRANSPORTATION

Information from:

Alaska Marine Highway System

National Oceanic and Atmospheric Association (NOAA) Fisheries Service

State of Alaska Department of Commerce website

Ferries: Alaska's ferry system is unique among the 50 states, operating eight, 24 hours per day long-haul vessels that include restaurants, lodging, and lounges. The total route structure covers more than 3,500 miles and includes ocean passages of the stormy Gulf of Alaska.

Ports: The Alaska Marine Highway serves 33 ports of call.

Coastline: Alaska has 6,640 miles of coastline and, including islands, has 33,904 miles of shoreline. Alaska has more than 50 percent of the entire coastline in the U.S.

Fishing: Commercial fishermen harvested over 2 million metric tons of fish and shellfish in 2012, according to the National Marine Fisheries Service Alaska Region Bering Sea Aleutian Islands Catch Report, making Alaska the country's top state for seafood.

2.7. SPACE TRANSPORTATION

The Kodiak Launch Complex is the nation's only high latitude full service spaceport, developed by the Alaska Aerospace Corporation. On March 2, 2012, Lockheed Martin Corporation announced it had chosen Alaska's Kodiak Launch Complex (KLC) as its dedicated West Coast launch facility for Athena rocket launches. The company's decision will enable the Alaska Aerospace Corporation to move ahead with plans to expand its space launch capabilities. Lockheed Martin has been working with the State of Alaska and Alaska Aerospace Corporation on expansion plans for the new medium-lift launch pad to support potential Athena III launches.

2.8. UNIQUE WINTER TRANSPORTATION

Trails: Winter dog sled and snowmachine trails are a historically important transportation system utilizing long winter conditions to provide a solid surface where wet ground and water surfaces exist in summer. Various agencies and groups mark many of these trails for public use. These trails form an important element of the rural transportation system in areas lacking roads and highways.

Ice Roads: A few areas of Alaska utilize ice roads to traverse rivers and soft ground. The ice roads are an acceptable alternative to the damage caused by permanent roads in sensitive landscapes. These roads are also commonly used in other high-latitude countries such as Canada and Russia.

2.9. COST OF LIVING

The following information is from: "The Cost of Living in Alaska" by Neal Fried, from Alaska Economic Trends (AET), July 2017, developed by the State of Alaska Department of Labor and Workforce Development, Office of Economic Development, Research and Analysis.

> *"The survey reports that the costs of living in Anchorage, Juneau, Fairbanks, and Kodiak remain well above the national average. (See Exhibit 8.) Alaska's index values haven't changed much in the past 30 years. Before then, the index included only Anchorage. In the 1960s, Anchorage's index was typically in the 160s and as high as 174.7, meaning Anchorage costs were 74.7 percent higher than the average U.S. city.*
>
> *Alaska's cities aren't the highest in the country, though, and a growing number are more expensive to live in than the four in Alaska." Source: COL 2017*

Council for Community and Economic Research (C2ER) provides the Cost of Living Index (COLI) that compares living costs for approximately 300 urban areas in the U.S. The COLI focuses on households with incomes in the top 20 percent for the area. It is often used by companies to equalize employee salaries in different cities. Of the seven detailed categories studied, the four Alaska cities all had higher than average costs with the exception of Anchorage utility costs.

Table 2-3 2017 Cost of Living Index, Select US Cities

Category's Weight in Total Index	100.00 Percent (%)	13.61%	27.59%	10.06%	9.59%	4.00%	35.15%
	Total	Groceries	Housing	Utility	Transport	Medical	Misc.
State of Alaska							
Anchorage, AK	127.6	130.6	143.9	104.6	113.2	143.7	122.4
Fairbanks, AK	134.3	127.1	123.9	222.7	120.8	150.9	121.7
Juneau, AK	132.1	140.7	145.4	121.7	122.1	153.9	121.5
Kodiak, AK	131.8	149.4	142.6	125.7	128.7	140.7	118.2
US West Region							
Portland, OR	127.3	116	175.9	80.1	100.9	109.3	116.2
Honolulu, Hi	187.7	165.7	299.3	193.3	133.3	119.3	129.6
San Francisco, CA	188.5	121.9	351.8	114.4	130.3	123.7	130.7
Los Angeles, CA	146.3	112.3	238.9	111.5	124.9	110	106.7
Las Vegas, NV	100.4	101.7	108.8	86.4	105.9	102.7	95.6
Reno, NV	102.8	95.3	105	85.2	110	108	106.5
Seattle, WA	145.1	128.5	181.7	120.7	128.4	125.7	136.5
Spokane, WA	95.7	94.3	91.1	76.7	108.5	115.3	99.5
Tacoma, WA	106.2	111.1	94	111.9	95.2	118.3	113.8
Boise, ID	92	91	86.6	84.8	106.3	102.7	93.6
Bozeman, MT	98	101.6	107.8	79.4	92.9	99.2	95.5
Laramie, WY	99.9	103.5	107.4	95.3	90.8	104.3	95.8
US Southwest / Mountain Region							
Salt Lake, UT	95.8	105.4	92.1	76.2	101.4	95.9	99.1
Phoenix, AZ	94.7	97.5	97.8	98.1	90.7	98.9	90.9

Table 2-3 2017 Cost of Living Index, Select US Cities

Category's Weight in Total Index	100.00 Percent (%)	13.61%	27.59%	10.06%	9.59%	4.00%	35.15%
	Total	Groceries	Housing	Utility	Transport	Medical	Misc.
Denver, CO	111.8	99.7	133	95.1	108.4	104.7	106.3
Colorado Springs, CO	95.3	99.3	102	76.4	94	101.3	93.6
Dallas, TX	101.2	90.6	102.4	102.3	101.2	103.4	103.7
Houston, TX	97	84.8	104.8	99.3	92.9	90.6	96.7
McAllen, TX	76.1	83.2	63.6	90.6	84.6	75	76.8
US Midwest Region							
Cleveland, OH	101.4	110.8	89.7	98.7	103.3	102	107.1
Chicago, IL	123	109.3	152.5	89.1	129.3	102.6	115.5
Minneapolis, MN	104.8	109.4	106.2	92.2	108.6	104.6	104.5
US Southeast Region							
Fort Lauderdale, FL	119	108.5	157.4	99.9	110.4	98.7	103
Miami, FL	114.3	108.1	138.4	99.9	119.3	99.7	102.3
Birmingham, AL	90.2	96.1	82.5	102.4	91.7	85.3	90.7
Atlanta, GA	97.7	104.7	91.1	89.2	101.4	107.8	100.4
US Atlantic / New England Region							
New York, NY	230.8	129	479.9	119.2	130.6	114.6	147.1
Boston, MA	148.6	107.1	204.4	146.6	111.5	134.1	133.1
Philadelphia, PA	116.2	115.3	129	121.9	112.2	105.4	107.3
U.S. Average	100	100	100	100	100	100	100

Note: *Index numbers represent a comparison to the average for all cities for which C2ER volunteers collected data.*

Source: C2ER

Another way to assess the cost of living is to look at community cost differences relative to Anchorage (Table 2-4). This information contains weekly costs for four dietary staples.

Table 2-4 2017 Cost of Living Relative to Anchorage

Community	Eggs (1dz)	Milk (1 gal)	Bread	Gas (1gal)
Anchorage	$2.00	$3.69	$2.50	$2.55
Juneau	$1.99	$3.89	$2.39	$2.98
Fairbanks	$1.99	$3.89	$3.59	$2.91
Kenai	$1.97	$3.88	$1.68	$2.84
Kodiak	$2.19	$4.19	$2.79	$3.14
Valdez	$2.29	$4.09	$2.39	$3.32
Glennallen	$5.50	$5.95	$3.95	$3.27
Nome	$2.79	$6.49	$2.59	$4.67
Bethel	$4.39	$8.29	$2.69	$4.99
Barrow	$3.79	$10.29	$4.99	$6.50
Average	$2.89	$5.47	$2.96	$3.72

Source: COLI 2017

Table 2-5 provides AET Article 3, "The Cost of Living" in Alaska, by Neal Fried, dated July 2017 provided rural Alaska fuel per gallon costs and transportation delivery modes data.

These data demonstrate how rural-remote Alaska communities living costs differ widely from the lower contiguous U.S. Shipping costs raise Alaska's utility prices, goods, and services. Fuel

prices are no exception, even though Alaska is an oil-producing state. Communities without road access pay a much higher price for fuel than other Alaskan communities.

Table 2-5 Rural Alaska Fuel Per Gallon

Community1	Heating Fuel #1, Residential	Gasoline	Bulk Fuel Delivery Method(s)
Angoon	$3.50	$3.49	Barge
Arctic Village	$12.00	$10.00	Air
Atka	$6.85	$6.65	Barge / Air
Utqiagvik (was Barrow)	Natural Gas	$5.90	Barge
Bethel	$4.78	$5.02	Barge
Chignik	$3.31	$4.00	Barge
Circle	$2.46	$2.96	Truck
Deering	$4.38	$4.64	Barge
Dillingham	$2.56	$3.93	Barge
Eagle	$3.50	$3.95	Refinery / Truck
Fairbanks	$2.50	$2.89	Truck
Galena	$5.95	$6.40	Barge
Gambell	$4.65	$5.00	Barge / Truck
Golivin	$4.00	$4.00	Barge
Holy Cross	$5.55	$6.00	Barge
Homer	$2.58	$2.92	Air
Hooper Bay	$5.20	$5.35	Barge
Huslia	$5.70	$5.50	Barge
Juneau	$2.88	$2.21	Barge
King Cove	$3.07	$3.81	Barge
Kokhanok	$6.10	$6.02	Barge
Kotzebue	$5.34	$5.45	Truck
Nenana	$2.94	$3.09	Air
Noorvik	$5.64	$6.06	Barge
Nuiqsut	Natural Gas	$5.00	Barge
Nulato	$4.35	$5.00	Barge
Pelican	$3.21	$3.43	Barge
Pilot Station	$7.32	$6.81	Barge
Port Lions	$3.45	$3.75	Refinery /Barge
Ruby	$3.45	$4.60	Barge
Sand Point	$4.32	$3.80	Barge
Unalaska	$3.90	$3.64	Barge
Wales	$7.21	$8.24	Barge
Wrangell	$3.00	$3.47	Barge

Notes:

I. This is a partial list of the 100 communities surveyed.
II. The North Slope Borough subsidizes heating fuel.
III. Utqiagvik (formerly Barrow) uses natural gas as a heat source.

Alaska has very geographically separated communities. This does not make fuel acquisition either easy or inexpensive. Therefore, Alaska has very elaborate fuel transportation, delivery, and pricing challenges. Alaska refineries receive and ship to and from the following locations:

Table 2-6 Rural Alaska Fuel Per Gallon

Community[1]	Fuel Type	Received[3]	Shipped[3]
Anchorage	Gasoline[2]	165,901,639	134,426,230
	Distillate[4]	2,816,901	45,633,803
Valdez	Gasoline[2]	327,869	82,950,820
	Distillate[4]	--	14,366,197
Ketchikan	Gasoline[2]	18,032,787	12,459,016
	Distillate[4]	8,450,704	15,492,958
Nikiski	Gasoline[2]	--	213,442,623
	Distillate[4]	--	289,295,775
Dutch Harbor	Gasoline[2]	21,967,213	5,245,902
	Distillate[4]	44,788,732	9,014,085
Juneau	Gasoline[2]	18,360,656	655,738
	Distillate[4]	11,549,296	845,070

Notes:
(1) Corps of Engineer data is reported in short tons. Gallon conversions assume gasoline weight of 6.1 pounds per gallon and distillate weight of 7.1 pounds per gallon.
(2) Assumes all fuel is shipped out of Nikiski and none is imported.
(3) ISER calculations to summarize in and outbound shipments.
(4) Distillates are primarily diesel #1 and #2.
Sources: U.S. Army Corps of Engineers, Waterborne Commerce Statistics, Pacific Coast, Alaska and Hawaii; ISER calculations. Bethel is also a major western Alaska fuel depot, but it is not shown here because shipments in and out are not segregated in Corps of Engineer data.

The Institute of Social and Economic Research (ISER), University of Alaska Anchorage prepared the "Components of Delivered Fuel Prices in Alaska" Final Report, June 2008 prepared for the Alaska Energy Authority. The report analyzed Alaska's fuel deliver requirements as they affected fuel pricing. The report states:

> ***IV. Fuel Product Transportation***
> *Fuel products in Alaska are transported in various ways, both from refineries to fuel terminals and from terminals to communities. Fuel is usually stored in communities before distribution to residents and businesses. This chapter describes fuel transportation (truck, barge, airplane), as well as storage and distribution methods, including how characteristics of each method influence fuel prices.*
>
> ***Refinery and Terminals to Communities***
> ***Truck***
> *Of the most common methods of transporting fuel in Alaska, trucking is the least expensive and complex. All Alaska communities on the road system have fuel delivered by truck. Gasoline is generally delivered directly to gas stations. Heating fuel is delivered from the refinery to regional fuel hubs for distribution or by distributors directly to homes from refineries…*
>
> ***Railroad Transportation***
> *Transporting fuel by rail to Alaska communities along the rail belt is affordable, efficient, and green (minimizing impacts to the environment by reducing emissions from vehicles on the road system). The railroad transports approximately 130 million gallons of fuel per year.*

Barge
Barging fuel to Alaska communities is an expensive, complex, and risky endeavor. Fuel transporters face a different set of delivery challenges and costs for each community. There are few fuel transport companies with the experience and capital needed to successfully deliver fuel to remote areas in Alaska. In addition to overcoming the physical challenges of barging fuel to Alaska communities, fuel transporters must correctly price their fuel transportation charges to fully recover the cost of delivery…

Barge Transportation Regions
For this analysis we divided Alaska into five regions: ice-free southern coast, Kuskokwim River, Yukon River, Northwest and Kobuk River, and Arctic. All these regions have some common factors that influence the cost of fuel delivery…

Ice-Free Southern Coast
This region extends from Southeast Alaska, along the Gulf of Alaska and out the Aleutian Island chain. The defining characteristic of this region is that it is ice-free year round and the communities are coastal. These characteristics allow year-round delivery of fuel. Crowley, Delta Western, and Petro Marine Services deliver fuel in this region…

Kuskokwim River
The Kuskokwim River Region includes all the communities on the Kuskokwim River and its tributaries, as well as coastal communities near the mouth of the river. Bethel serves as the regional hub, and almost all fuel delivered to the region is at least temporarily stored in Bethel. Fuel from Bethel storage tanks must be loaded into smaller barges to navigate the Kuskokwim River upstream of Bethel. Approximately four million gallons of fuel are shipped out of Bethel each year…

Yukon River
Nenana serves as the fuel hub for the Yukon River. Fuel arrives at the Nenana hub from refineries in North Pole, or is carried from Anchorage on the Alaska Railroad or by truck. From Nenana, fuel is barged both upstream as far as Fort Yukon and downstream to the mouth of the Yukon River. Crowley is the dominant fuel transporter in the region. Recently, Ruby Marine started competing on a small scale with Crowley…

Northwest and Kobuk River
This region is defined as the area served by fuel hubs in Kotzebue and Nome and consists of Norton Sound, Kotzebue Sound and the Kobuk River. Nome's port can accommodate large barges and does not require lighterage, while Kotzebue's port is shallow and does require fuel lightering…

Arctic
Fuel delivery in the Arctic region is subsidized by the North Slope Borough and is not investigated in this report…

Air delivery
Flying fuel is the most expensive method for transporting fuel to rural Alaska villages. Communities will generally only fly in fuel if they do not have access to navigable water or in emergencies when the river is frozen and the barges are unable to deliver. This can happen if a community did not have the cash or credit available to purchase a full winter season of fuel before freeze-up, or when a community sells all its fuel before spring break-up when the barges are able to return…

Table 10 shows the delivery cost component of 2003 and 2006 State of Alaska fuel contracts—that is, contracts for fuel for state-owned facilities. We combined the two fuel contract years and

averaged costs for communities that received contracts in both years. For most communities with contracts in both years the delivery charge was similar. Source: ISER 2008

ISER prepared the True Cost of Electricity in Rural Alaska and True Cost of Bulk Fuel in Rural Alaska, October 26, 2016 in collaboration with Mark Foster & Associates. The document defines actual fuel costs throughout the state.

True Cost of Electricity in Rural Alaska
Introduction
In this analysis, we compile data from several sources to estimate the true cost of electricity in rural Alaska. The true cost includes expenses listed on the utilities' books plus costs paid by other entities in the form of explicit and implicit subsidies.

Our focus is on the nonfuel costs of power. Fuel costs are quite volatile and are tracked carefully by AEA on a monthly basis. The concept of "Fuel cost" typically includes the price paid at the point of delivery into a bulk storage tank. We do include here as contributed resources the estimated subsidies to the fuel delivery system for electricity due to provision of bulk fuel storage by, for example, the Denali Commission…

True Cost of Bulk Fuel in Rural Alaska
Methodology
To estimate the true cost of bulk fuel, we began with per gallon fuel prices obtained from the Department of Community and Regional Affairs (DCRA) Heating Fuel Survey (January 2016.) To those reported prices we added an estimate of the per gallon subsidy that results from bulk tank farm projects.

Bulk Fuel Program Cost Compilation and Cost Allocations
The data on bulk tank farm projects were extracted from the Denali Commission Project Database on December 15, 2015. This data included the total project cost as well as contributed capital from state and federal sources for bulk fuel tank farm project developments and construction across Alaska. We totaled the bulk fuel tank farm project costs that were contributed from other than ratepayers, also known as "contributed capital" for individual communities. We allocated regional or statewide project development costs to communities based on storage capacity.

We reviewed a sample of a dozen bulk tank farm project business plans to estimate the tank farm capacity associated with electric fuel and the capacity associated with heating fuel. Roughly one-third of the bulk fuel tank capacity was attributed to electric utility diesel fuel and roughly two-thirds of the bulk tank farm capacity was attributed to local heating fuel.

To annualize the resulting capital project cost allocations to electric (1/3) and heating markets (2/3), we assumed a 30-year life and a discount rate of 4.5% (a conservative lower-bound estimate of the long-run real return on the Permanent Fund, based upon historical returns through FY15 and preliminary projections for FY16.)

The underlying calculations for these can be found in the "BulkFuel to Electric" and "BulkFuel to Heating tabs in the "Denali Commission Project Database 15 December 2015a" Excel workbook.

Results
The Department of Community and Regional Affairs (DCRA) Heating Fuel Survey (January 2016) included 98 villages with reported prices. Forty-three (43) of those communities received Denali Commission Subsidized Bulk Fuel Storage Projects. The total cost of heating fuel for the DCRA survey, with the addition of the DC bulk fuel storage subsidies, ranges from $2.32 per

gallon in Fairbanks to $13.99 per gallon in Arctic Village. The appendix at the end of this section presents the data by community…

Finally, we have computed regional average data for those 43 communities with bulk fuel tank storage projects, which is presented in Table 1. The average total cost of heating fuel ranged from $4.64/gallon in Southeast, including $0.72/gallon of fuel tank farm subsidy to $7.04/gallon in Interior including $1.26/gallon of fuel tank farm subsidy.

Table 1: Total Cost of Heating Fuel for Communities in DCRA Survey with Denali Commission Bulk Fuel Storage Subsidies

Row Labels	Average of Survey $/gallon	Average of $/gallon storage subsidy	Average of $/gallon total
Gulf Coast	$ 4.57	$ 1.26	$ 5.82
Interior	$ 6.18	$ 0.86	$ 7.04
Northwest	$ 5.10	$ 0.99	$ 6.09
Southeast	$ 3.92	$ 0.72	$ 4.64
Southwest	$ 5.13	$ 0.79	$ 5.92
Western	$ 5.90	$ 0.82	$ 6.72
Grand Total	**$ 5.30**	**$ 0.92**	**$ 6.22**

Appendix to True Cost of Bulk Fuel in Rural Alaska

Table 10: Fuel oil cost per gallon by community

Community		*Survey $/gallon*	*$/gallon storage subsidy*	*$/gallon total*
Arctic Village	*Interior*	*$12.00*	*$1.99*	*$13.99*
Hughes	*Interior*	*$9.00*	*$0.22*	*$9.22*
Alatna	*Interior*	*$7.00*	*$2.03*	*$9.03*
Pilot Station	*Western*	*$7.32*	*$1.51*	*$8.83*
Nunapitchuk	*Western*	*$6.49*	*$1.74*	*$8.23*
Atka	*Southwest*	*$6.85*	*$1.33*	*$8.18*
Brevig Mission	*Northwest*	*$5.80*	*$2.12*	*$7.92*
Kokhanok	*Southwest*	*$7.00*	*$0.84*	*$7.84*
Chenega Bay	*Gulf Coast*	*$6.05*	*$1.74*	*$7.79*
Toksook Bay	*Western*	*$6.00*	*$1.60*	*$7.60*
McGrath	*Interior*	*$7.45*	*$0.00*	*$7.45*
New Stuyahok	*Southwest*	*$6.52*	*$0.91*	*$7.43*
Saint George	*Southwest*	*$7.36*	*$0.00*	*$7.36*
Wales	*Northwest*	*$7.21*	*$0.00*	*$7.21*
Nelson Lagoon	*Southwest*	*$6.18*	*$0.90*	*$7.08*
Stebbins	*Northwest*	*$5.69*	*$1.06*	*$6.75*
Atmautluak	*Western*	*$6.73*	*$0.00*	*$6.73*
Koyuk	*Northwest*	*$4.80*	*$1.88*	*$6.68*
Larsen Bay	*Gulf Coast*	*$5.26*	*$1.31*	*$6.57*
Noorvik	*Northwest*	*$6.56*	*$0.00*	*$6.56*
Scammon Bay	*Western*	*$6.33*	*$0.19*	*$6.52*
Huslia	*Interior*	*$6.50*	*$0.00*	*$6.50*
Hooper Bay	*Western*	*$6.45*	*$0.00*	*$6.45*
Saint Michael	*Northwest*	*$5.88*	*$0.48*	*$6.36*
Upper Kalskag	*Western*	*$6.25*	*$0.00*	*$6.25*
Akiak	*Western*	*$6.24*	*$0.00*	*$6.24*
Galena	*Interior*	*$6.21*	*$0.00*	*$6.21*
Kiana	*Northwest*	*$5.67*	*$0.42*	*$6.08*
Savoonga	*Northwest*	*$5.25*	*$0.82*	*$6.07*
Anvik	*Interior*	*$6.00*	*$0.00*	*$6.00*
Gambell	*Northwest*	*$5.25*	*$0.60*	*$5.85*

Table 10: Fuel oil cost per gallon by community

Community		Survey $/gallon	$/gallon storage subsidy	$/gallon total
Kotlik	Western	$5.30	$0.50	$5.80
Tanana	Interior	$5.25	$0.47	$5.72
Old Harbor	Gulf Coast	$4.07	$1.63	$5.70
Sleetmute	Western	$5.70	$0.00	$5.70
Deering	Northwest	$4.89	$0.78	$5.68
Bethel	Western	$5.67	$0.00	$5.67
Shishmaref	Northwest	$4.08	$1.51	$5.59
Holy Cross	Interior	$5.55	$0.00	$5.55
Golovin	Northwest	$5.00	$0.52	$5.52
Grayling	Interior	$5.50	$0.00	$5.50
Kaltag	Interior	$4.50	$1.00	$5.50
Teller	Northwest	$5.46	$0.00	$5.46
White Mountain	Northwest	$4.35	$1.10	$5.45
Marshall	Western	$5.41	$0.00	$5.41
Nondalton	Southwest	$5.24	$0.00	$5.24
Pelican	Southeast	$3.43	$1.76	$5.20
Unalakleet	Northwest	$4.57	$0.62	$5.18
Emmonak	Western	$5.15	$0.00	$5.15
Tuntutuliak	Western	$4.88	$0.23	$5.11
Quinhagak	Western	$5.00	$0.00	$5.00
Mountain Village	Western	$4.98	$0.01	$4.99
Ruby	Interior	$3.70	$1.19	$4.89
Point Baker	Southeast	$4.65	$0.17	$4.82
Russian Mission	Western	$4.80	$0.00	$4.80
Seldovia	Gulf Coast	$4.00	$0.79	$4.79
Kwigillingok	Western	$4.65	$0.00	$4.65
Togiak	Southwest	$4.62	$0.00	$4.62
Sand Point	Southwest	$4.48	$0.00	$4.48
Nulato	Interior	$4.45	$0.02	$4.47
Port Lions	Gulf Coast	$3.45	$0.81	$4.26
Eagle	Interior	$4.25	$0.00	$4.25
Goodnews Bay	Western	$4.12	$0.00	$4.12
Kake	Southeast	$3.68	$0.22	$3.90
Wrangell	Southeast	$3.85	$0.00	$3.85
King Cove	Southwest	$3.37	$0.34	$3.71
Chignik	Southwest	$3.25	$0.45	$3.70
Gustavus	Southeast	$3.58	$0.00	$3.58
Dillingham	Southwest	$3.57	$0.00	$3.57
Minto	Interior	$3.55	$0.01	$3.56
Angoon	Southeast	$3.55	$0.00	$3.55
Unalaska	Southwest	$3.54	$0.00	$3.54
Akutan	Southwest	$2.75	$0.76	$3.51
Kotzebue	Northwest	$3.16	$0.00	$3.16
Juneau	Southeast	$3.15	$0.00	$3.15
Thorne Bay	Southeast	$3.07	$0.00	$3.07
Petersburg	Southeast	$2.97	$0.00	$2.97
Craig	Southeast	$2.94	$0.00	$2.94
Ouzinkie	Gulf Coast	$2.94	$0.00	$2.94
Hoonah	Southeast	$2.85	$0.00	$2.85
Cordova	Gulf Coast	$2.79	$0.00	$2.79

Table 10: Fuel oil cost per gallon by community

Community		*Survey $/gallon*	*$/gallon storage subsidy*	*$/gallon total*
Kodiak	*Gulf Coast*	*$2.72*	*$0.00*	*$2.72*
Valdez	*Gulf Coast*	*$2.70*	*$0.00*	*$2.70*
Nenana	*Interior*	*$2.69*	*$0.00*	*$2.69*
Healy	*Interior*	*$2.65*	*$0.00*	*$2.65*
Anderson	*Interior*	*$2.59*	*$0.00*	*$2.59*
Kaktovik	*Northern*	*$2.50*	*$0.00*	*$2.50*
Chitina	*Gulf Coast*	*$2.45*	*$0.00*	*$2.45*
Circle	*Interior*	*$2.45*	*$0.00*	*$2.45*
Glennallen	*Gulf Coast*	*$2.45*	*$0.00*	*$2.45*
Homer	*Gulf Coast*	*$2.35*	*$0.00*	*$2.35*
Delta Junction	*Interior*	*$2.35*	*$0.00*	*$2.35*
Fairbanks	*Interior*	*$2.32*	*$0.00*	*$2.32*
Nuiqsut	*Northern*	*$2.05*	*$0.00*	*$2.05*
Point Hope	*Northern*	*$1.74*	*$0.00*	*$1.74*
Anaktuvuk Pass	*Northern*	*$1.55*	*$0.00*	*$1.55*
Wainwright	*Northern*	*$1.50*	*$0.00*	*$1.50*
Atqasuk	*Northern*	*$1.40*	*$0.00*	*$1.40*

Source: ISER 2016, https://pubs.iseralaska.org/media/b0e39f4e-90d5-4afb-a329-77be171913de/2016_10_26-TrueCostElectricityFuelRuralAK.pdf

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3. PLANNING PROCESS

This section provides an overview of the planning process; identifies the planning team members and key stakeholders; documents public outreach efforts; and summarizes the review and incorporation of existing plans, studies, and reports used to develop this SHMP. Planning teleconferences, meetings, and outreach support documents are provided in Appendix 13.8.

DMA 2000 requirements and State mitigation plan implementing processes include:

DMA 2000 Requirements
Standard State. Planning Process
S1. Does the plan describe the planning process used to develop the plan? [44 CFR §§201.4(b) and (c)(1)] S2. Does the plan describe how the state coordinated with other agencies and stakeholders? [44 CFR §§201.4(b) and (c)(1)]
Source: FEMA, March 2015.

3.1. OVERVIEW

The State of Alaska, Division of Homeland Security and Emergency Management (DHS&EM) provided funding and project oversight for AECOM to update the legacy 2013 SHMP as well as facilitate and guide planning team meetings and data gathering.

The planning process began on December 19, 2017 with AECOM staff reviewing the legacy 2013 SHMP to determine what information currently existed while subsequently developing a prioritized process to complete the project in the most time and resource efficient process.

The planning team determined that the 2018 SHMP update needed to be reorganized to make the plan more readable by simplifying and streamlining information access, to assess hazard analytics to determine more concise information needs, and to incorporate the most current hazard data with associated maps to better define hazard locations and statewide vulnerabilities.

Therefore, the following seven-steps were completed throughout the 12 month update process beginning November, 2018 and continuing through October, 2018.

1. Organize resources: Engage the SHMAC as the main component of the SHMP planning team along with various interested public and non-profit participants who could provide technical expertise and historical information needed during the update activity.
2. Evaluate and update the legacy 2013 SHMP: The planning team reviewed the plan to determine whether it was used as intended – did it fulfill statewide needs? The team examined how SHMP process decisions affected hazard impacts.
3. Participant agencies were encouraged to provide data as to how their respective agencies incorporated mitigation initiatives and actions into their existing planning mechanisms.
4. DHS&EM contracted with the Department of Natural Resources' (DNR) Division of Geological and Geophysical Surveys (DGGS) to update Alaska's disaster profiles and reassess Alaska's risk and vulnerabilities for those natural hazards under their purview.
5. The planning team reviewed the resulting hazards analysis, risk analysis, and vulnerability assessment, prior to and during developing the mitigation strategy, to assure it matched their respective agencies determinations.

6. The planning team reviewed current administrative, technical, legal and regulatory, and fiscal capabilities to determine whether existing provisions and requirements adequately addressed, strengthened or hindered mitigation implementation and plan component integration within existing planning activities and documents.
7. After reviewing the risks posed by each hazard, the planning team reviewed and developed new SHMP mitigation goals and action initiatives.

3.2. Planning Team and Interested Parties Participation

DHS&EM determined the need to engage the State Hazard Mitigation Advisory Committee (SHMAC) as the primary planning team for the 2018 SHMP update process.

AECOM extended an invitation to SHMAC members and entities (Appendix 13-6). The January 19, 2017 project kick-off teleconference described the planning process and announced the upcoming SHMP's update requirements. All SHMAC and SHMP planning team related announcements were emailed to federal and state, relevant academia and non-profits on nearly a bi-weekly basis as schedules permitted during the SHMP update process. The following agencies were invited to participate as planning team members and review the SHMP:

State:

- Alaska Volcano Observatory (AVO)
- Association of Village Council Presidents (AVCP)
- Denali Commission
- Alaska Department of Administration (DOA)
  - Division of Risk Management (RM)
- Department of Community, Commerce, and Economic Development (DCCED)
  - Division of Community Advocacy (DCRA)
    - Alaska Climate Change Impact Mitigation Program (ACCIMP)
    - Floodplain Management
- Department of Environmental Conservation (DEC)
  - Division of Spill Prevention and Response (DSPR)
  - Village Safe Water (VSW)
- Department of Health and Social Services (DHSS)
- Department of Labor and Workforce Development (DLWD)
- Department of Military and Veterans Affairs (DMVA)
  - State Defense Force (ADF)
  - Alaska National Guard (ANG)
  - Division of Homeland Security and Emergency Management (DHS&EM)
- Department of Natural Resources (DNR)
  - Division of Forestry (DOF)
  - Division of Geological and Geophysical Surveys (DGGS)
  - Division of Mining, Land, and Water (DMLW)

        - Dam Safety and Construction Unit
    - Department of Public Safety (DPS)
    - Department of Transportation and Public Facilities (DOT/PF)
        - Central Region
        - North Region
        - Southcoast Region
    - University of Alaska Anchorage (UAA)
    - University of Alaska Fairbanks (UAF)
        - Geophysical Institute (GI)
        - Alaska Earthquake Center (AEC)

Federal:

- U.S. Army Corps of Engineers (USACE)
- U.S. Bureau of Indian Affairs (BIA)
- U.S. Bureau of Land Management (BLM)
- U.S. Department of Agriculture (USDA)
    - Division of Rural Development (RD)
    - Natural Resources Conservation Service (NRCS)
- U.S. Environmental Protection Agency (EPA)
- U.S. Department of Housing and Urban Development (HUD)
- U.S. Department of Commerce (Commerce)
    - National Oceanic and Atmospheric Administration (NOAA)
        - National Oceanic Service (NOS)
        - National Weather Service (NWS)
            - Northern Tsunami West Coast (NTWC)
- U.S. Fish & Wildlife Service (USFWS)
- U.S. Geological Survey (USGS)
    - Alaska Volcano Observatory (AVO) *(joint program with UAF/GI & DGGS)*

Other:

- City and Borough of Juneau (CBJ)
- Kenai Peninsula Borough (KPB)
- Matanuska -Susitna Borough (MSB)
- Municipality of Anchorage (MOA)
- Alaska Native Tribal Health Consortium-Community Development (ANTHC)
- Alaska Municipal League, Joint Insurance Association (AML-JIA)
- Alaska Railroad Corporation (ARRC)
- Alaska Institute for Justice (AKIJ)
- Tanana Chiefs Conference (TCC)

3.3. LEGACY 2013 SHMP REVIEW AND ANALYSIS

Legacy Year HMP Lifecycle Planning Team Meeting Recommendations

44 CFR requires states to schedule SHMP planning team meetings and teleconferences to review, discuss, and determine mitigation implementation and other plan component integration into state agency policies, programs, and procedures, and to annotate accomplishments; track data relevance for future SHMP update inclusion; and document recommendations for future SHMP updates.

The Legacy 2013 SHMP document was revised as described below.

Section 1 Introduction

This section was revised to add an entire new section explaining State level authorities and regulatory planning requirements.

Section 2 The Alaska Experience

This section was revised to update and expand Alaska information, providing facts, transportation, and cost of living challenges.

Section 3 Planning Process

This section was updated to reflect 2018 public process, State Hazard Mitigation Advisory Committee (SHMAC) membership, plan update participation.

Section 4 Plan Adoption

2018 resolutions and dates were added to this section.

Section 5 Hazard Profile Analysis

DHS&EM contracted with DNR/DGGS to update Alaska-wide hazard profiles. DGGS provided a comprehensive update effort that formed the foundation for Section 5, Hazard Profiles and Section 6, Risk and Vulnerability Assessments.

The planning team reviewed hazards that DGGS was not tasked to update (e.g., flood, weather, wildland fire) and updated their profiles and changes that may have occurred since the legacy 2013 SHMP was implemented.

Furthermore, many hazard profiles were updated to combine closely associated hazard categories (e.g., new ground/failure profile combined avalanche, landslide, permafrost sink holes, and other components). The weather profile addresses climate change as it pertains to changing patterns and impacts. Other natural hazards also describe relevant climate change impacts as appropriate; these modifications meet Alaska's needs better.

Section 6 Vulnerability Analysis

This section was updated this section to analyze vulnerability with existing critical facility and infrastructure data.

Section 7 Mitigation Strategy

This section was revised to include reviewed 2013 mitigation goals and actions. Mitigation goals, actions, programs, and strategies were separated from each hazard category and defined within Section 7, Mitigation Strategy. All mitigation project and initiatives were combined in a

similar manner and their respective current status reviewed. A new Mitigation Action Plan was developed to facilitate future mitigation action and initiative responsibility and progress tracking.

Section 8 References

Revised to reflect 2018 update research efforts.

3.3.1. LEGACY PLAN NEEDS DETERMINATION

DHS&EM intermittently reviewed the legacy 2013 SHMP during its five-year life cycle editing each section to update pertinent information. Table 3-1 was developed to guide planning team efforts and categorized to identify SHMP components' data gaps that necessitated focused review. The team determined that potential development changes, construction, and infrastructure conditions, climate change impacts, and population increases or decreases have influenced hazard risks and/or facility vulnerabilities. These were addressed as needed throughout this SHMP update.

The 2018 SHMP update process included inviting new and existing stakeholders to review the legacy 2013 SHMP to determine what was accomplished versus what their respective agencies intended to accomplish. Pertinent section data were also identified to guide the 2018 development process.

Table 3-1 Legacy HMP Review and Update Needs Determination

2013 HMP Section	2013 SHMP Items Needing Updates	Status ** Key:* *F:Fulfilled* *NF: Not Fulfilled*	2013 SHMP Identified items for Deletion	Newly Identified Items to be Added for 2018 SHMP Compliance	New Action Commitments
Planning Process	• Planning process obligations successes • Planning team membership • Mitigation resource list • Continue public outreach initiatives • HMP initiative integration into other planning mechanisms • Plan Maintenance Activities	F: DHS&EM staff completed a SHMP reviews during 2016 – but did not routinely engage SHMAC with SHMP review activities NF: Participating agencies 2013 SHMP component integration into other planning mechanisms or initiatives was sporadic F: DHS&EM Continued SHMAC involvement to guide mitigation project selection and prioritization during the plan's five-year life cycle	• None	• Refine plan maintenance processes documentation	• DHS&EM will strive to engage SHMAC to conduct annual SHMP review activities • Strive to integrate HMP initiatives into other planning mechanisms

Table 3-1 Legacy HMP Review and Update Needs Determination

2013 HMP Section	2013 SHMP Items Needing Updates	Status ** Key:* *F:Fulfilled* *NF: Not Fulfilled*	2013 SHMP Identified items for Deletion	Newly Identified Items to be Added for 2018 SHMP Compliance	New Action Commitments
Hazard Profile Update	• Update hazard profiles and new event history • Profile newly identified hazard risks	F: DHS&EM contracted DGGS to update Alaska's hazard profiles, develop new event history, and a GIS dataset based on their research findings	• Participating agency specific hazard mitigation process (31 pages) • Out-dated information	• Edit SHMP to reflect new hazard and vulnerability data • Update hazard impacts spanning 2013 to 2018	• Encourage local & tribal jurisdictions to review the 2018 SHMP to facilitate updating their respective HMPs
Risk Analysis and Vulnerability Assessment	• Update a the State's sparse asset inventory • Develop statewide vulnerability analysis & summaries based on newly define hazards and their potential impact areas	NF: Identify SHMP development and infrastructure changes	• Out-dated information	• Updated asset inventory • Updated infrastructure vulnerabilities • Updated residential structure vulnerabilities • Describe newly identified repetitive loss data as appropriate	• Strive to fill data gaps • Collect new scientific information to resolve data gaps • Better define or determine future potential statewide climate change impacts
Mitigation Strategy	• Develop concise, global mitigation goals • Mitigation Strategy-define how the state manages their current or future programs	NF: Track project implementation processes or progress NF: SHMP component integration	• Removed agency specific mitigation projects and initiatives • Out-dated information	• Develop SHMP focused mitigation strategies, processes, SOPs, etc to more closely align with SHMP review criteria • Update statewide capability assessment(s)	• Annually review mitigation strategy successes, implementation challenges, • Track SHMP agency progress with integrating SHMP component integration

3.4. 2018 UPDATE SHMP PLANNING ACTIVITIES

AECOM made initial contact with the DHS&EM project manager and grant programmatic leaders to discuss the requirements for completing the 2018 State Hazard Mitigation Plan update under a compressed contract timeline. Scott Simmons, AECOM Alaska's HMP lead, worked with the project manager to review and provide information updates throughout the planning process.

Mr. Simmons requested guidance on whether the SHMAC, comprised of nearly 50 state agencies, was still in-place as an adjunct SHMP planning team. He further inquired as to whether AECOM was allowed to engage them in participating and assisting with SHMP development. Mr. Simmons reasoned that agency-pertinent natural hazard data could only come from appropriate regulating agencies. Agency participation is critical to facilitate updating the SHMP's hazard profiles, infrastructure risk, and vulnerability, and to provide insight into how they manage their respective mitigation projects and initiatives.

Table 3-2 lists the SHMP's SHMAC and agency participation teleconference activities with focused discussions seeking agency-specific insight with first-hand update assistance.

Table 3-2 Public Involvement Mechanisms

State Hazard Mitigation Agency Committee Teleconferences	Description
January 19, 2018	Invited agencies to review 2013 SHMP located on the DHS&EM Local/Tribal All Hazard Mitigation Plan Development website at: http://ready.alaska.gov/plans/localhazmitplans
January 31, 2018	Reviewed selected priority update items
February 21, 2018	Reviewed selected priority update items
March 7, 2018	Reviewed selected priority update items
March 26, 2018	Reviewed selected priority update items
April 18, 2018	Reviewed legacy SHMP goals, projects, and MAP initiatives
May 2, 2018	Reviewed legacy SHMP goals, projects, and MAP initiatives
May 16, 2018	Reviewed selected priority update items
July 13, 2018	Reviewed selected priority update items
July 19, 2018	Discussed DGGS draft hazard profile completion, solicited agency submittals
August 8,2017	Submitted draft SHMP update for DHS&EM review
September 14, 2018	Submit draft SHMP update for SHMAC review
October 12, 2018	Submit for FEMA review

AECOM described the specific information needed from the SHMAC to assess critical facility vulnerability and population risk by the location, value, and population size. After the risk analysis and vulnerability assessment was completed DGGS updated the hazard profiles and vulnerabilities data, and validated their estimates.

SHMAC teleconferences were occurring throughout the planning process to keep forward momentum. Teleconferences focused on reviewing and prioritizing each agency's new mitigation actions identified based on the results of the risk assessment and to facilitate agencies that needed assistance providing essential status updates for their legacy 2013 SHMP mitigation projects and initiatives.

Note: *Agency and participant comments were continually received throughout the SHMP development process and draft review period and addressed during draft SHMP development.*

3.5. PLAN MAINTENANCE

This section describes a formal plan maintenance process to ensure that the SHMP remains an active and applicable document. It includes an explanation of how the State's planning team intends to organize their efforts to ensure that improvements and revisions to the SHMP occur in a well-managed, efficient, and coordinated manner. Planning maintenance includes programmatic integration as a vital SHMP component to assure mitigation success. The planning team will:

Incorporate and integrate SHMP components into existing planning mechanisms, actions, and initiatives

Continue public involvement

Monitor, review, evaluate, and update the SHMP annually

3.5.1. INCORPORATING EXISTING PLANS AND OTHER RELEVANT INFORMATION

During the 2018 SHMP update planning process, the planning team reviewed and incorporated pertinent historical information and new data that became available since the legacy 2013 SHMP received FEMA final approval. These data included newly available plans, studies, reports, and technical research. These data were reviewed and referenced where applicable for the SHMP's jurisdictional information, hazard profiles, risk analysis, and vulnerability assessment. References are listed in Appendix 13.26.

3.5.2. INTEGRATING SHMP WITHIN AGENCY AND FEMA PLANS, PROGRAMS & INITIATIVES

DMA 2000 Requirements
Enhanced State. Integrated Planning
E2. Does the plan demonstrate integration to the extent practicable with other state and/or regional planning initiatives and FEMA mitigation programs and initiatives? [44 CFR §201.5(b)(1)]
Source: FEMA, March 2015.

3.5.2.1. PROGRAM INTEGRATION

State Planning Programs

DHS&EM's mitigation staff actively pursues and effectively engages Alaska agencies and jurisdictions with developing strong mitigation programs. All of the programs and activities listed in Table 3-3 demonstrate how Alaska state and federal agencies strive to jointly educate the population to facilitate increasing their hazard reduction knowledge needed when they seek funding to reduce their hazard event impacts and damages.

Table 3-3 State Mitigation Initiatives

State Planning Activities	Agencies	Alaska Mitigation Integration
Administrative Order 175	Legislature	Requires state agencies to comply with federal flood damage standards and consider flood and erosion issues when siting and constructing State owned and financed construction projects.

Table 3-3 State Mitigation Initiatives

State Planning Activities	Agencies	Alaska Mitigation Integration
Hazard Mitigation Plan Development	DHS&EM	Mitigation Planning Technical Assistance.
National Tsunami Hazard Mitigation Program (NTHMP)	NOAA, FEMA, USGS, State Emergency Management Agencies: AK, CA, HI, OR and WA. Eastern and Gulf states joined the program in 2005 and all other coastal states and territories joined in 2006	Collaborative federal and state effort to preserve life and property along U.S. coastlines from tsunami inundation events. Funds public outreach, tsunami inundation map development, mitigation, and hazard assessment programs, such as Deep-ocean Assessment and Reporting of Tsunamis (DART).
Alaska Tsunami Ready Program	DHS&EM, NWS	Promotes tsunami hazard preparedness as an active collaboration among federal, state and local emergency management agencies, the public, and the NWS tsunami warning system.
Tsunami Inundation Mapping Program	NOAA, DHS&EM, UAF/GI, AEC, DNR/DGGS	Develops and provides tsunami inundation maps for communities along the Gulf of Alaska maps depict historical tsunami inundation locations that are essential for determining potential evacuation routes and aide long-term planning for vulnerable coastal communities.
National Tsunami Warning Center (NTWC)	NOAA/NWS	Provides accurate and timely tsunami bulletins, warnings, and watches to is Area of Responsibility (AOR) that includes Canadian provinces and all U.S. coastal states, except Hawaii.
Alaska Storm Ready	DHS&EM, NWS, Local Communities	Assists communities with storm preparedness; encouraging them to take a proactive approach to improving local hazardous weather operations by providing local emergency officials with clear guideline or requirements to be StormReady certified.
Earthquake Simulator – Quake Cabin	DHS&EM	Participants actively experience demonstrations that exemplify methods and effectiveness for securing potential falling objects and furniture in their homes, offices, or work areas. Used for general disaster preparedness awareness.
Earthquake Resistant Model Home	DHS&EM	Displays with the Quake Cabin at safety fairs, home shows, and other educational outreach functions The model home demonstrates earthquake mitigation effectiveness such as attachment hardware and bracing options.
Alaska Seismic Hazard Safety Commission	Public agency and private Commissioners	Focus on mitigating risk that increases public awareness through education.
Earthquake Hazard Reduction Program	DHS&EM	Educates the public about mitigation projects such as seismic hazards structural retrofits and risk reduction Structural and non-structural seismic mitigation and post-earthquake evaluation and training.
Alaska Earthquake Center (AEC) (Alaska Statute 14.40.075)	University of Alaska Fairbanks, Geophysical Institute (UAF/GI) and the USGS	Dedicated to reducing earthquakes, tsunamis and volcanic eruptions impacts through partnerships Provides definitive earthquake information to the public, emergency managers, scientists and engineers.
Emergency Watershed Protection	Alaska Disaster Fund, NRCS/EWP	State capability, mitigation strategy.

Table 3-3 State Mitigation Initiatives

State Planning Activities	Agencies	Alaska Mitigation Integration
Alaska Climate Adaptation Science Center (AK CASC)	UAF, DGGS, UAS, USFWS, NOAA, USDA Forest Service, NPS, DGGS	Program partners provide expertise in climate science, ecology, environmental impacts assessment, modeling, cultural impacts and advanced information technology. These partnerships are essential for addressing climate issues in Alaska, where changes in temperature and precipitation are already having significant impacts on terrestrial and marine ecosystems.(https://casc.alaska.edu/about/program-partners).
Dam Safety Program	DNR, Dam and Construction Unit	Recommendations for minimum standards for dam design, construction, and operation hazard potential classification that includes hydrologic and seismic evaluations, construction quality assurance, and emergency action planning.
Alaska Dam Rehabilitation Program	DNR, Dam and Construction Unit	Manages a continuous dam inspection and rehabilitation program striving to ensure the highest degree of safety from dam failure events for Alaska residents.
National Levee Safety Program	USACE, DHS&EM, DNR, Dam and Construction Unit	Levee inspection, maintenance and repairs. Mitigation grant funding for many Alaska projects.
RISK Map Business Plan	DCCED/DCRA, DHS&EM, FEMA	Integrates Alaska's map modernization projects, updated Flood Insurance Rate Maps (FIRM) mapping, assessment, and planning. Alaska's Map Modernization projects, develops the Alaska RISK Map Business Plan, and participates in Cooperating Technical Partnership (CTP) Agreements with FEMA.
National Flood Insurance Program (NFIP)	FEMA, DCRA, Floodplain Coordinator	Offers federally backed flood insurance to communities enforcing local floodplain management ordinances. 31 communities actively participate in Alaska's NFIP program.
Community Rating System (CRS)	FEMA, DCRA, Floodplain Coordinator	Adjusts the rates paid for flood insurance based on mitigation measures undertaken by the community. The rating system uses a unique numbering methodology. The lower the community rating number the more the community has undertaken to encourage and enforce floodplain management efforts.
Flood Mitigation Grant Programs	DCCED/DCRA	Manages FEMA's state level Flood Mitigation Assistance (FMA) grant programs.
Spring Pre-Flood RiverWatch Program	DHS&EM and NWS's River Forecast Center (RFC)	Created to educate and warn communities of impending flooding, issues flood watch and warnings. Educates communities about flood preparedness.
WaterWatch Program	USGS, DHS&EM	"Flood and high flow" maps show stream gauge location of stream gages and their corresponding water levels.
Alaska Climate Change and Resiliency	DHS&EM, NWS	State capacity, capability, and mitigation strategy.
Pilot Information Reports (PIREPs)	NWS Aviation Weather Center	Provides actual current weather, terrain, and river conditions and observations as a courtesy to other fliers.

Table 3-3 State Mitigation Initiatives

State Planning Activities	Agencies	Alaska Mitigation Integration
Alaska Silver Jackets Program	DCCED/DCRA, DHS&EM, USGS, FEMA, HUD, Denali Commission, USFWS	Alaska's interagency program to create comprehensive and sustainable solutions to flood hazard issues including mitigation planning, flood hazard mapping, risk reduction activities, and response and recovery planning were successful throughout the legacy 2013 SHMP's 5-year life cycle. (e.g., the State of Alaska Silver Jackets team partnered with the Northwest Arctic Borough to design a bi-lingual English and Inupiat poster detailing simple measures that people can take to reduce their flood risk.)
Environmentally Threatened Communities (ETC)	Denali Commission, ANTHC, DHS&EM	The Denali Commission is leading federal, state, and tribal resources to assist communities in developing and implementing both short- and long-term solutions to address climate change impacts: erosion, flooding, and permafrost degradation.
Alaska Permafrost Observatory	UAF/GI,	Deploys sensors for timely detection of changes in permafrost temperature and forecasting areas of permafrost degradation.
Alaska Soil Survey Information	USDA/NRCS	Assists landowners and communities in selecting the best sites for their homes, infrastructure, and farmland.
Prevention and Emergency Response Program (PERP)	DEC, SPAR, EPA, Office of Solid Waste and Emergency Response (OSWER)	Responsible for ensuring spill prevention and response and to make sure spills get cleaned up Area Response Teams have expertise and resources to combat a spill and also work in coordination with other State, local, and Federal officials.
Alaska State Public Health Laboratories (ASPHL)	ASPHL, State of Alaska Epidemiology (SOE), Public Health Nursing (PHN)	ASPHL provides analytical and technical laboratory information in support of state and national public health disease prevention programs and represents the first line of defense in the rapid recognition of the spread of communicable diseases and biological emergencies.
Infectious Disease Program	PHN, SOE, ASPHL	Partners with local providers to perform tuberculosis, sexually transmitted infections (STIs), foodborne illnesses, and other reportable diseases such as giardiasis and measles case investigations.
Community Wildfire Protection Plans (CWPP)	DNR, DOF. AFS, DGGS	Collaborative efforts between wildfire suppression agencies, federal, state, and local governments, community groups, and individuals to identify fire risk sources and prioritize mitigation project areas.
Alaska Master Cooperative Wildland Fire Management and Stafford Act Response Agreement	Alaska Department of Natural Resources (DNR), the US Department of Interior, Bureau of Indian Affairs (BIA), Bureau of Land Management (BLM), Fish and Wildlife Service (FWS), National Park Service (NPS), and the US Forest Service (USFS)	State capability assessment, mitigation strategy.

Table 3-3 State Mitigation Initiatives

State Planning Activities	Agencies	Alaska Mitigation Integration
Alaska Wildland Fire Coordinating Group (AWFCG)	State, Federal, and Native Land Management Agencies/ Owners	Alaska forum that fosters cooperation, coordination, collaboration, and communication for wildland fire management. Plans and implements interagency fire management practices statewide and promotes programs and interagency partnerships.
Alaska Multi-Agency Coordination Group (MAC)	Alaska: DEC, ADF&G, DNR USDOI: BIA, BLM, NPS, USFWS USDA: USFS AK Native Reps: Chugachmiut (consortium) Association of Village Council Presidents (consortium) (AVCP) Tanana Chiefs Conference (TCC) Structural Fire Departments and Other Organizations: Anchorage Fire Dept. (AFD)	Fosters safety, cooperation, coordination, collaboration and communication for wildland fire management and related-activities in Alaska. The AWFCG is the leadership focus for planning and implementing interagency fire management statewide.
Alaska Interagency Coordination Center (AICC)	DOF, AFS, BLM, & other agencies	Coordinates state-wide tactical resources, logistics support, and predictive services for state and federal agencies involved in wildland fire management and suppression.
Alaska Firewise	DOF, AFS, DHS&EM	Collaborative effort among federal, state, local, and private agencies and organizations to promote wildland/urban interface fire safety and mitigation.
Alaska Volcano Observatory	USGS, DNR/DGGS, and UAF/GI	A joint USGS, DNR/DGGS, and UAF/GI program. The AVO is the state's principal agency responsible for volcano hazard assessing, monitoring, and issuing early warnings. Distributes daily written status reports to more than 100 recipients at federal, state, local agencies, the media, and the public via Internet and fax.

FEMA Mitigation Programs Integration

The 2018 SHMP actively participates in and works with communities and other state agencies to pursue FEMA program integration and supporting communities who seek Hazard Mitigation Assistance (HMA), National Flood Insurance Program (NFIP) participation, Community Rating System (CRS) capacity to garner participant insurance discounts, and Risk Map initiatives that helps communities mitigate their flood risks and vulnerabilities. For example, the DCCED/DCRA manages the state's Risk MAP and NFIP, as well as FMA grant initiatives. Tables 3-3 and 3-4 list federal and state agency programs and initiatives that represent and support the State's mitigation strategy (SHMP Section 9). Additional agency grant availability information can be found in Appendix 13.20.

Table 3-4 FEMA Supported Mitigation Programs

State Disaster Assistance	SHMP Integration
HMA Program (HMGP)	Funding Cost Share (Technical assistance and State absorbs 25 percent (%) grant participant cost share).
HMA Programs (PDM, FMA)	PDM grant application technical assistance.
• Pre-Disaster Mitigation (PDM) grant program	FEMA funding available to eligible local and tribal jurisdictions on an annual basis. This grant is nationally competitive and can only be used to fund pre-disaster mitigation plans and projects.
• Flood Mitigation Assistance (FMA) grant program	FEMA funding available to eligible local and tribal jurisdictions on an annual basis. This grant can be used to mitigate repetitively flooded structures and infrastructure to protect repetitive flood structures. Qualified jurisdictions may qualify for this funding source because they participate in the NFIP.
US Department of Homeland Security	Homeland Security grants to provide and improve emergency operation center capacity.
Fire Mitigation Fees	These grants can finance future fire protection facilities and provide fire capital expenditures for new development within special districts.
Earthquake Hazard Reduction Program (EHRP)	Provides structural and non-structural seismic mitigation and post-earthquake evaluation and training annually to specialists in the government and private sector responsible for facilities, building code revisions, and retrofit projects.
TsunamiReady Community Program	Promotes tsunami hazard preparedness as an active collaboration among federal, state, and local emergency management agencies, the public, and the NWS tsunami warning system with clear program criteria and guidance for achieving official TsunamiReady certification.
Tsunami Inundation Mapping Program	Develops and provides tsunami inundation maps for communities along the Gulf of Alaska as part of the National Tsunami Hazard Mitigation Program (NTHMP) for determining potential evacuation routes and aide long-term planning for vulnerable coastal communities.

3.5.3. FEMA MITIGATION PROGRAMS

The 2018 SHMP strives to integrate FEMA programs such as Hazard Mitigation Assistance (HMA), National Flood Insurance Program (NFIP), Community Rating System (CRS), and Risk Map initiatives within Section 9, Hazard Mitigation Strategy' mitigation actions. Section 9 describes the State's efforts at increasing NFIP and CRS participation, implementation, supports the Risk MAP program, and HMA grant program funding to assist communities with mitigating historical hazard threats.

FEMA Program SHMP Integration includes:

- HMA mitigation grant funding sources
- Alaska's ongoing Risk MAP Business Planning activities to improve NFIP participation
- CRS local capability assessment
- Bundling together funding sources using FMA, Increased Cost of Compliance, Flood Insurance proceeds, and HMGP funding to facilitate flood damage recovery efforts

3.5.3.1. SUPPORTING JURISDICTIONAL MITIGATION CAPABILITIES

DMA 2000 Requirements
Standard State. Planning Process
S13. Does the plan generally describe and analyze the effectiveness of local and tribal, as applicable, mitigation policies, programs, and capabilities? [44 CFR §201.4(c)(3)(ii)]
S14. Does the plan describe the process to support the development of approvable local and tribal, as applicable, mitigation plans? [44 CFR §§201.3(c)(5) and 201.4(c)(4)(i)]
S15. Does the plan describe the criteria for prioritizing funding? [44 CFR §201.4(c)(4)(iii)] S16. Does the plan describe the process and timeframe to review, coordinate and link local and tribal, as applicable, mitigation plans with the state mitigation plan? [44 CFR §§201.3(c)(6), 201.4(c)(2)(ii), 201.4(c)(3)(iii), and 201.4(c)(4)(ii)]
Source: FEMA, March 2015.

3.5.3.2. DHS&EM'S LOCAL AND TRIBAL MITIGATION POLICIES, PROGRAMS, AND CAPABILITIES ANALYSIS AND EFFECTIVENESS

The State of Alaska subscribes to a whole community approach to emergency management. It is expected that extensive collaboration with the public, all levels of government, government agencies, the private sector, non-governmental organizations, and community organizations will be required to address and build mitigation policies, programs, and capabilities analysis and effectiveness. The state's intent is to foster a cooperative relationship with each community and tribal governments in order to build the most resilient Alaska possible.

3.5.3.3. LOCAL AND TRIBAL MITIGATION PLANNING EFFECTIVENESS

Open dialogue between the community and state is fostered and assistance is offered at all HMP development stages.

The State, in partnership with the community and assisted by a contractor, guides the planners through the planning process from grant application to plan approval, into mitigation project development striving for face-to-face communication and cooperation.

The planning processes begin with a kick-off meeting where a State of Alaska HMP planner, the State-selected contractor, and community leaders come together to discuss HMP goals and needs. In some instances, due to geography or inclement weather, this may be accomplished via teleconference. New or update HMP performance expectations are covered for both the contractor and the local and tribal community as applicable. Community HMP involvement levels, local planning team development, completion timelines, and incremental and final product deliverables are discussed. Future meetings are scheduled with the local planning team(s) and community council(s) to address new or update HMP information. For HMP updates, discussions occur to define any infrastructure construction or develop changes as well as associated risk vulnerabilities to known hazard events that have occurred since the legacy HMP was implemented.

A state representative from DHS&EM is present to build the state-city or state-tribe relationship. State participation ensures that the local government is aware of how the plan needs to interface with applicable state mitigation processes and priorities, their planning resources, hazards and associated vulnerabilities, and mitigation options.

From the kick-off meeting to the final draft edit, public feedback and input is not only encouraged but essential for developing a viable HMP. The State recognizes that the community's insight and collective history may be some of the only historical information available. It is not uncommon for Alaska Native tribes to pass down oral stories from generation-to-generation.

The community provides the draft plan to their public to solicit comments and ensure accuracy. It can be made available on city and/or tribal websites, at town offices or other community locations Public comments are gathered and included within the plan content.

The State, community, or tribal contractor finalizes the draft plan after the completed plan has been through public review and technical editing. The jurisdiction, tribe, or contractor then sends it for State (DHS&EM) review. The State confirms the plan fulfills FEMA regulatory criteria ensuring: communities are aware of their hazard data, their planning resources, and that the plan follows the state's mitigation priorities. The State then sends the plan to FEMA for formal review and approval.

The State strives to review and forward mitigation plans within 30 days of receipt from the community or contractor. If FEMA requires revisions, the State will coordinate with the local government or tribe to obtain the required information, amend the plan and resubmit to FEMA in a timely manner. Once the plan has fulfilled FEMA criteria, it will move to the Approvable Pending Adoption (APA) stage. The State will contact the jurisdiction encouraging them to formally adopt their HMP; knowing the adopted plan will be approved. The State will ensure the plan is adopted within one calendar year from the APA date. Once adopted, the State will forward community and tribal resolutions (as applicable) to FEMA to complete the final phase – plan approval. FEMA's approval letter starts the plan's five-year lifecycle as determined from the HMP's approval date.

The completed HMP along with all approval letters, resolutions, review tool, and HMP development or supporting documents are packaged and sent (electronically and hard copy) to local and tribal communities. An electronic copy of the HMP is provided to the Department of Commerce, Community, and Economic Development to post on their Community Plans Library portal. The local or tribal jurisdictions are also provided with the following documents to aid in plan execution:

- The first is a one page document titled "I have a Mitigation Plan: What do I do now?"
  - It is a how-to guide that assists with getting projects off the paper, through application, and completed
  - The guide provides direction and information relating to programs available, funding availability, requirements, application processes, deadlines, and contact information
- Other documents include:
  - The HMA fact sheet and handout
  - Mitigation Planning Benefits and Process
  - Maintaining your Hazard Mitigation Plan
  - Notice of Funding Opportunity

3.5.3.4. DHS&EM HMP DEVELOPMENT CHALLENGES

Barriers to timely plan development and subsequent review dissemination include:

- DHS&EM's mitigation section experienced frequent turn-over spanning from 2014 to 2017.
- The HMP planner position remained unfilled almost half of that time with four people ultimately transitioning through that position.
- The SHMO position experienced similar turnover with four different people being selected and ultimately transitioning to other positions in and out of DHS&EM. The HMGP manager was selected to fill the SHMO position. The new SHMO works diligently to understand the position's requirements and responsibilities.
- With the absence of a State HMP planner the new PDM grant manager reviewed local hazard mitigation plans and provided technical assistance to participating communities and tribes, while striving to understand the position's requirements and responsibilities.
- In December 2017 the present planner was hired and immediately began reviewing mitigation plans. Twenty-one plans from the PDM 2014 cycle and 25 from the PDM 2015 cycle were backlogged needing immediate attention. These plans needed to be reviewed while the new planner was simultaneously striving to understand and adjust to the position's requirements and responsibilities.

3.5.3.5. DHS&EM MITIGATION PROGRAM FUNDING PRIORITIZATION PROCESS:

Alaska's local and tribal plans inform and influence the state's risk assessment and mitigation priorities. The State uses information from these mitigation plans to supplement data. It is this information that provides a broader understanding of regional vulnerabilities that will shape prioritization actions and policies to reduce risk most effectively.

3.5.3.6. DHS&EM JURISDICTIONAL MITIGATION PLAN REVIEW, COORDINATION, AND LINKING TO SHMP PROCESS:

A component of updating the State's mitigation strategy is the consideration and inclusion of the local and tribal mitigation plan strategies. By reviewing, prioritizing, and incorporating the types or categories of actions identified by communities, the State can better understand how to support investments in local and tribal mitigation efforts.

Reviewing the local and tribal hazard mitigation plans informs and influences the state's risk assessment and mitigation priorities. The reviews determine whether HMPs follow and fulfill state hazard mitigation goals, priorities, and if it is integrated into the state and borough HMPs, as well as numerous agency mitigation initiatives as applicable.

The State uses the State Mitigation Plan Review Guide, released March 2015, to ensure it meets the requirements of the Stafford Act and Title 44 Code of Federal Regulations (CFR) and subsequently includes it with the completed Mitigation Plan.

3.5.3.7. CONTINUED AGENCY INVOLVEMENT

DHS&EM, with assistance from the SHMAC and agency planning team members, is committed to continually guide, reshape, and update the SHMP throughout its five-year lifecycle. An electronic copy of the SHMP will be posted on the DHS&EM Mitigation Planning website: http://ready.alaska.gov/Plans/Mitigationplan, for reference.

DHS&EM seeks many opportunities to raise community awareness about Alaska's various locational hazard impacts through the SHMP. This effort includes organizing and participating at community and state fairs, emergency management focused meetings, and workshops, as well as state and federal focused association and professional venues where they provide educational hazard pertinent materials.

DHS&EM has committed to having the mitigation planning staff collect, log, and track public and agency comments regarding the SHMP. This information will include collected data and other pertinent material within an annual SHMAC report for future SHMP update consideration and inclusion.

3.5.3.8. MONITORING, REVIEWING, EVALUATING, AND UPDATING THE SHMP

DMA 2000 Requirements
Standard State. Planning Process
S17. Is there a description of the method and schedule for keeping the plan current? [44 CFR §§201.4(c)(5)(i) and 201.4(d)] S18. Does the plan describe the systems for monitoring implementation and reviewing progress? [44 CFR §§201.4(c)(5)(ii) and 201.4(c)(5)(iii)]
Source: FEMA, March 2015.

The SHMP was prepared as a collaborative effort. To maintain momentum and build upon previous hazard mitigation planning efforts and successes, the State of Alaska will continue to use the SHMAC as their planning team to monitor, review, evaluate, and update the SHMP.

3.5.3.9. PLANNING TEAM SHMP MAINTENANCE RECOMMITMENT

The DHS&EM's planning team organized 2018 SHMP improvements and revision efforts to follow three process steps:

1. Review and revise the 2018 SHMP to reflect regulatory plan development changes, planning process improvements, project implementation progress, project priority changes, and mitigation strategy progress throughout the SHMP's five-year life cycle.
2. Submit an SHMP update at the end of its five-year lifecycle for FEMA review and approval.
3. Continually strive to encourage the SHMAC to implement and integrate mitigation initiatives within their respective agency regulations, policies, and procedure documents.

DHS&EM reviewed the legacy 2013 SHMP's during 2016 to analyze and update numerous sections. The revised data was saved within a designated "2016 SHMP update folder" to easily access the data for inclusion within the next SHMP update submittal.

However, very few legacy SHMP components were integrated within other SHMAC agency planning mechanisms. The 2018 SHMP update team reviewed and edited the legacy 2013 SHMP

data, included the 2016 edits. The contractor also worked with DHS&EM section managers along with SHMAC agencies to collect newly available data for inclusion.

3.5.3.10. MONITORING THE SHMP

The SHMAC and participating agencies listed in Section 3.2 will continually monitor their portion of the SHMP, evaluate their respective projects' status annually, and update their data for each SHMP's five-year life cycle, within 90 days of a presidentially declared disaster (if required), or as necessary to reflect changes in state and jurisdictional development projects, as well as changes to state or federal law.

The Hazard Mitigation Plan Annual Progress Report and Hazard Mitigation Plan Annual Evaluation Forms are essential SHMP review tools (Appendix 13.6) that the SHMAC participants can access and complete annually to facilitate accomplishing their reporting commitments. FEMA and DHS&EM determine when significant changes warrant an update prior to the SHMP's scheduled five-year anniversary date.

Each SHMAC agency authority is responsible for implementing their respective agency's components, commitments, and determining whether their respective actions were effectively implemented. Each authority will subsequently coordinate or communicate their finding annually to the DHS&EM SHMP planning lead or designee for project progress tracking.

The DHS&EM SHMP planning lead or designee, will serve as the primary point-of-contact and will coordinate planning team efforts to monitor, evaluate, revise, and update SHMP mitigation strategy actions' progress status.

3.5.3.11. REVIEWING THE SHMP

The planning team did not track any legacy SHMP maintenance components due to intermittent and limited staff with a lack of training. This is a major barrier to enabling SHMP maintenance successes. DHS&EM mitigation planning section positions e.g., the State Hazard Mitigation Officer (SHMO), grants manager, and mitigation planner were in constant transition or turn-over status from 2014 through 2017. Replacement staff was constantly struggling to learn their new position's requirements only to end forward progress due to transfers or the addition of new staff without relevant experience.

Therefore, no mitigation project or initiative had consistent tracking to determine project closure or planning team success, address roadblocks to SHMP action, initiative implementation, or to assure project integration into their respective planning mechanisms.

The planning team recommits to reviewing their success for completing SHMP review, maintenance, and mitigation goals, as well as activities and initiatives during future annual review processes.

Additionally, during each annual review, each authority or agency administering a mitigation project will submit a Project Progress Report (Appendix 13.6) to the DHS&EM SHMP planning lead. The report will include the mitigation project's current status, any project changes, a list of identified implementation problems (with appropriate strategies to overcome them), and a statement of whether or not their respective projects have helped achieve their perceived goals.

3.5.3.12. EVALUATING THE SHMP

The Annual Review Questionnaire and Progress Report (Appendix 13.6) provide the basis for future SHMP evaluations by guiding the planning team through the process of identifying new or more threatening hazards, adjusting to changes or increases in resource allocations, and garnering additional support for SHMP implementation.

The DHS&EM SHMP planning lead or designee will initiate an annual SHMP review two months prior to the scheduled SHMAC plan meeting date to ensure that all data is assembled for discussion with the SHMAC. The findings from these reviews will be presented at the annual planning team meeting. Each review, as shown on the Annual Review Worksheet, will include an evaluation of the following:

- Determine authorities, outside agencies', stakeholders', and residents' participation with SHMP implementation successes.
- Identify notable risk changes for each identified and newly considered natural-caused hazards.
- Consider land development activities and related programs' impacts on hazard mitigation.
- Risk MAP implementation progress and integration (identify problems and suggest improvements as necessary).
- Evaluate SHMP local resource implementation for identified activities.

3.5.3.13. UPDATING THE SHMP

The SHMAC agencies did not review their respective data legacy 2013 SHMP during its initial five-year life cycle. However, they recommitted to annually reviewing the plan as described in Section 3.6.10 for inclusion within the SHMP's five year life cycle (or when significant disaster events, agency critical facility relocation or development, or other significant change(s) necessitates an update). The SHMAC will collectively review all agencies Annual Review Questionnaires (Appendix 13.6) to determine their success with implementing the SHMP's Mitigation Action Plan.

Completed Annual Review Questionnaires will enable the planning team to more efficiently identify possible changes or increases in development, resource allocations, and in garnering additional support for SHMP integration and implementation (successes, failures, and roadblock experiences). Mitigation Action Plan initiatives should refocus attention on new or more threatening hazards, changing resource availability, and in garnering stakeholder support for SHMP project implementation.

Throughout the SHMP's five-year life cycle, DHS&EM SHMP planning lead will undertake the following activities:

- Request grant assistance from FEMA to update the SHMP (it can take up to two years to obtain funding and one year to update the plan).
- Ensure that each agency or authority administering their internally identified mitigation projects has submitted appropriate progress reports for SHMAC review.
- Update the SHMP review data (Table 3-1) to identify those SHMP sections that need improvement and describe the proposed changes.

- Thoroughly analyze and update the natural hazard risks.
  - Determine the current status of each agencies' mitigation projects.
  - Identify the proposed grant funded projects that were completed, deleted, or deferred (delayed) as well as any ongoing or combined projects. Each action should include a description of whether the project should remain on the list, be deleted because the action is no longer feasible, or reasons for their implementation delay.
  - Describe how each action's priority status has changed since the SHMP was originally developed and subsequently approved by FEMA.
  - Determine whether or not the action has helped achieve the appropriate goals identified in the plan.
  - Describe whether the action project's owner has experienced any barriers preventing them from implementing their mitigation actions (projects) such as financial, legal, and/or political restrictions, and define the appropriate strategies to overcome those barriers.
  - Update ongoing processes, and change the proposed implementation date and/or duration timeline for delayed actions the owning agency still desires to implement.
  - Prepare a new draft State of Alaska SHMP.
    - Finalize an updated/draft SHMP for FEMA review.
    - Submit the draft SHMP to FEMA for review.
    - Submit the final SHMP for FEMA final approval.

3.6. FEMA's Formal SHMP Review

Outdated Hazard Mitigation Plans do not qualify the State for disaster assistance until the SHMP has been updated and received FEMA final approval; only emergency assistance to avert direct hazard impacts will be allowed. Additionally, complete, unapproved SHMPs do not allow the state to receive funding until the SHMP has received formal State adoption, and subsequent FEMA final approval. Therefore, once the SHMP has fulfilled all FEMA criteria, Alaska's governor or designee is required to sign a formal SHMP Adoption Resolution or a Letter of Promulgation. The required documents are then sent to FEMA for final SHMP approval.

FEMA's final approval assures the State eligibility for applying for appropriate disaster assistance and mitigation grant program funding.

3.7. Tribal or Native Village Mitigation Grant Application Process Considerations

An Indian Reorganization Act (IRA) tribe can potentially qualify to either apply for applicable grant funding as a State sub-applicant, or apply directly to FEMA as an eligible federally recognized IRA tribal government with sovereign authority working directly with government agencies.

Therefore, the tribe can determine which of the two following options will best fit their needs. These options are:

Option 1:

The tribe can submit grant applications through the State with no loss in tribal governance authorities.

The tribe submits their mitigation grant applications to the State Hazard Mitigation Officer (SHMO) for initial State review. This option could potentially enable the tribe to avoid paying future mitigation project grant funding match.

The SHMO will then coordinate tribal applications during their grant review and prioritization process for potential approval and award. DHS&EM will review, prioritize, and award grants, assigning their most current grant recipient cost share requirements to successful grant awardees.

Option 2:

The tribe can submit mitigation grant applications directly to FEMA or other granting agencies as a sovereign, federally recognized IRA tribal government maintaining sovereign authority working directly with government agencies.

As an IRA tribe, the tribal council submits their mitigation grant applications directly to FEMA with full knowledge the tribe will be responsible for providing any applicable programmatic project matching funds.

FEMA will review, prioritize, and award grants, assigning their most current grant recipient cost share requirements to successful grant awardees.

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4. State Hazard Mitigation Plan Adoption

This section is included to fulfill State SHMP promulgation requirements.

The state of Alaska's 2018 SHMP update meets the Robert T Stafford Act Section 409 and DMA 2000 Section 322, and 44 CFR §201.

The State of Alaska assures compliance with all applicable federal statutes and regulations in effect with respect to the periods for which it receives grant funding, including 2 CFR parts 200 and 3002. The State will amend its plan whenever necessary to reflect changes in state or federal statutes and regulations. The governor or the governor's authorized representative's signature affirms this commitment.

4.1. Governor's SHMP Formal Adoption / Promulgation

DMA 2000 requirements and implementing state governance regulations for the SHMP adoption include:

DMA 2000 Requirements
STANDARD STATE. Plan Adoption and Assurances
S19. Did the state provide documentation that the plan has been formally adopted? [44 CFR §201.4(c)(6)]
S20. Did the state provide assurances? [44 CFR §201.4(c)(7)]
Source: FEMA, March 2015.

The State of Alaska, Governor Bill Walker, formally adopted or promulgated the 2018 SHMP on date, 201x and submitted the finalized 2018 SHMP to FEMA for formal approval.

A scanned copy of the State's formal adoption is included in Appendix 13.2

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5. Hazard Analysis Process

This section identifies and profiles the hazards that could affect the state of Alaska.

5.1. Overview

A hazard analysis includes identifying, screening, and profiling each hazard. Hazard identification includes recognizing the natural events that threaten an area. Natural hazards result from unexpected or uncontrollable natural events of sufficient magnitude. Even though a particular hazard may not have occurred in recent history, all natural hazards that may potentially affect Alaska were considered. Those hazards that are unlikely to occur or for which the State has determined as having a very low risk were eliminated from consideration.

The planning team decided to relocate Dam Failure and Public Health Hazards out of the Natural Hazard category into SHMP Annex 12. These hazards will no longer be addressed during future SHMP updates.

Additionally, the legacy SHMP's economic, hazardous materials, and terrorism-related hazards are beyond the scope of this plan. These hazards are controlled by regulatory agencies and will no longer be addressed during this or future SHMP updates.

5.2. Hazard profiles

Hazard profiling requires research to determine the hazard type or characteristics, history, magnitude, frequency, location, extent, and likelihood. The State identifies hazards through historical and community anecdotal information, and by reviewing pertinent plans and scientific studies. Hazard mapping determines geographic extent and proximity to populated areas. A natural phenomenon, such as a volcanic eruption, is only considered a hazard when people and property are potentially affected. "Risk," is the likelihood of harm resulting from a hazard. All natural hazards posing a risk to the state are considered, and those found to have minimal risk are eliminated from consideration.

5.3. Hazard Identification and Risk Assessment

DMA 2000 Requirements
STANDARD STATE. Hazard Identification
S3. Does the risk assessment include an overview of the type and location of all natural hazards that can affect the state? [44 CFR §201.4(c)(2)(i)]
S4. Does the risk assessment provide an overview of the probabilities of future hazard events? [44 CFR §201.4(c)(2)(i)]
Source: FEMA, March 2015.

Hazard identification and risk assessment is the first step of the hazard analysis. The DHS&EM administration organized a project kick-off meeting with AECOM on November 20, 2017. Meeting participants discussed Request for Proposal (RFP) project deliverable requirements, project proposal documents, and DHS&EM management, project staffing, and primary project contacts. Travel expectations, reporting procedures, and invoicing requirements were also discussed.

AECOM reviewed the legacy 2013 SHMP to determine Alaska's identified statewide hazards. Next, AECOM evaluated and screened the comprehensive list of additional hazards based on a range of factors, including prior knowledge or perception of a hazard's threat along with the relative risk presented by each hazard, the ability to mitigate the hazard, and the known or expected information availability as listed in Table 5-1.

The planning team determined that there are eight natural hazards that potentially threaten Alaska: cryosphere, earthquake, flood, ground failure, tsunami, volcano, weather, and wildland fire; some of which are influenced by increasing changing climate conditions such as late ice formation, early thaw conditions, or inconsistent rain (described in Table 5-1).

Table 5-1 Hazard Identification and Screening

Hazard Type	Should It Be Profiled?	Explanation
Natural Hazards		
Cryosphere	Yes	There are many locations in Alaska where both surface and subsurface water is frozen year round. This includes sea ice, lake ice, river ice, snow cover, glaciers, ice caps, ice sheets, and frozen ground (such as permafrost).
Earthquake (EQ)	Yes	Alaska experiences over 100 earthquakes every day. Many located in remote unpopulated locations; some spanning very low to severe potential population impacts.
Flood (FL) (Riverine, Coastal, Lake, other related flood types. Includes resultant erosive scour damages)	Yes	Snowmelt run-off and rainfall flooding occur during spring thaw and the fall rainy season. Several minor flood events cause damage. Severe damages occur from major floods. Alaska experiences storm surge, coastal ice run-up, and coastal wind scour along the shoreline and riverine high water flow scour along the area's rivers, streams, and creek embankments as well as damages from coastal or riverine ice flows, wind, surface runoff, and boat traffic wakes.
Ground Failure (GF) (Landslide/Debris Flow, Subsidence)	Yes	Ground failure occurs throughout Alaska from earthquakes, landslides, thawing permafrost, and ground subsidence. However, subsidence and permafrost degradation are the primary hazards causing houses to shift due to ground sinking and upheaval, and high ground water thawing the permafrost.
Tsunami (TS) (includes Seiche)	Yes	This hazard has historically impacted Alaska's coastal community and infrastructure.
Volcano (VO) (Volcanic Ashfall)	Yes	Volcano-generated ash periodically impacts Alaska communities. Volcanic ash creates severe air, marine, and road transportation, disrupts utility operations, water quality, etc. Tephra can impact those communities closest to volcanoes.
Weather (WX) (Severe Cold, Drought, Rain, Snow, Wind, etc.)	Yes	Severe weather impacts the entire state with climate change/global warming and changing El Niño/La Niña Southern Oscillation (ENSO) patterns generating increasingly severe weather events. Winter storms, heavy or freezing rain, thunderstorms and subsequent secondary hazards such as riverine or coastal storm surge floods, landslides, snow, wind, etc. discussions are included within this section.
Wildland Fire (WF) (Tundra and Conflagration Fire)	Yes	Alaska communities with surrounding forest and/or tundra areas become very dry in summer months with weather (such as drought and lightning) and human-caused incidents igniting dry vegetation in the adjacent area (burning trash outside their landfill's burn box, camp fires, etc.). Fire proximity could also create urban/ wildland fire interface challenges.

Table 5-1 Hazard Identification and Screening

Hazard Type	Should It Be Profiled?	Explanation
Other Hazards (Located in Appendix 12)		
Dam Failure (DF)	No	Legacy dam failure hazard profile information is now located in Appendix 12.2.1 but will no longer be updated in SHMPs.
Public Health	No	Legacy public health hazard profile is now located in Appendix 12.2.2 but will no longer be updated in future SHMPs.

The planning team chose hazards that occur most frequently, cause the most damage, and have the highest response and recovery costs. Examinations include several factors:

- Hazard characteristics (or hazard type)
  - Typical event characteristics
  - Potential climate change impacts are primarily discussed in the Weather hazard profile but are also identified where deemed appropriate within selected hazard profiles
- History (geologic as well as previous occurrences)
- Location
- Extent (breadth, magnitude, and severity)
- Impact (Section 5 provides general impacts associated with each hazard. Section 6 provides detailed impacts to Alaska's residents and critical facilities)
- Recurrence probability statement

Table 5-2 provides an alphabetical sub-classification index to various Alaska Division of Geological & Geophysical Survey (DGGS) defined scientific hazard classifications. These classifications have been integrated with pertinent major hazard profile classes as listed in Table 5-1. Table 5-2 facilitates easy access to specific subsets within specified SHMP locations.

Table 5-2 DGGS Hazard Index

Hazard	SHMP Location *(Section/Page)*	Hazard	SHMP Location *(Section/Page)*
Acidification	6-91, 95, 99	Lateral Spread	6-34, 66, 68
Alluvial Fan Flooding	6-43	Lava Flow	6-93
Aufeis Flooding or Icing	6-6, 6-48	Liquefaction	6-34
Ballistics	6-94	Local Tsunami	6-77
Block Slide	6-66, 67, 72	Loose Snow Avalanche	6-14
Climate Change	6-1, 19, 104, 111	Naled	6-48
Coastal Erosion	6-20, 49, 60	Overbank Flooding	6-43
Coastal Flooding	6-45, 62	Periglacial	6-5
Cornice Collapse	6-14	Permafrost	6-5, 19, 23
Cryosphere Hazards	6-3, 24	Pyroclastic Density Current	6-93
Debris Avalanche	6-66, 67, 88, 93	Rainfall-Runoff Flooding	6-43, 56
Debris Flow	66, 67, 72	Regional Tsunami	6-77
Directed Blast	6-88, 94	Retrogressive Thaw Slide	6-68
Distant Tsunami	6-77	Retrogressive Thaw Slump	6-68
Drifting Ice	6-13	Riverine Erosion	6-52, 60
Earthflow	6-66, 67	Riverine Flooding	6-43
Earthquake	6-27	Rockfall	6-19, 66, 67, 93
Earthquake-induced or tectonic Tsunami	6-75	Rotational Landslide	6-66, 67
Earthquake-related Ground Failure	6-36, 6-72	Sea Ice	6-13
Erosion	6-2, 41, 72	Sea Level Rise	6-46
Flash Flooding	6-44	Seiche	6-34, 77, 81
Flooding	6-41	Slab Avalanche	6-15
Fluctuating Lake Levels	6-47	Slump	6-68
Frost Cracking	6-6	Slush Avalanche	6-15
Frost Heaving	6-6	Slush Ice	6-14
Frost Jacking	6-7	Snow Avalanche	6-14, 23, 25
Frozen Debris Lobes	6-69	Snowmelt Flooding	6-43, 56
Gelifluction	6-68	Soil Creep	6-66, 68
Glacial Calving	6-3	Solifluction	6-68
Glacial Lake Outburst Flooding	6-5, 21, 47	Storm Surge	6-45
Glacier Surge	6-5	Strong Ground Motion	6-33
Glaciers	6-3	Subsidence	6-33, 68
Ground Failure	6-21, 31, 65, 70	Surface Rupture	6-33
Ground Ice	6-5, 6, 8, 11	Thermokarst	6-7, 68
Grounded Floeberg	6-13, 14	Topple	6-66, 67
Groundwater Flooding	6-48	Translational Landslide	6-66, 67
Ice Collapse	6-3	Tsunami	6-34, 75
Ice Fall Avalanches	6-4	Uplift	6-33
Ice Jam Flooding	6-44	Usteq	6-8
Ice Overflow Flooding	6-48	Volcanic Ash Cloud	6-88
Ice Push	6-13	Volcanic Ash Fall	6-89
Iceberg	6-13	Volcanic Debris Avalanche	6-93
Icing or Aufeis	6-6, 48	Volcanic Gases	6-91
Ivu	6-2, 13, 25, 59-59	Volcanic Landslide	6-93
Lahar	6-67, 92, 93	Volcanic Rockfall	6-93
Landfast Ice Break-out	6-14	Volcanic Tsunami	6-94
Landslide	6-65, 93	Volcanoes	6-85
Landslide-generated Tsunami	6-31, 79, 82	Wind erosion	6-52

Each profiled hazard is assigned an impact (i.e. magnitude or severity) rating based on its individual characteristics. Recurrence probability is defined within each hazard profile (Section 6).

Section 8.6 explains the SHMP's vulnerability assessment methodology along with detailed hazard risk analyses and associated vulnerability assessments.

This analysis was completed using geographic information system (GIS) mapping tools to analyze, manage, and present spatial relational data.

- Tables 8-14 through 8-21 have "Severity" and "Description" columns, which designate infrastructure category's locational or situational likelihood.
- Tables 8-22 and 8-23 provide historical event data from DHS&EM's 2018 Disaster Cost Index (Appendix 13.18).

Section 8.7 Exposure Analysis – Narrative Summaries

This section provides individual hazard narrative descriptions based on Tables 8-14 through Table 8-21 that are broken out by their respective "severity" and "description" column data.

Note: *Alaska's profiled hazards are presented throughout Sections 6. The presentation order does not signify their importance or risk level.*

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6. Natural Hazards

6.1. CRYOSPHERE

6.1.1. HAZARD CHARACTERISTICS

The "cryosphere" is defined as those portions of Earth's surface and subsurface where water is in solid form, including sea, lake, and river ice, snow cover, glaciers, ice caps and ice sheets, and frozen ground (e.g., permafrost) (Figure 6-1). The components of the cryosphere play an important role in climate. Snow and ice reflect heat from the sun, helping to regulate our planet's temperature. They also hold Earth's important water resources and therefore regulate sea levels and water availability in the spring and summer. The cryosphere is one of the first places where scientists are able to identify global climate changes.

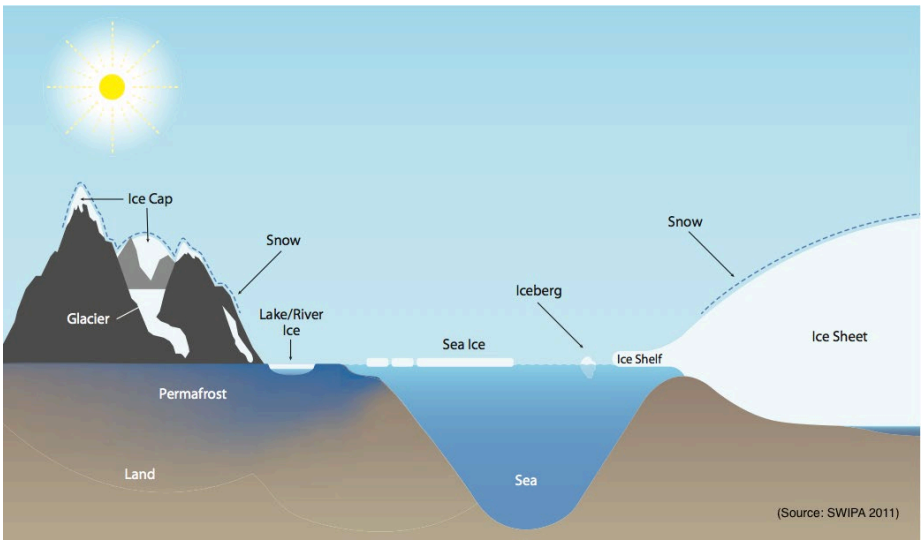


Figure 6-1 Cryosphere Components Diagram

The diagram depicts cryosphere components. Source: Snow, Water, Ice, Permafrost in the Arctic (SWIPA)

Hazards of the cryosphere can be subdivided into four major groups:

- Glaciers
- Permafrost and periglacial
- Sea ice
- Snow avalanche

Glaciers are made of compressed snow, which has survived summer and transformed into ice. Over many years, layers of accumulated ice build into large, thickened ice masses. Due to the sheer mass of the accumulated ice, glaciers flow like very slow rivers. Presently, glaciers occupy about 10 percent of the world's total land area, with most located in polar regions. Today's glaciers are much reduced from the last Ice Age, when ice covered nearly 32 percent of the land and 30 percent of the oceans. Most glaciers lie within mountain ranges that show evidence of a

much greater extent during the ice ages of the past 2-million years, and recent retreat in the past few centuries. Hazards related to glaciers include ice collapse (e.g., glacial calving and ice fall avalanche), glacial lake outburst flood, and glacial surge.

Permafrost and periglacial hazards are caused by the effects of changing perennially frozen soil, rock, or sediment (known as permafrost) and the landscape processes that result from extreme seasonal freezing and thawing (Figure 6-2). Permafrost is found in nearly 85 percent the state. It is thickest and most extensive in Arctic Alaska north of the Brooks Range; present virtually everywhere and extending as much as 2,000 feet below the surface of the Arctic Coastal Plain. Southward from the Brooks Range permafrost becomes increasingly thinner and more discontinuous, broken by pockets of unfrozen ground known as taliks, until it becomes virtually absent in Southeast Alaska, with the exception of pockets of high-elevation alpine permafrost.

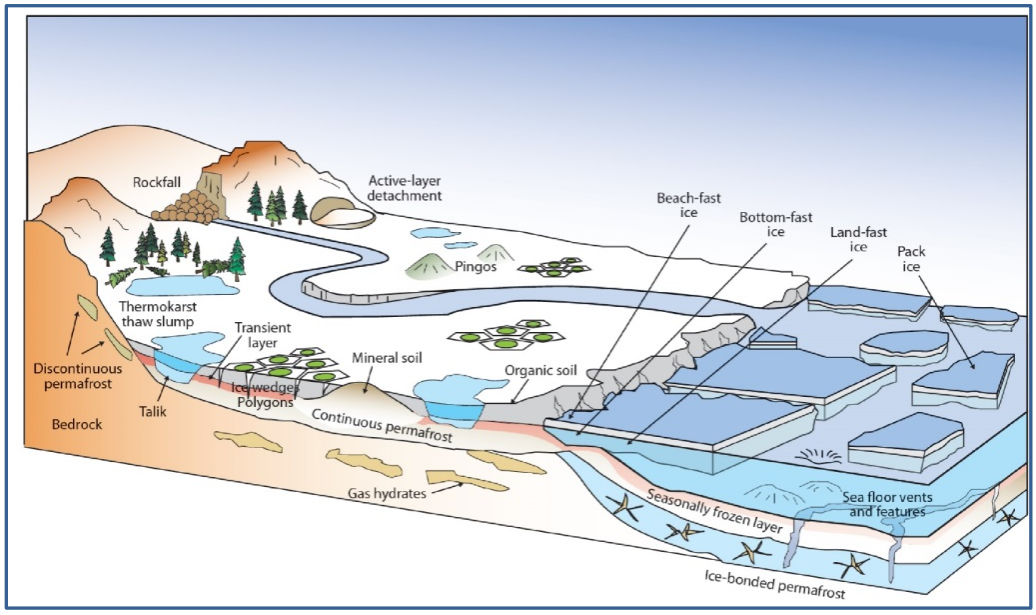


Figure 6-2 Schematic Diagram Associating Landscape, Permafrost, and Sea Ice
These features are closely associated in northern latitudes. Source: SWIPA

In the U.S., the presence of widespread permafrost results in classes of geologic hazards, which are largely unique to Alaska. Permafrost is structurally important to the soils of Alaska, and thawing causes landslides, ground subsidence, and erosion as well as lake disappearances, new lake development, and saltwater encroachment into aquifers and surface waters. *Usteq*, from the Yup'ik word meaning "surface caves in," is a catastrophic form of permafrost thaw collapse that occurs when frozen ground disintegrates under the compounding influences of thawing permafrost, flooding, and erosion.

Sea ice is frozen ocean water that forms, grows, and melts in the ocean (Figure 6-2). Sea ice grows during the winter and melts during the summer, but some sea ice remains all year in certain regions. Risks associated with human activities and ice processes are the greatest in the Arctic and sub-Arctic regions because of the prevalence of sea ice in those high latitudes. Hazards from sea ice include threats to shipping from running into ice; equipment or personnel breaking through ice when it is used as a seasonal platform for development activities; ice push (ivu) and gouging of the land or seafloor; and slush ice build-up that can clog intake valves. Lack

of sea ice during fall and winter increases the risk of coastal flooding and erosion from storms in northern and western Alaska because the ice is not there to protect the shore.

A snow avalanche is a mass of snow, ice, and debris that releases and slides or flows rapidly down a steep slope, either over a wide area or concentrated in an avalanche chute or track. Avalanches reach speeds of up to 200 miles an hour and can exert forces great enough to destroy structures and uproot or snap large trees. A moving avalanche may be preceded by an "air blast," which is also capable of damaging buildings. Snow avalanches commonly occur in the high mountains of Alaska during the winter and spring as the result of heavy snow accumulations on steep slopes.

Alaska is particularly vulnerable to cryosphere hazards, as much of its social and economic activity is connected to the existence of snow, ice, and permafrost.

Glaciers

Ice Collapse hazards result from large ice chunks breaking off from a glacier, either through glacial calving or as an ice fall avalanche. These hazards are almost impossible to predict and, in contrast to most other hazards in the cryosphere environment, they can happen independently of weather (e.g., heavy precipitation and rapid warming). In Alaska, ice collapses have on multiple occasions been triggered by earthquakes. Depending on the volume of ice collapse, these hazards can have tremendously devastating effects and can cause additional hazards, such as flooding and snow avalanches.

Glacial Calving is the breaking away of a mass of ice from a near-vertical ice face along the terminus of a glacier, often into a large body of water (Figure 6-3). Glacier calving can be accompanied by a loud cracking or booming sound as the blocks of ice break loose and crash into the water. The entry of the ice into the water can cause large, sometimes hazardous, waves that can swamp boats and inundate nearby shores. In July 2015, a magnitude 6.3 earthquake occurred 120 miles west of Bear Glacier in Kenai Fjords, triggering a one-mile swath of ice to calve from the glacier and generating waves (a local tsunami) throughout the lagoon.

Figure 6-3 Ice Calving From Glacier Front, Alaska
(Source: U.S. Geological Survey [USGS])

Ice Fall Avalanches are triggered by new or existing cracks (crevasses) in the glacier ice that allow chunks of a glacier to detach and fall down the slope as a mass of broken ice. Similar to cornice collapses (see Snow Avalanche), the mass of these ice falls often triggers snow avalanches on the slope below as they hit the snowpack. Ice fall avalanches are unrelated to precipitation, temperature, or other typical snow avalanche factors.

Glacial Lake Outburst Floods, also known as jökulhlaups, occur when water is rapidly released from a glacial lake due to the sudden failure of an ice or moraine dam, or to water overtopping the dam as a result of waves caused by mass wasting (landslide) of nearby unstable slopes that cause a landslide-generated tsunami. In the glacial system, ponds may form wherever water can be retained and drainage restricted, resulting in five glacial lake types (Figure 6-4):

A. *Ice-marginal lake:* forms alongside a glacier when a tributary valley or distributary glacier gets dammed by the main trunk of a valley glacier or outlet glacier
B. *Proglacial lake:* forms at the terminus of a valley glacier or outlet glacier
C. *Supraglacial lake:* forms in depressions on top of a glacier
D. *Englacial lake:* forms within a glacier in enlarged conduits and cavities in the ice
E. *Subglacial lake:* forms underneath a glacier in a topographic depression, or by damming by subglacial debris; subglacial volcanic or geothermal activity can also cause a subglacial lake to form

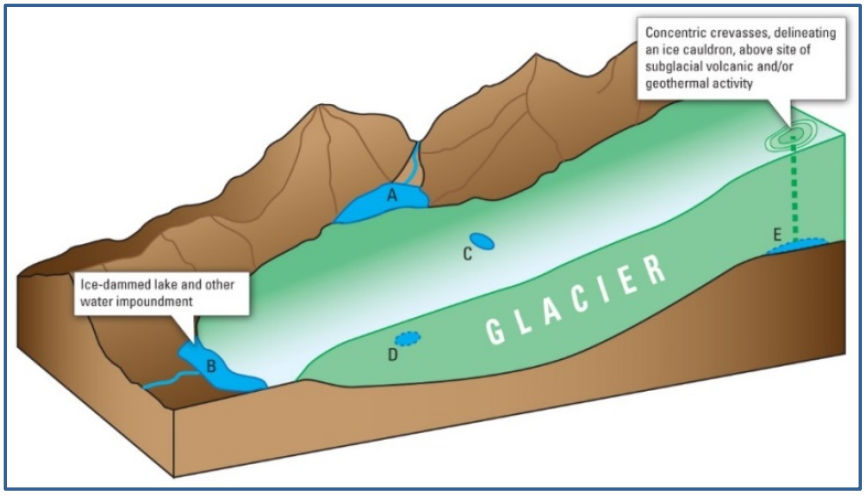


Figure 6-4 Glacial Lake Formation Diagram

Shows the possible locations of impounded water that can form glacial lakes and potentially generate outburst floods. Source: USGS, 2018

Outburst floods can be incredibly destructive; depending on the water volume released and downstream topography, outburst floods can cause extensive damage to downstream infrastructure and threaten public safety. Through collaboration between state agencies, universities, and local cities, a monitoring program has been established in Alaska for ice-dammed lakes at Bear Glacier in the Kenai Mountains, Valdez Glacier in the Chugach Mountains, Russell Lake at Hubbard Glacier in the Saint Elias Mountains, and the Suicide Basin at Mendenhall Glacier in the Coast Range.

Glacier Surge is when a glacier periodically undergoes a brief phase (typically lasting 1–4 years) of rapid flow, called a surge. Surges are generally interspersed with longer periods (typically 10–100 years) of near-stagnation. During a surge, a large volume of ice is displaced downstream at speeds of up to several yards per hour into an ice-receiving area, and the affected portion of the glacier is chaotically crevassed (i.e. cracked). In the interval between surges, the ice reservoir is slowly replenished by snow accumulation and normal ice flow, and the ice in the receiving area is greatly reduced by ablation (i.e. the natural removal of ice through melting, calving, and sublimation). A surging glacier can advance quickly and override the ground in front of it, destroying anything in its path and potentially damming water flow to create a glacial lake that is a potential source of outburst flooding. Surging glaciers can also be particularly dangerous after surging because highly crevassed glacier snouts are unstable and subject to a higher incidence of calving and ice fall avalanches.

Permafrost and Periglacial

In the periglacial environment, the effects of freezing and thawing drastically modify the ground surface. Types of modification include the displacement of soil materials, migration of groundwater, and the formation of unique landforms. Many periglacial regions are underlain by permafrost that strongly influences geomorphic processes acting in these parts of the world.

Permafrost, defined as ground with a temperature that remains at or below freezing (32°F or 0°C) for two or more consecutive years, can include rock, soil, organic matter, unfrozen water, air, and ice. Regions with permafrost are typically categorized by percent of surface area underlain by permafrost (Figure 6-5): continuous (>90 percent), discontinuous (50-90 percent), sporadic (10-50 percent), and isolated (<10 percent) permafrost. Bodies of ice can occur in permafrost, including pore ice, segregated ice, tabular ice, and ice wedges, among others. Large bodies of ground ice are referred to as massive ground ice. Permafrost with a high volume of ice is called ice rich permafrost.

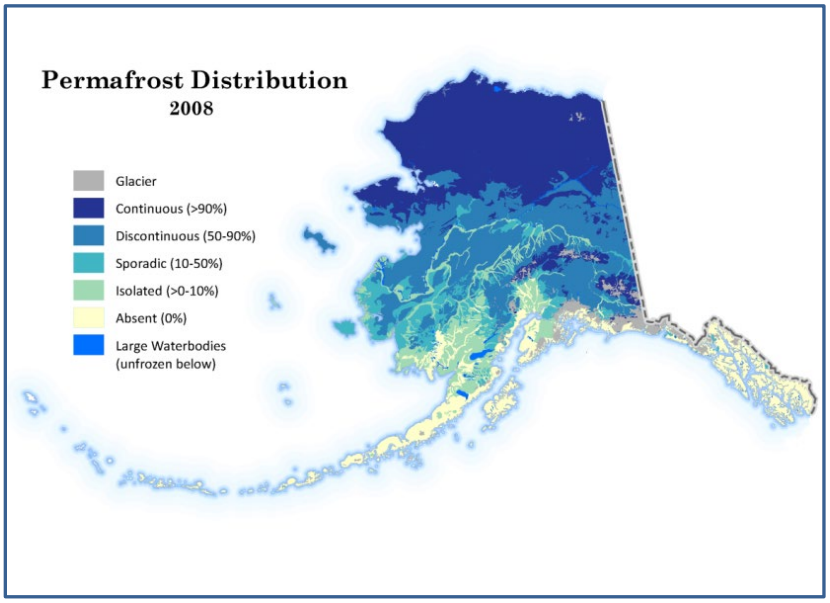


Figure 6-5 Permafrost Distribution Map
Shows permafrost distribution in Alaska, 2008. Source: Jorgenson and others, 2008

Permafrost provides a stable foundation for structures and infrastructure in cold-climate regions as long as the temperature of the frozen ground is well below freezing. A major hazard of warming and thawing permafrost is that ground ice degrades and the soil surface collapses. Fluctuations in temperature over the seasons also cause the ground to move as the upper layers freeze (i.e. ice lens formation) and thaw (i.e. loss of ice). Segregated ice lenses may form under wet conditions as the ground freezes, especially in fine-grained soils such as silt or clay. Upon thawing, ground ice can cause an excess of liquid water that cannot be stored in the soil and needs to flow out of the soil as gravity consolidates the soil after thawing.

Aufeis (German for "ice on top"), or ***Icing***, occurs when a sheet-like mass of layered ice forms from successive groundwater flows during freezing temperatures. Groundwater is forced by hydraulic pressure to break through to the surface and flow on top of previously formed ice, which can occupy most or all of the river bed and causes the liquid to flow around or over the ice. This ice accumulation means that even small flows in winter can create large hazards as the icing impinges on roads and buildings (Figure 6-6). Aufeis can also cause a secondary hazard during snowmelt, when meltwater is unable to occupy the ice-filled river bed and instead flows unrestrained across the land and ice surface. The Dalton Highway aufeis flood described in the Flood and Erosion section of this report was exacerbated by meltwater.

Figure 6-6 Aufeis at a Bridge Near Fairbanks, Alaska
Source: DGGS

Frost Cracking results from freezing soil contraction. This contraction can be forceful enough that the ground cracks in order to release tensile stress, similar to what happens when mud dries to form mud cracks. In extreme cases, polygons may form from thermal contraction in very cold environments and develop ice wedges within the cracks from meltwater and blowing snow accumulation. Frost cracking can be hazardous when it occurs in road surfaces, breaking pavement and road bed structure.

Frost Heaving occurs when the soil surface is lifted with great strength from below by seasonal ice lens development in fine-grained soils (Figure 6-7). The temperature gradient from the freezing surface into the unfrozen ground drives liquid water to the freezing front, where it can

freeze into solid ice lenses. Buildings and roads are affected by the lifting force of the growing ice lenses, but the most destructive conditions occur when there is differential frost heave. Differential frost heave occurs when ice lens formation is non-uniform and only portions of the soil surface are pushed up—this can break building foundations and roads to pieces. A compounding effect of the seasonal ice lenses that cause frost heaving is that, upon thawing, the soil is left supersaturated, meaning that the liquid is carrying the weight of the soil. Pressure on the supersaturated soil, such as driving on a road across the thawed ice heave area, causes horizontal (lateral) movement of the soil and destruction of the overlying roadbed. This is the reason that roads can fail in spring, and why there are restrictions on axle weight.

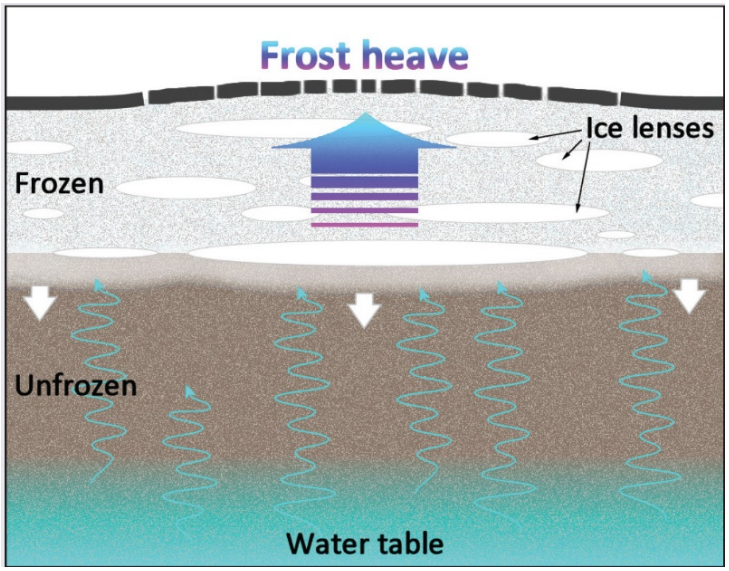


Figure 6-7 Diagram of Frost Heave Formation

Freezing takes place from the surface down (white arrows). When conditions are favorable, an ice lens begins to form a short distance behind the freezing front. Fed by liquid groundwater from warmer zones deeper in the soil profile, the lens will continue to grow for as long as the controlling mechanisms allow. Multiple lenses reflect fluctuations in these controls due to changes in surface temperature, soil texture, and water availability. The amount of vertical displacement (heave) is roughly equal to the combined thicknesses of the underlying ice lenses. Heaving causes the pavement to crack.

Source: North Dakota Department of Mineral Resources

Frost Jacking occurs when a solid object, such as a fence post or foundation block, is incrementally jacked out of the ground due to ice lens formation within the soil during repeated freeze-thaw cycles. Two mechanisms are believed to be responsible for frost jacking:

- Freezing soil grips the object and heaves upward due to expanding ice, thereby lifting the object out of the ground; and
- Water trickles underneath a solid object and resultant ice growth during freezing pushes the object out of the ground. This process can cause foundations to break and buildings to collapse.

Thermokarst is a form of periglacial topography resembling karst, characterized by irregular surfaces and hollows, produced by the selective melting of ice in ice-rich permafrost (especially permafrost with massive ground ice). Degrading ice-rich permafrost causes differential

settlement when voids are left behind by melting ice collapse. Sometimes this can form deep depressions (i.e. pits) when thick ground ice degrades and the soils above it cave in, or thermokarst lakes where continued thawing along the margins of the lake causes the surface to collapse further and the lake to expand over time.

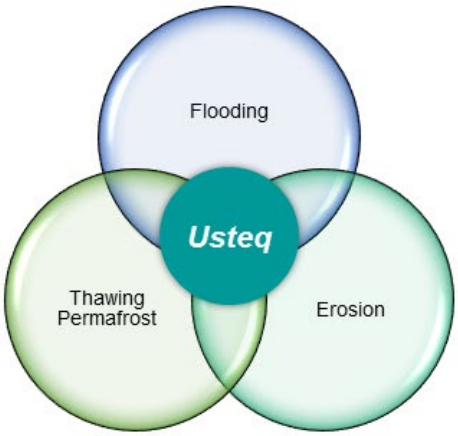
When permafrost is present on steeper slopes and the water released from melting ground ice is greater than the pore volume of the thawed soils, slope materials can become unstable and flow downhill. This is known as a retrogressive thaw slump or active layer detachment slide (see Ground Failure). These features can continue to grow as long as massive ice is present in the collapsing ground and the remaining slopes are sufficiently steep.

Usteq is a catastrophic form of permafrost thaw collapse that occurs when frozen ground disintegrates under the compounding influences of thawing permafrost, flooding, and erosion (Figures 6-8 and 6-9). It is important to recognize that the compound hazard of usteq is much greater than the individual component processes; permafrost thaw, flooding, and erosion are parts of an escalating feedback loop. While permafrost degradation on its own can be a slow or moderately rapid process, in combination with flooding (including storm surge) and erosion, permafrost thaw can happen very quickly. During usteq, permafrost thaw that was previously a slow, developing hazard becomes a high-impact disaster as the ground caves in and collapses.

Figure 6-8 Structure at Elson Lagoon, Alaska
Land lost to the ocean due to usteq. Source: USGS

There are three critical permafrost characteristics that strongly affect susceptibility to usteq: thermal state, ice content, and soil characteristics. In practice, the thermal state of permafrost refers to the temperature of the frozen ground. Permafrost is a reflection of the long-term-thermal stability of atmospheric temperatures, combined with the dynamics of snow accumulation; and the stability of permafrost can be determined by measuring its temperature. When temperatures approach the melting point of ice in the ground, permafrost temperature remains more-or-less steady at that point until all ground ice has melted. During permafrost thaw, surface collapse can sometimes be measured instead of temperature to detect the progression of permafrost thaw. During wet summers, the effects of permafrost thaw can be accelerated because infiltrating water transports heat to the thawing front, and the additional water carries sediment away from ground ice in thaw slumps.

Individually, flooding, thawing permafrost, and erosion are persistent geologic hazards in Alaska. When combined, feedbacks effectively lower the threshold to each other's impacts and result in catastrophic permafrost thaw collapse known as ***usteq.***



Thawing Permafrost

Threshold Measure
- Soil temperature above 0° C
- Increasing active layer thickness
- Collapsing land surface

Natural Stressors
- Temperature
- Ice content
- Soil character

Anthropogenic Stressors
- Building on permafrost
- Removing thermal insulator (vegetation) from ground surface

Feedbacks
- Thawing permafrost results in subsidence of the ground surface, lowering the threshold to flooding
- Thawed permafrost is less cohesive than frozen ground, lowering the threshold to erosion

Documentation
- Ground temperature
- Summer thaw depth
- Land surface levels

Flooding

Threshold Measure
- Water levels exceed the elevation of a bank or shoreline

Natural Stressors
- Coastal/ocean storm surge and waves
- High precipitation
- Ice jam
- Snowmelt
- Glacial outburst
- Relative sea level rise

Anthropogenic Stressors
- Building on low-lying land
- Building damming structures

Feedbacks
- Flooding introduces warm or saline water into permafrost hydrology, increasing susceptibility to thaw
- Flooding physically erodes land through increased flow velocity over erodible materials

Documentation
- Level of water relative to a land-based datum

Erosion

Threshold Measure
- Loss of land

Natural Stressors
- Waves, currents, and wind
- Soil character

Anthropogenic Stressors
- Boat wakes
- Vehicle and walking use
- Building structures in the nearshore coastal zone, disrupting longshore transport of sediment
- Removing vegetation

Feedbacks
- Erosion along rivers and coasts exposes permafrost to warm air and water
- Erosion of land can reduce the height of natural or built flood mitigation structures, or completely breach barriers to water flow

Documentation
- Position of the shoreline or riverbank

Figure 6-9 Schematic Describes Usteq's Compounding Threat

A catastrophic form of permafrost thaw collapse that occurs when frozen ground disintegrates under the compounding influences of thawing permafrost, flooding, and erosion. Source: DGGS

Permafrost temperatures throughout Alaska are showing warming trends (Figure 6-10); as permafrost approaches the freezing point (0°C/32°F), it becomes increasingly unstable and prone to collapse. Unstable permafrost requires very little trigger to initiate degradation.

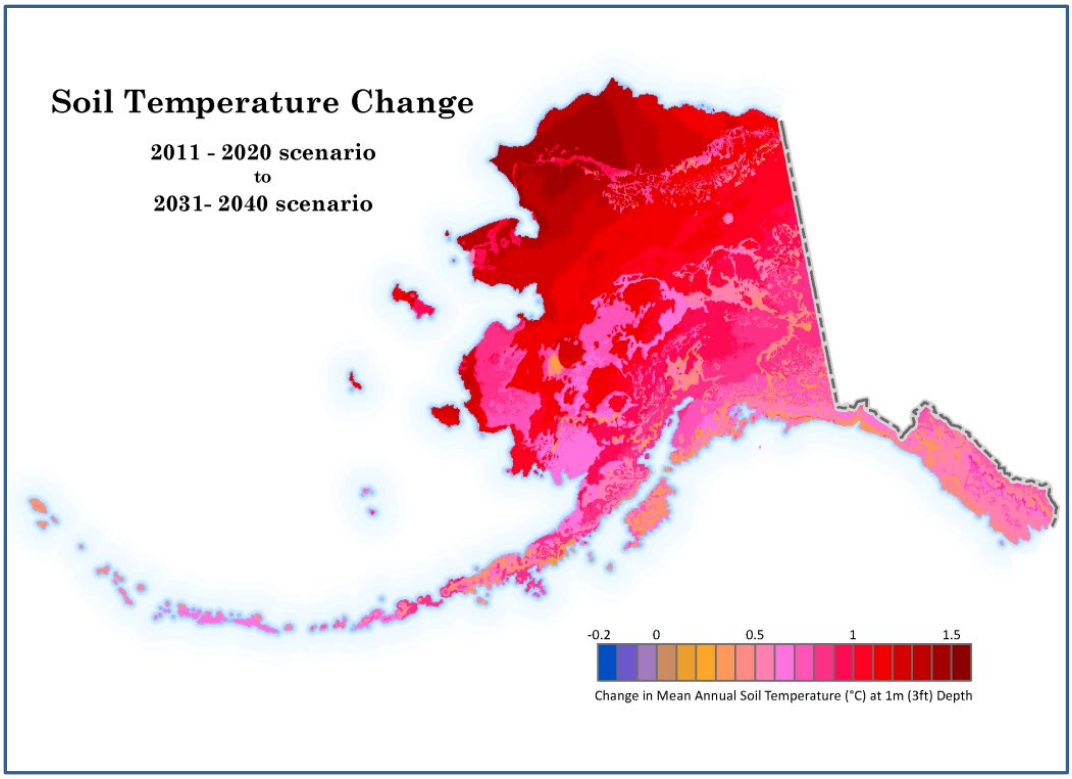


Figure 6-10 Displays Modeled Soil Temperature Potential Changes
Scenarios span over the next 20 years. This is just one illustration of the many scenarios that scientists use to try to anticipate changes as climate warms; most models indicate that soil temperatures in Alaska are showing warming trends as global temperatures rise. Source: Denali Commission Threat Assessment, & UAF, 2018

Ice content is the measure of frozen water in a given volume of permafrost (Figure 6-11). Because permafrost by definition is any earth material that remains below freezing for more than two consecutive years, permafrost composition is highly variable, ranging from solid rock to soils that are composed almost entirely of ice. Studies near Cape Halkett and Drew Point on the Arctic coast of Alaska have demonstrated that the rate of coastal erosion of ice-rich permafrost coast is much faster than non-ice-rich coast. In Alaska, yedoma that may be tens of feet thick occurs in the Arctic Foothills, in the northern part of the Seward Peninsula, and in interior Alaska; these areas will be particularly susceptible to catastrophic thaw collapse as temperatures warm. For example, the In'upiat community of Noorvik sits on 65 to 100 feet of massive ground ice that will be at risk of collapse if trends continue.

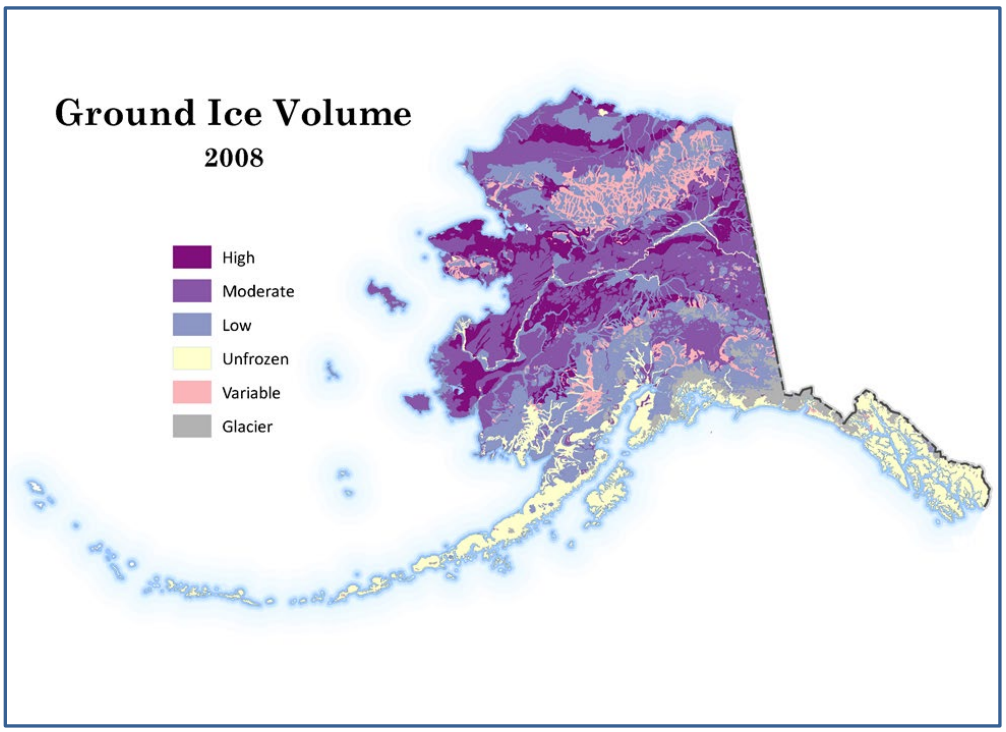


Figure 6-11 Map Showing Ground Ice Volume of Permafrost in Alaska
A higher volume of ground ice, especially in fine-grained soils, can make soils more unstable upon thawing due to high pore water pressures in the supersaturated soils, and lead to extreme ground settlement due to voids left by melting ice. Source: Jorgenson and others 2008

Figure 6-12 Yedoma Exposed Along an Eroded Arctic Coast
Source: NPS

The third factor is frozen soil or ground composition. Some soils (e.g., gravel) may have a very high ice content but are thaw stable when the ice melts, and other soil types (e.g., silt) will disintegrate and collapse when the supporting ice structure turns to water and saturates the soil material. When large areas of thick, ice-rich, fine-grained substrate thaw, there is potential for extreme consequences, including large-scale land surface lowering and collapse, sinkholes, and landslides.

Feedback mechanisms become particularly significant for affected communities in coastal and riverine environments, where river or ocean water from local flood events or storms can reach far inland and contribute to permafrost degradation. Warming temperatures initiate permafrost thaw, causing the land surface to sink (a form of ground subsidence). This lowered land surface is more vulnerable to storm surges and flooding, which exacerbate the hazard and lead to catastrophic hyper-erosion and inundation. Coastal storms that bring saltwater into contact with unstable permafrost can magnify thawing impacts, for example, at Kwigillingok on the Yukon-Kuskokwim Delta. Modeling shows that saltwater accelerates coastal permafrost thaw, even if temperature effects are ignored.

Permafrost is present and is collapsing throughout most of Alaska. Thawing permafrost alone is considered a specific hazard, but usteq is an additional unique, compound hazard. While some communities will have thawing with little or no flooding or erosion, it is when all three processes combine that the effects become catastrophic.

Elevated community risk factors for usteq include permafrost thermal state, soil ice content, soil characteristics, coastal vulnerability, and riverbank vulnerability. Measuring permafrost thaw vulnerability can be accomplished by:

- Measuring soil temperature, and evaluating whether it is approaching thaw vulnerability thresholds (in most cases 32°F);
- Measuring summer thaw depth and determining if this depth is increasing; and
- Monitoring ground surface levels to look for long-term subsidence.

Modeling and data sharing are critical to mitigating usteq threats to Alaska communities and infrastructure. On the ground observations, in conjunction with remotely sensed data, provide the necessary information required to develop realistic models of the interacting environmental hazards and how to integrate their effects into a unified understanding of the threat. Data inputs and results must be shared so that all stakeholders have equal access and can independently evaluate and use the information for diverse needs and priorities. Partnerships, which link local community observers with universities and government agencies researchers have already formed to create effective teams that contribute critical data to help understand and evaluate Alaska's thawing permafrost, flooding, and erosion challenges. These partnership networks include Alaska Native Tribal Health Consortium's Local Environmental Observer Network (LEO Network; http://www.aoos.org/alaska-community-based-monitoring/what-are-we-observing/leo-network); the Alaska Sea Grant-funded Shoreline Erosion Monitoring Project (https://seagrant.uaf.edu/research/projects/summary.php?id=1041); the UAF' Alaska Arctic Observatory and Knowledge Hub (AAOKH; https://arctic-aok.org); and a new community-based monitoring project initiated by the Alaska Institute of Justice, Woods Hole Research Center, and DGGS.

Sea Ice

Sea ice hazards are common in the Arctic, where extreme cold weather conditions freeze the oceans' surface. Some of these hazards are also relevant for fresh water systems, such as rivers and lakes. The Arctic Ocean freezes over vast areas to ice thicknesses of more than 3 feet annually. A large portion of this area melts during the summer, but usually some of the annual ice remains to become multi-year ice that can freeze again and become much thicker. Sea ice and its associated hazards are complex and dynamic due to the interaction of wind, temperature, first-year ice, and multi-year ice with a variety of human activities related to transportation, subsistence living, coastal erosion, and resource extraction. *Source: Eicken & Mahoney, 2015*

Sea ice hazards have been present since the first people ventured out into the sea ice for hunting and travel. Population growth, demand for resources, and the warming climate of the last century have spurred more interest in arctic exploration and an increase in the number of cruises into high-latitude waters. Even the indirect consequences of sea ice activity can be hazardous to ship traffic; for example, in August 1996, the cruise ship "Hanseatic" ran aground in Simpson Strait near Gjoa Haven, Northwest Territories, because winter sea ice had moved a buoy that was supposed to be marking a shoal.

Drifting Ice (Iceberg) is ice that has broken free of its source (sea ice or glacier) and floats in an ocean or lake. Icebergs come in all shapes and sizes, from ice-cube-sized chunks to ice islands up to 4,250 square miles (about the size of Connecticut). Icebergs pose a danger to ships traversing high-latitude waters.

A ***Grounded Floeberg*** is a massive piece of sea ice, composed of pressure ridges or hummocks, which has separated from the ice pack and become lodged in shallow water.

Ice Push (Ivu) is a surge of ice from an ocean or large lake onto the shore. Ivus are caused by currents, strong winds, or temperature differences pushing ice onto the shore, creating immense ice piles that can be shoved far inland and are capable of moving and destroying infrastructure and buildings (Figure 6-13).

Figure 6-13 Ivu Near Golovin, Alaska
Ivu seen after the 2011 Bering Sea storm. Source: DGGS

Landfast Ice Break-Out occurs when grounded pressure ridges that anchor sea ice to the shallow ocean bottom fail or unground, and previously stationary ice detaches from the coast and drifts away to form a floeberg.

Slush Ice is a mixture of snow and ice crystals floating on the surface of the ocean. The ice crystals, called frazil, represent the first stages of sea ice growth. Slush ice can build up on vessels and equipment and clog intake valves.

With commercial shipping routes in the Arctic Ocean becoming more commonly traveled, ships are increasingly experiencing the impacts of sea ice. Even small amounts of ice can create problems for valves and water intake for jet propulsion. Icebreakers are typically used to break sea ice to reduce collision hazard, but multi-year ice can be too thick and pose a problem for ice breakers.

Oil pipelines and communication cables are typically laid upon or buried in sediment on the bottom of the ocean. Where sea water is shallow, iceberg gouging can be a problem when the ice thickness is greater than the water depth. Propelled by the wind, these ice masses push through the sediment and can disrupt cables or pipelines.

Snow Avalanche

A snow avalanche is a downhill mass movement of snow. Their size, run-out distance, and impact pressure vary. Large avalanches have the potential to kill people and wildlife, destroy infrastructure, level forests, and bury entire communities. Significant avalanche cycles (multiple avalanches naturally releasing across an entire region) are generally caused by long periods of heavy snow, but avalanche cycles can also be triggered by rain-on-snow events, rapid warming in the spring, and earthquakes.

An avalanche releases when gravity-induced shear stress on or within the snowpack becomes larger than its shear strength. Triggers can be natural (e.g., rapid weight accumulation during or just after a snowstorm or rain event, warming temperatures, and seismic shaking) or artificial (e.g., human weight or avalanche-control artillery). There are four distinct avalanche types in Alaska that occur under varying snowpack and weather conditions. Each avalanche type is named based on its snow release characteristics:

- Cornice collapse
- Loose snow avalanche
- Slab avalanche
- Slush avalanche/flow

Cornice Collapse occurs when an overhanging snow mass breaks, separates, or is released. Cornices form on ridge crests or shoulders adjacent to gullies due to wind blowing the snow. The cornice is an indicator of predominant wind directions, as the cornice is formed on the lee (i.e., downwind) side of topographic features. Over time, the cornice can develop weaknesses in its structure and its attachment to the slope may fail. A cornice collapse often triggers a loose snow or slab avalanche as it adds sudden and significant stress onto the snowpack below.

Loose Snow Avalanches, also known as point releases, initiate with a small amount of non-cohesive (loose) snow and quickly grow larger as they move downhill and entrain more snow.

This type of avalanche typically carries relatively small amounts of powder snow and virtually no other debris. However, a loose snow avalanche may trigger a larger slab avalanche on the same slope.

A ***Slab Avalanche*** releases as a block of cohesive snow when snow particles have stuck together to form one or more resistant layers. There is a wide range of slab characteristics possible, running the gamut from "soft" slab (weakly cohesive snow) to "hard" slab (very cohesive snow), and from "storm" slab (release of recently deposited storm snow), to "persistent" and "deep persistent" slab (release of a slab that failed on a weak layer deeper down in the snowpack). Due to their large release masses, and because more snow is picked up along the way (snow entrainment), slab avalanches are the most destructive avalanche type. Human encounters with even small-sized slab avalanches are often fatal.

Slush Avalanches are fast-moving mixtures of snow and water. They release in isothermal snowpacks (snow temperature throughout the snowpack is 32°F) when liquid water permeates the snowpack and dramatically weakens the intergranular bond. Slush avalanches therefore typically occur in northern Alaska during the spring when warm temperatures and strong solar radiation quickly warm up the snowpack. Slush avalanches can release on slopes as gentle as 20 degrees. Their release is often slower than other avalanche types, but as the slushy snow runs downhill they can reach speeds over 40 miles per hour. Smaller, more fluid avalanches with higher water content are commonly referred to as slush flows.

An avalanche path comprises three main parts: starting zone, track, and run-out zone (Figure 6-14). Local topography determines the shape and size of each part. Steep gullies that contain a stream or creek in the summer often function as avalanche paths in the winter, but avalanches also release and run on simple and complex open slopes.

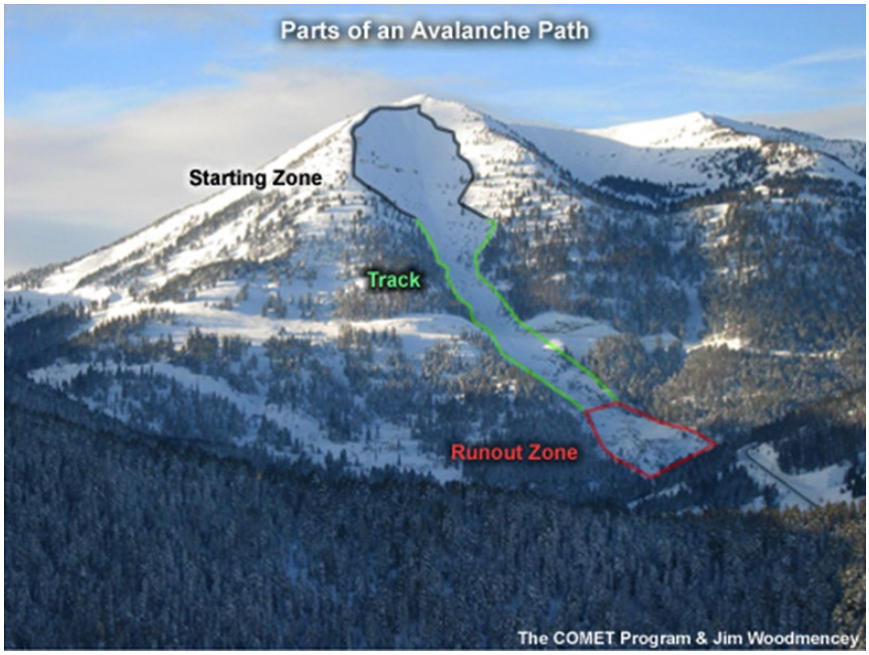


Figure 6-14 Parts of an Avalanche Path
Source: Cooperative Program for Operational Meteorology, Education, and Training [COMET®]
http://www.comet.ucar.edu/who_about_us.php

The *starting zone* is also called the release area. This is the upper part of the avalanche path, where snow accumulates (creating a slab or point source release area) and the avalanche begins its downhill movement. Starting zones are commonly located in the headwaters of a drainage where snow is accumulated on lee-side aspects of topographic features. Starting zones on open slopes are more difficult to identify. Sometimes multiple starting zones join into one track (e.g., several creeks funneling into one major gully).

The *track* is the middle part of the path, where the avalanche transports the released snow downhill to the deposition (runout) zone. The avalanche accelerates and reaches its maximum velocity in the track, and can also pick up more snow, adding to its mass. The track can be comprised of both confined gullies and unconfined open slopes. Tracks can also branch onto adjacent slopes, creating successive avalanches.

The *run-out zone* is the bottom part of the path, where the avalanche slows down and deposits debris. The avalanche impact pressure, which is a function of its snow density, volume (i.e., mass), and velocity, determines the amount of damage the avalanche could potentially cause. This measure is used for designing mitigation structures to protect infrastructure and buildings that are located in an avalanche risk zone.

Terrain factors that influence avalanche release are slope angle, aspect, and curvature, as well as topography (terrain roughness). Avalanches are also controlled by vegetation cover and elevation, which are both factors in getting enough snow accumulation on the slope. Avalanches typically release on slopes greater than 25 degrees and less than 60 degrees; this is the slope range where the snow can accumulate enough to build a slab, but also where snow tends to remain in place without sluffing off due to gravity. It is important to remember that avalanche run-out (deposition) can occur on all slopes. Figure 6-15 is a generalized avalanche-potential map of Alaska that was produced in 1980 by compiling and cross-correlating topographic relief, snow-avalanche regions, climatic zones, snowpack characteristics, and known and suspected avalanche activity. The map includes regions that had little or no snow avalanche occurrence data and is therefore provisional until better data are available and new analysis methods and avalanche modeling can be applied.

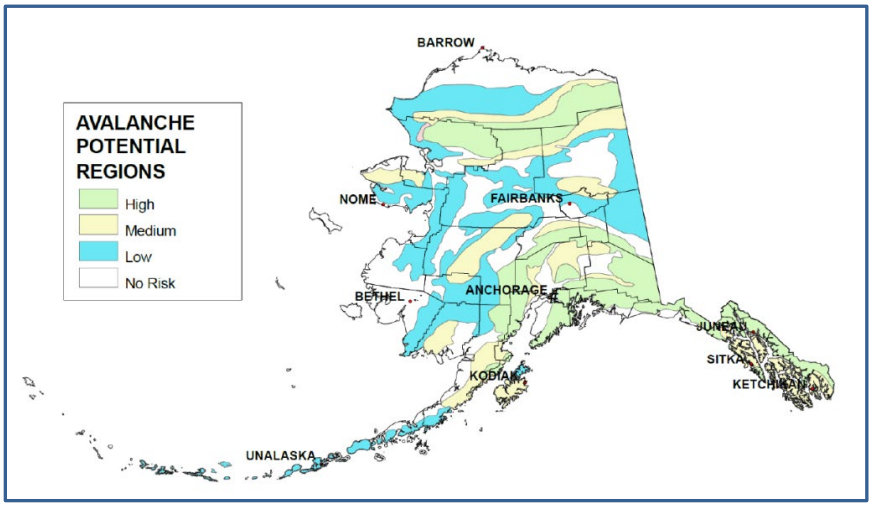


Figure 6-15 Map Depicting Alaska's Potential Snow-Avalanche Areas
Source: Hackett and Santeford 1980

New Alaska avalanche studies are currently being carried out by the State of Alaska Division of Geological & Geophysical Surveys and UAF. Figure 6-16 depicts potential snow avalanche release areas within a 6-mile buffer of roads in Alaska. The modeling uses digital topographic information as input and determines the potential release zones based on geostatistical parameters (e.g., elevation, slope, and curvature) and land cover (e.g., trees). This is a preliminary model result that does not include weather or snowpack parameters, but more advanced studies that will incorporate these elements are planned.

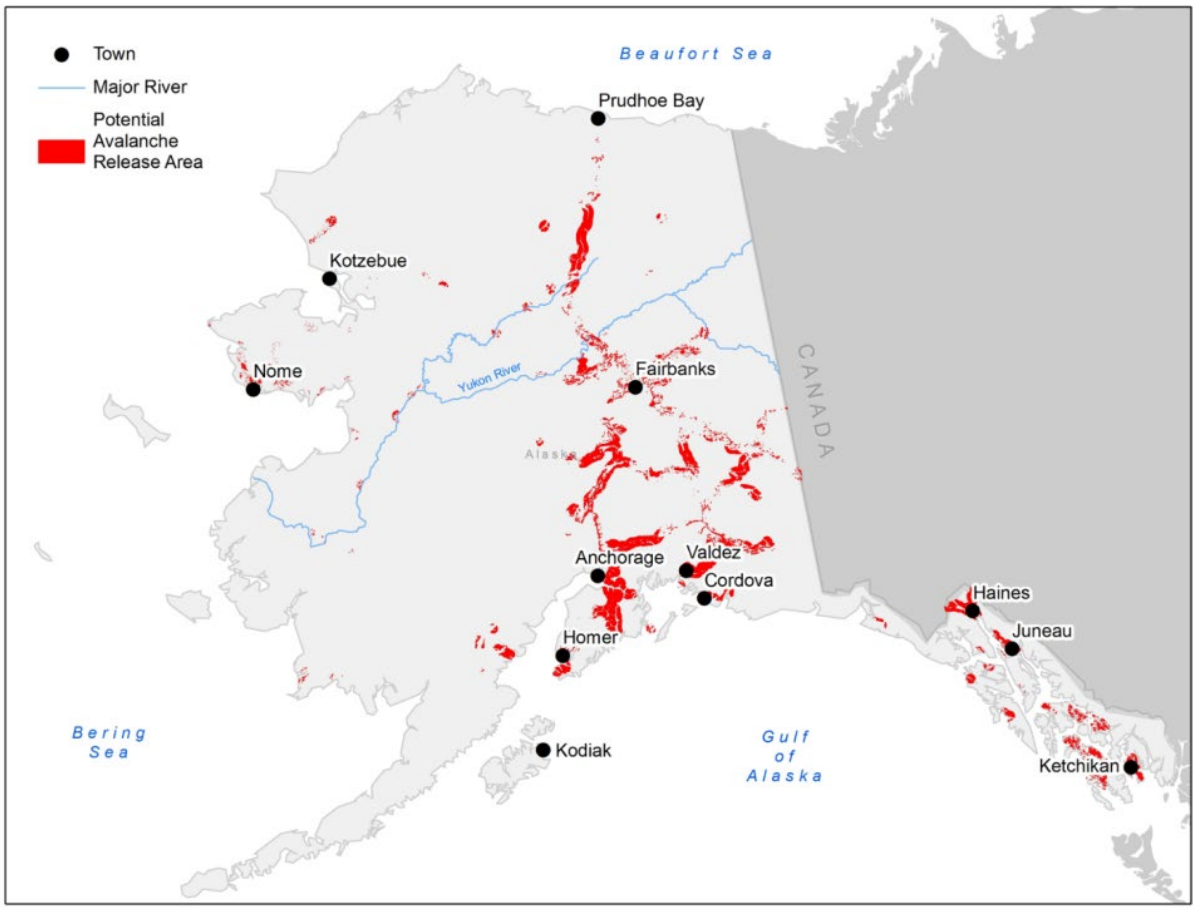


Figure 6-16 Potential Snow-Avalanche Release Areas
Source: DGGS 2018

Numerous snow avalanches occur in Alaska every year due to abundant avalanche-susceptible terrain and large amounts of snowfall. Many highways, the railroad, and multiple communities are at risk of avalanche hazards every winter, some of which can be particularly destructive. The most recent extreme avalanche event took place near Valdez in January 2014 after a mid-winter rain event that triggered many full-depth wet snow avalanches throughout Southcentral Alaska. This avalanche blocked the only road connection to Valdez and dammed a river in Keystone Canyon, Figure 6-17.

Figure 6-17 Keystone Canyon Avalanche
An avalanche blocked the road and impounded a lake in Keystone Canyon near Valdez, 2014.
Source: DOT/PF 2017

Alaska is sparsely populated with most development concentrated in relatively few areas. The exact number of avalanches release annually is undeterminable. However, snow avalanches cause more fatalities in Alaska than any other natural hazard (Figure 6-18). Alaska leads the nation in avalanche accidents per capita and experiences multiple fatalities each year due to this hazard. In addition to human risk, road closure due to avalanches is very costly. For example, a typical road closure with roughly 1,500 cubic feet of snow covering the road costs Alaska Department of Transportation & Public Facilities approximately $10,000 to remove. In the winter of 1999 to 2000, unusually high snowfall from the Central Gulf Coast Storm fueled avalanches in Cordova, Valdez, Anchorage, Whittier, Cooper Landing, Moose Pass, Summit, the Matanuska-Susitna Valley, and Eklutna. Damages in these communities exceeded 11 million dollars, resulting in the first presidentially-declared avalanche disaster in U.S. history.

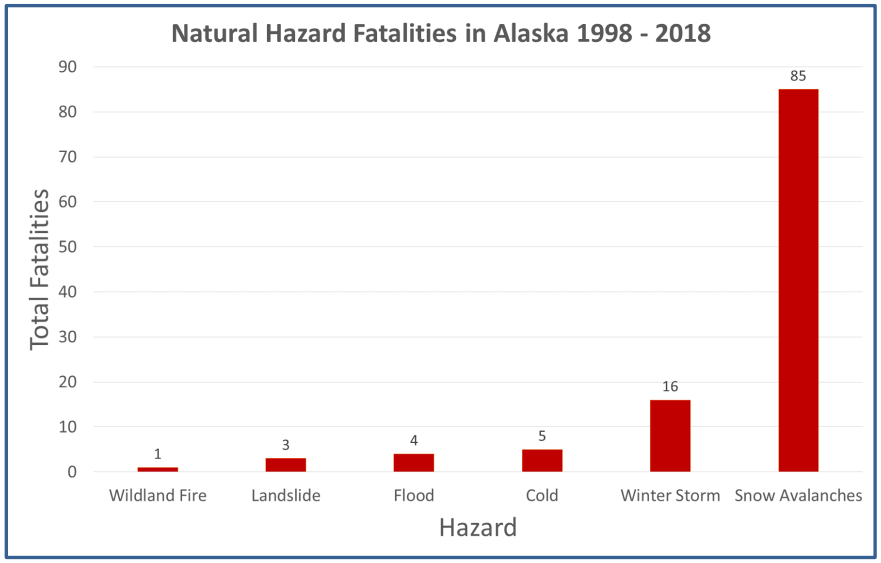


Figure 6-18 Alaska's Weather Related Fatalities 1998–2018
Source: Data from NWS, http://www.nws.noaa.gov/om/hazstats.shtml

6.1.2. CLIMATE FACTORS

Climate has a major effect on cryosphere hazards because these hazards are so closely linked to snow, ice, and permafrost. Changes in climate can modify natural processes and increase the magnitude and recurrence frequency of certain geologic hazards (e.g., avalanches, floods, erosion, slope instability, permafrost thaw, and glacier lake outburst floods), which if not properly addressed, could have a damaging effect on Alaska's communities and infrastructure, as well as on the livelihoods and lifestyles of Alaskans.

During the last several decades, Alaska has warmed twice as fast as the rest of the U.S. Alaska's glaciers are in steep decline, and are among the fastest-melting glaciers on Earth. New ice-dammed lakes are being formed in valleys formerly occupied by glaciers, and as climate change continues on its current trajectory, more ice-dammed lakes can be expected. Glacier retreat also causes debuttressing and valley-wall unloading, potentially increasing rockfall and landslide incidences.

Permafrost is at an increased risk of thawing as a result of climate change. The major climatic factor leading to warming and thawing permafrost is an increase in air temperatures. Another important factor is the potential increase in snow depth predicted by the majority of climate models. Snow insulates permafrost from low winter temperatures, which leads to an increase in ground temperatures and diminishes permafrost stability. When soils are warm, permafrost becomes unstable and is sensitive to catastrophic collapse in conjunction with flooding and erosion. Even in non-ice-rich soils, process-driven models show more material is available for erosion and transport when the soil is thawed, which leads to increased exposure of underlying or adjacent frozen material to thermal and physical stressors.

Scientific data on the impacts of changing climate on the active layer (i.e., the surface layer above the permafrost that thaws each summer) is sparse, but on the decadal timescale (i.e., tens of years), the depth of the active layer looks to be increasing (Figure 6-19). This is potentially destructive to permafrost stability because the ground is not completely refreezing in winter, and leads to talik development. Taliks are areas of unfrozen ground within predominately frozen permafrost areas. Taliks exist over winter and have the potential to change many physical processes in the upper part of the soil, especially hydrology. If permafrost is ice-rich, taliks may greatly accelerate thawing. Critical thresholds are being approached in many parts of Alaska.

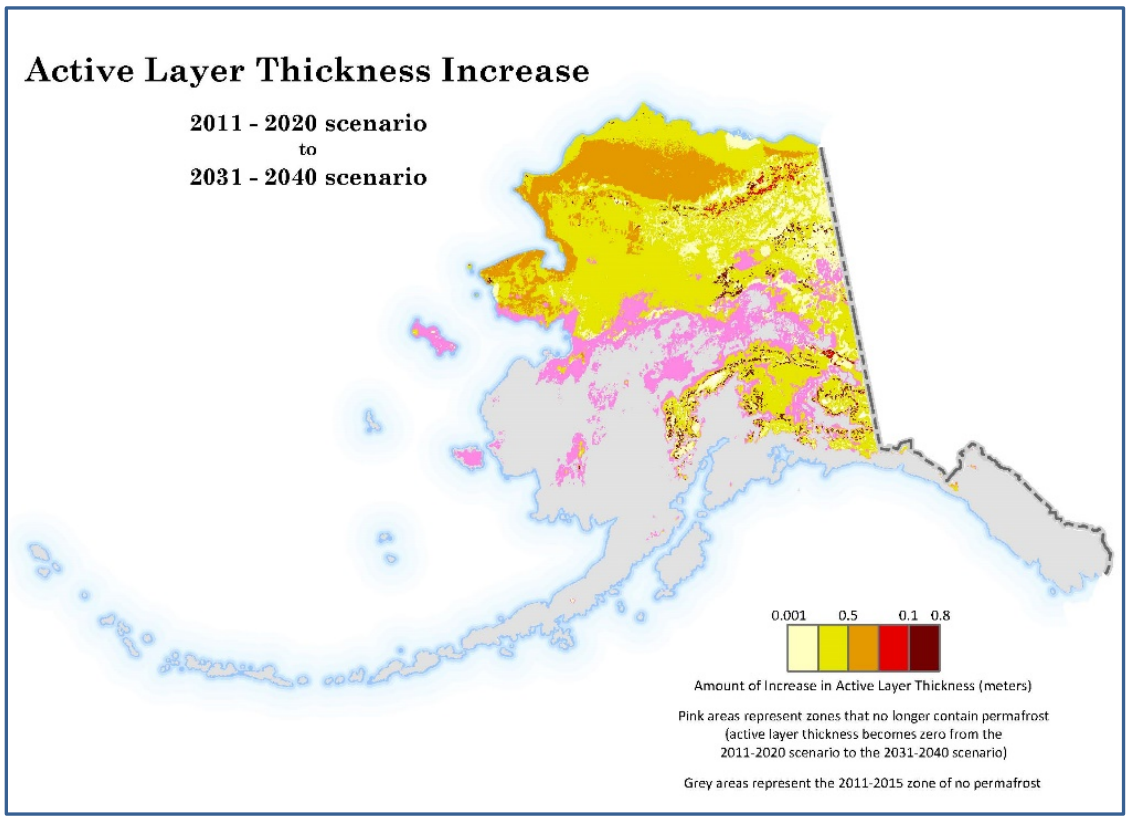


Figure 6-19 Active Soil Thickness Layer Map

The map shows modeled potential change in the thickness of the active layer in Alaska over the next 20 years. Calculations indicate the active layer will thicken everywhere in Alaska as climate warms. Pink shows areas where existing permafrost will disappear. This is just one illustration of the many scenarios that scientists use to try to anticipate changes as climate warms. Source: Denali Commission Threat Assessment, and UAF, 2018

Sea ice and climate are intimately linked. There are three timeframes to consider concerning the impacts of sea ice as climate changes:

1. Long-term concerns – regulation of the global climate;
2. Intermediate-term concerns – coastal erosion; and
3. Immediate concerns – transportation.

Global climate: Sea ice plays an important role in the regulation of atmospheric temperature on a global scale. Snow and ice reflect a large portion of the incoming solar radiation back into space before this radiation can be converted into heat that would be trapped in the atmosphere. Without sea ice, the snow-covered area of Earth would be dramatically smaller and the dark ocean water would absorb short-wave radiation, resulting in a much warmer planet.

Coastal erosion: Sea ice reduces wave development in the open ocean during winter months. Landfast ice can also mitigate wave action, nearshore ocean currents, and storm surge on the coastline by providing a physical barrier, minimizing coastal sediment transport. When waves and elevated water levels exceed beach elevations, relatively warmer, saline water can thermally destabilize coastal permafrost, and waves can mechanically erode coastal beaches, bluffs, and dunes. Many villages are located along Alaska's coastline and are threatened by eroding shores.

Transportation: Many transportation forms can be affected by sea ice, both positively and negatively. Native people travel on sea ice to access subsistence hunting areas; reduced sea ice cover and thickness can create challenging and dangerous hunting conditions. Industrial development relies on sea ice routes to supply off-shore operations. These routes often make use of the more-stable landfast ice near the shore, but warming conditions reduce the annual duration and extent of landfast ice. Thinner ice, a consequence of warming climate, is vulnerable to being broken during storms, making sea ice roads impassable.

Climate warming affects sea ice in many different ways. As discussed above, sea ice and snow cool the planet by increasing albedo (i.e., reflecting solar energy) over polar regions. The current trends in atmospheric warming are causing a reduction in sea ice extent, which results in an increase in shortwave radiation absorption in the atmosphere. Delayed freezing in the fall allows longer periods of ice-free seas, and wave action can damage the shores for a longer duration, particularly in the fall when larger storms are typical. Direct use for transportation can be affected both positively and negatively: as arctic sea routes are open longer, they can be used for shipping during a longer season, but the timeframe during which surface travel is possible on the sea ice is reduced and thinner ice can break more easily in response to stress on the ice.

Ice gouging is potentially reduced due to a reduction in multi-year ice and reduced thickness of annual ice, but an increase in pressure ridges resulting from thinner ice could lead to much thicker ice locally, which in turn could lead to more gouging by icebergs.

Some studies suggest that warming climate may increase avalanche risk due to changes in snow accumulation and moisture content, as well as loss of snowpack stability because of changing air temperature. Increased rain-on-snow event frequency is leading to an increase in avalanche hazards all across Alaska. Rural and urban Alaska communities do not have many road options. Anchorage has the largest population. Yet it has one main road (north and south) connecting to the rest of the state's road systems. Most Alaska communities have road choke points such as bridges and steep terrain that are susceptible to multiple natural hazard impacts from earthquakes, floods, and ground failure events such as landslides, mudslides, and avalanches.

Rural community road systems may experience the same threats. However, remote-rural locations have very limited road access to their immediate neighboring community via one road. If road access is blocked from natural hazard impacts these communities will be restricted to receiving resupply by boat, barge, or aircraft.

6.1.2.1. RELATED HAZARDS

Related hazards include flooding, erosion, and ground failure.

6.1.3. CRYOSPHERE HAZARD HISTORY

- **Glacial Lake Outburst Floods**

  Bear Glacier Ice-Dammed Lake, Kenai Mountains

  The Bear Glacier ice-dammed lake in Kenai Fjords National Park is located in the Kenai Mountains at an elevation of approximately 900 feet on the east side of Bear Glacier, 8.8 miles up-glacier from the terminus. Bear Glacier ice-dammed lake is fed by meltwater from the glacier itself, and by water runoff (rain and snow meltwater) from upstream slopes. It generally empties in the late summer or early fall. The narrow strip of land that separates the

proglacial lake from the ocean, creating a lagoon, was formed during previous glacial retreat. The sand bar is a popular camping spot and the lagoon is a popular kayaking destination to watch calving icebergs. When the ice-dammed lake bursts, it may cause significant water level increase in the lagoon that could endanger campers and people recreating in the area.

Valdez Glacier Ice-Dammed Lake, Chugach Mountains

The Valdez Glacier ice-dammed lake is located at an elevation of approximately 720 feet on the east side of Valdez Glacier, 4.5 miles up-glacier from the current glacier terminus. The water from outburst floods exits Valdez Glacier and enters Valdez Glacier Lake subaqueously, causing a rapid rise in the proglacial lake level, localized flooding, and increased Valdez Glacier Stream discharge. The basin in which the lake forms was previously occupied by an unnamed tributary glacier to the east, and is repeatedly filled from glacier, snow, and rain runoff. The Valdez Glacier ice-dammed lake produces annual to bi-annual outburst floods of varying magnitude. One outburst event regularly occurs in June following spring snowmelt, and a second outburst event typically occurs in September-October in association with heavy rain from fall storms.

Russell Ice-Dammed Lake at Hubbard Glacier, Saint Elias Mountains

Hubbard Glacier and Russell Fjord are located north of Yakutat in the Saint Elias Mountains, Southeast Alaska. Earth's two largest recorded outburst floods occurred when the Hubbard Glacier ice-and-moraine dam breached, catastrophically releasing impounded water from Russell Lake. Hubbard Glacier is the largest tidewater glacier in North America, covering an area of ~1,460 square miles. In contrast to most glaciers in Alaska, Hubbard Glacier has advanced ~1.5 miles since 1895. Russell Fjord has no other outlet to the ocean than through Disenchantment Bay. Russell ice-dammed lake forms intermittently during times of glacial advance when Hubbard Glacier blocks the channel linking Russell Fjord and Disenchantment Bay at Gilbert Point. Outburst floods from Russell Lake have occurred when the ice dam has been breached, for example, in 1986 and 2002. Peak discharges during these events ranged from 1.9 million cubic feet per second to 3.7 million cubic feet per second. Glacial lake outburst floods from Russell Lake have the potential to cause major socio-economic consequences to the community of Yakutat, commercial and sport fisheries, and tourist and shipping industries, as well as impact sea life in the area.

Suicide Basin at Mendenhall Glacier, Coast Range

Suicide Basin ice-dammed lake is a sub-glacial lake that forms in an over-deepened basin carved by a now detached tributary glacier 2.2 miles up-glacier and on the east side of Mendenhall Glacier, ~10 miles northwest of Juneau in the Coast Range. Mendenhall Glacier terminates in the proglacial Mendenhall Lake, which drains into Mendenhall River. The river flows through a residential area and near critical infrastructure before reaching the ocean. The subglacial lake in Suicide Basin is fed by meltwater from surrounding glaciers and heavy rain in the early summer months. The ice-dammed lake in Suicide Basin has flooded annually since 2011; some years have multiple smaller floods and some years have only one large flood. The low-lying area along Mendenhall River is the most populated residential area of the City of Juneau, Alaska's capital. In 2014, an outburst flood from Suicide Basin caused the water level of Mendenhall Lake to gain 12 feet over the baseline and resulted in significant damage to riverside properties (Figure 6-20).

Figure 6-20 Juneau Area Flooding in the View Drive Neighborhood
Source: Eran Hood, UAS 2014

Flooding occurred along the Mendenhall River during the 2014 Suicide Basin outburst flood event.

- **Permafrost**

2016 Fall Usteq at Newtok

Usteq claimed at least 40 feet of ground between Newtok and the Ninglick River during this event, with blocks of tundra the size of minivans slumping and being carried away by floodwaters. The town is built on permafrost plateaus just 6-10 feet above river level, and the ground is disintegrating. The tribal government of Newtok declared a disaster, but the Obama administration declined to issue a Presidential disaster declaration.

2016 Spring and Fall Usteq at Kivalina

Repeated episodes of usteq, triggered by storms, struck Kivalina in 2016. The fall usteq threatened the Kivalina airport. The tribal government of Kivalina declared a disaster, but the Obama administration declined to issue a Presidential disaster declaration.

- **Snow Avalanche**

January 2014 Valdez "Damalanche"

In January 2014, the Richardson Highway was blocked by a huge avalanche that released above Keystone Canyon, near Valdez, due to heavy rain on top of snow (Figure 6-17). The snow became so saturated with water that the snowpack in the starting zone fractured all the way through to the ground, releasing a full-depth avalanche. The avalanche debris dammed Lowe River, and the local residents as well as the press took to calling it a "damalache." The dammed lake covered about 100 acres with an estimated 81 million cubic feet of water. The event blocked all transportation by road to and from Valdez (and the important Alyeska oil terminal) for 12-¼ days. 100,000 tons of snow (140 feet deep) were on the road, and the Alaska Department of Transportation & Public Facilities' round-the-clock cleanup work were estimated to have cost about $250,000.

6.1.4. LOCATION, EXTENT, IMPACT, AND RECURRENCE PROBABILITY

Location

Cryosphere hazards can impact any place in Alaska where water occurs seasonally or permanently in solid form, including glaciers, ice caps, ice sheets, permafrost, sea ice, lake ice, river ice, and snow cover.

Glaciers and icefields currently occupy many of the mountain ranges in Alaska. Much of Alaska has been shaped by glaciation and deglaciation, and recent changes in climate are causing Alaska's glaciers to melt faster than most other places on the planet. These long- and short-term changes generate a range of glacier hazards, such as unstable water discharge rates, glacier lake outburst floods, glacier and slope instabilities, erosion and sedimentation, iceberg production, and glacier surges that can impact infrastructure and threaten public safety. Infrastructure and buildings located downstream of a glacier, for example low-lying residential areas along many rivers in coastal Southcentral Alaska, are at risk for flooding triggered by glacial lake outburst floods at higher elevations. In Alaska's coastal areas, unexpected glacial calving can become dangerous for cruise ships and recreationists. Glacier hazards can also start a chain reaction of other hazards, such as snow avalanches and debris flows. Because of Alaska's rapidly retreating glaciers, glacier hazard frequency is expected to increase, for example, more significant ice calving events during the summer, and greater flooding and erosion caused by outburst floods from lakes forming in valleys previously occupied by glacier ice.

Extent

Permafrost is found beneath nearly 85 percent of Alaska (Figure 6-5). It is thickest and most extensive in arctic Alaska north of the Brooks Range, and becomes increasingly thinner and more discontinuous southward until it is virtually absent in Southeast Alaska except for pockets of high-elevation alpine permafrost. Permafrost can harbor ice in many forms, ranging from massive ice bodies to ice lenses to disseminated interstial ice crystals. Thawing causes landslides, ground subsidence, and erosion as well as lake disappearances, new lake development, and saltwater encroachment into aquifers and surface waters. Usteq—catastrophic permafrost collapse accompanied by flooding and erosion—is particularly destructive. Aufeis can form in low-lying areas such as along creeks. Periglacial hazards result from the effects of repeated freezing and thawing and include frost cracking, frost heaving, and frost jacking, and can occur anywhere in the state.

Impacts

Permafrost and periglacial impacts include a full range of damage from comparatively minor bending or buckling of manmade features due to heterogeneous movement, to complete destruction of infrastructure and buildings due to catastrophic ground failure (usteq) and flooding (aufeis). Permafrost and periglacial processes have generated comparatively slow ongoing phenomena in the past, but warming climate is expected increase the magnitude and frequency of damaging permafrost collapse. Frost cracking, frost heaving, and frost jacking are annually occurring events.

Sea ice hazards are common in Alaska's arctic oceans, where extreme cold weather conditions freeze the oceans' surface. Some of these hazards are also relevant for fresh water systems, such

as rivers and lakes. Ice floes and ice break out events typically occur just off shore. Slush ice can be a problem anywhere on freezing water. Ice push (or ivu) is an on-land coastal hazard. The impacts from ice floes are on moving or fixed assets in the ocean such as shipping vessels, pipelines, and drill platforms. Ice break out events mainly affect sea ice transportation routes that supply offshore exploration operations, but could also affect subsistence hunters. Ivu is a major concern for onshore buildings or pipelines.

All sea ice hazards occur on an annual basis. Drifting ice bergs are more likely in summer and fall when ice is moving due to wind. Break out and ivu is most likely in the winter or spring when the ice warms up and winds are strong.

Snow avalanches are dangerous natural hazards that occur in mountainous areas. Approximately 30 percent of Alaska is subject to avalanche activity (Figure 6-15), and snow avalanche is the weather-related natural hazard that causes the most fatalities in the state (Figure 6-18). Driven by gravity, these hillslope mass movements of snow can release on slopes of 20–60°, but their run-out zones (where debris is deposited) can include slopes less than 20°, such as valley floors, and steep cliffs (slope > 60°). Large avalanches have the potential to kill people and wildlife, destroy infrastructure, level forests, and bury entire communities. In many areas of the state, avalanches lead to lengthy closures of important transportation routes. The economic impacts of such avalanches, from impeding traffic to removing avalanche debris blocking the transportation corridor, can be significant at both the local and state levels. Large avalanche cycles (multiple avalanches naturally releasing across a wide region) are generally caused by long periods of heavy snow, but avalanche cycles can also be triggered by rain-on-snow events, rapid warming in the spring, and earthquakes. Large avalanche cycles are more common in Alaska during pronounced climate events driven by changes in the Pacific Ocean, such as during La Nina/El Nino and the larger-scale Pacific Decadal Oscillation, that cause warmer air temperatures and heavier precipitation than normal. However, the effects on air temperature and precipitation during these climate abnormalities vary across the state, consequently the resulting likelihood of avalanche activity depends on region.

Recurrence Probability

Return periods for snow avalanches, which are used to estimate avalanche risk of an avalanche to strike a position at least once in a specified time period, are typically categorized into 1, 5–10, 30, 50–100, and 200–300 years (McClung and Schaerer, 2006). Due to the incomplete historical record of avalanche occurrences in Alaska, longer return periods cannot be confidently stated. Some studies suggest that warming climate is increasing avalanche risk due to changes in snow accumulation and moisture content, and loss of snowpack stability because of changing air temperature. Increased rain-on-snow event frequency is leading to an increase in avalanche hazards all across Alaska.

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6.2. EARTHQUAKE

Alaska is one of the most seismically active regions in the world and is at risk of societal and economic losses due to damaging earthquakes. The 2002 Denali fault ruptured, causing the largest earthquake (Magnitude [M] 7.9) of its kind in North America in over 100 years. On average, Alaska has one "great" (M>8) earthquake every 13 years, one M 7-8 earthquake every year, and six M 6-7 earthquakes every year. Additionally, earthquakes that occur on tectonic plate boundary faults near the coast can generate tsunamis that impact coastal communities (see Tsunami). Earthquakes have killed more than 130 people in Alaska during the past 60 years, and as population centers near active faults and coastlines continue to grow it is imperative that Alaskans prepare for future events.

It is not possible to predict the time and location of the next big earthquake, but the active geology of Alaska guarantees that major damaging earthquakes will continue to occur and can affect almost anywhere in the state. Scientists have estimated where large earthquakes are most likely to occur, along with the probable levels of ground shaking to be expected. With this information, as well as information on soil properties and landslide potential, it is possible to estimate earthquake risks in any given area. It is also possible to estimate the potential for earthquakes to generate tsunamis, and to model the extent to which tsunamis will inundate coastal areas.

Alaska earthquake statistics:

- Alaska is home to the second-largest earthquake ever recorded (1964 Great Alaska Earthquake, moment magnitude 9.2)
- Alaska has approximately 11 percent of the world's recorded earthquakes
- Three of the eight largest earthquakes in the world were in Alaska
- Seven of the ten largest earthquakes in the U.S. were in Alaska

In addition to the previously mentioned large earthquakes, since 1900, Alaska has had an average of:

- 45 magnitude 5 – 6 earthquakes per year
- 320 magnitude 4 – 5 earthquakes per year
- 1,000 earthquakes located in Alaska each month

Source: Alaska Earthquake Center (AEC)

Figure 6.21 shows Alaska's typical annual earthquake distribution.

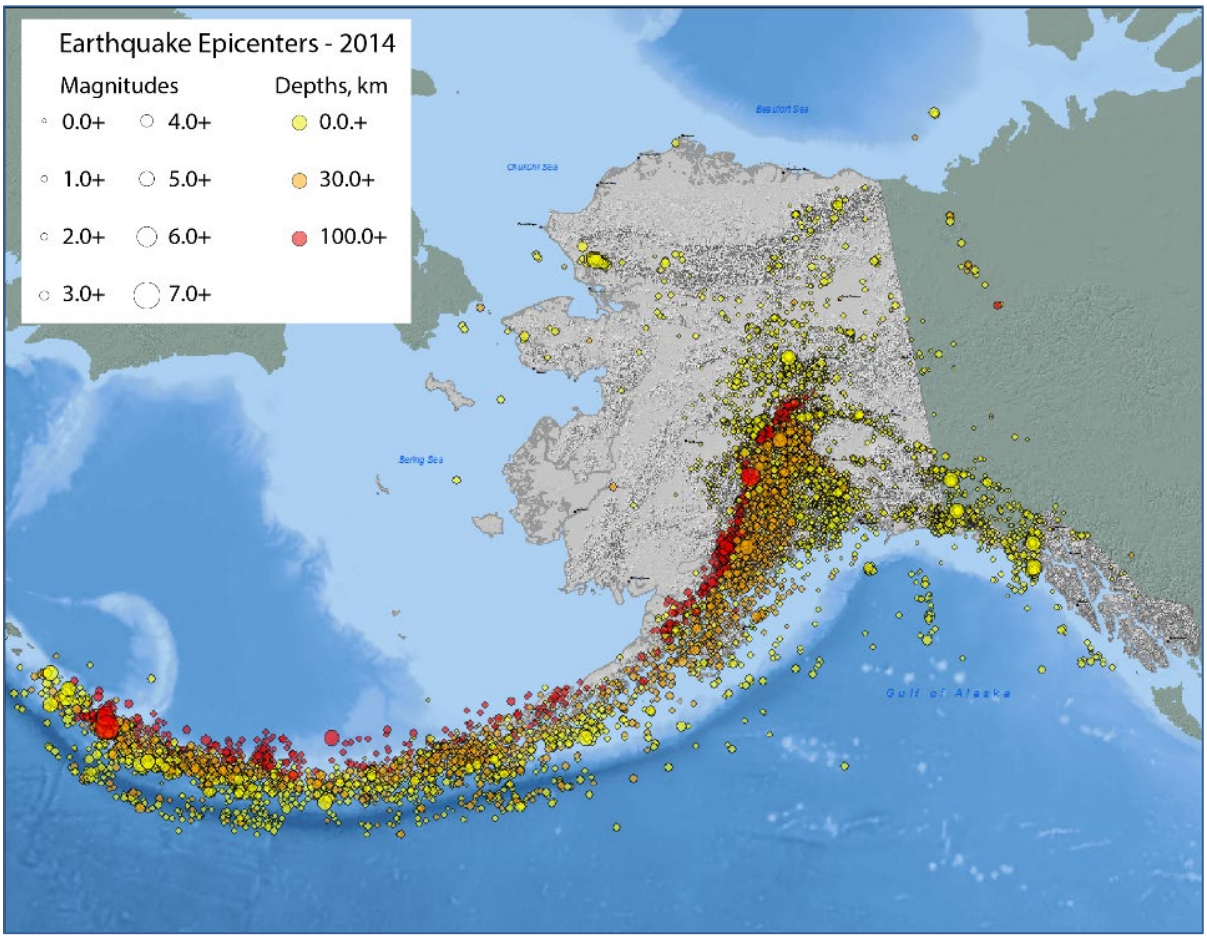


Figure 6-21 Map of Reported Earthquakes in Alaska
Occurring for one typical year. Source: AEC 2014

6.2.1. EARTHQUAKE CHARACTERISTICS

Earthquake shaking is caused by the release of elastic strain energy that has accumulated on faults within or at the boundary between earth's tectonic plates. Tectonic plates are thin, brittle pieces of the crust (the outer, rigid layer of earth) that move across the earth's surface relative to each other, like slabs of ice on a lake. The plates are constantly in motion because of forces originating from within the earth. The plates' motion causes energy buildup that is periodically released in earthquakes. Alaska is near a major tectonic plate boundary, known as the Alaska-Aleutian subduction zone, where one tectonic plate (the Pacific plate) is forced beneath its neighbor (the North American plate) (Figure 6.22). In addition to the major plate boundary, the subduction of one plate beneath the other causes distributed deformation on a network of faults extending more than 700 km north into the interior of Alaska (Figure 6-23).

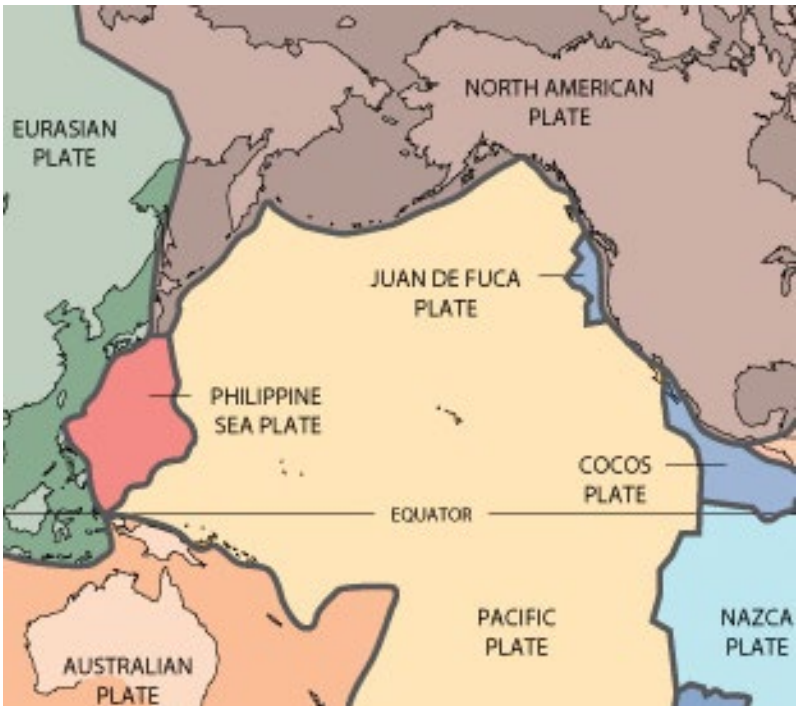


Figure 6-22 Major Tectonic Plates of the Pacific Region
Source: USGS

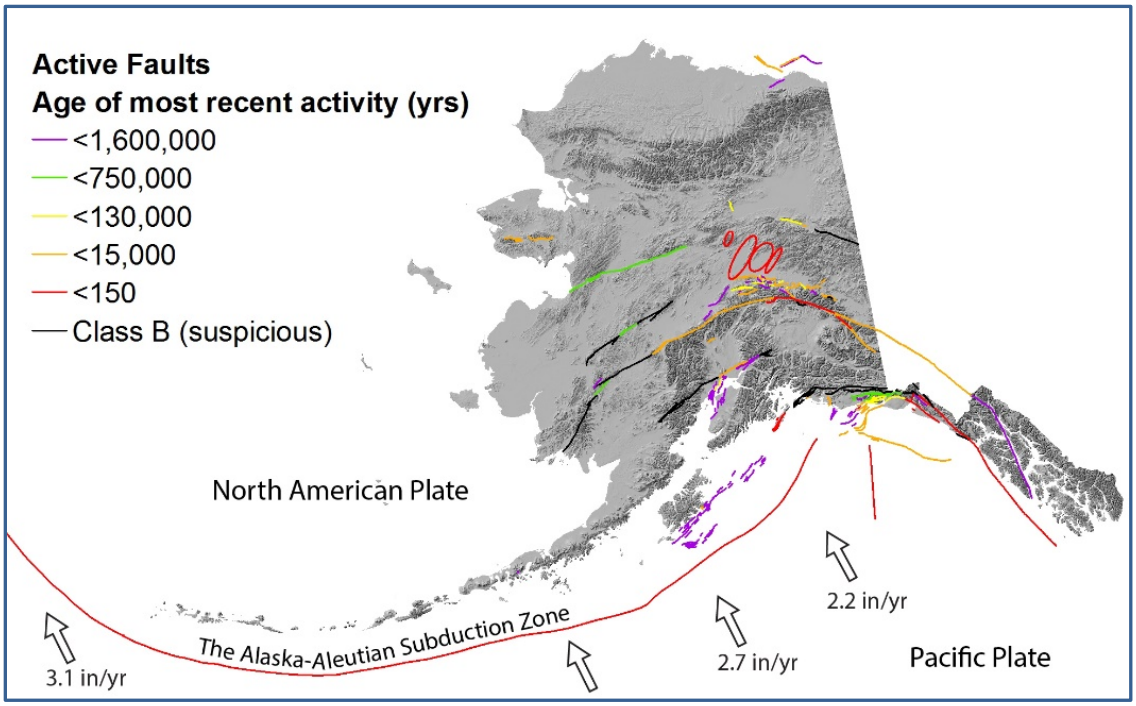


Figure 6-23 Alaska's Known-Active Faults
Colored by activity recency. The North American plate and the Pacific plate are converging at the Alaska-Aleutian subduction zone at a rate of several inches per year. Source: DGGS 2018

The point at the earth's surface directly above earthquake rupture begins is known as its "epicenter." While the epicenter usually experiences the most intense earthquake effects (e.g., shaking), the total area affected can cover hundreds of thousands of square miles, depending on the earthquake's magnitude. Scientists cannot predict earthquakes, and because damage can occur only seconds after rupture initiation, it is important for every Alaskan to know what to do to minimize risk posed by damaging earthquakes.

The moment magnitude scale (M_w) is used to describe the size of moderate to large earthquakes, and is objectively based on the amount of physical energy released in an event. The seismic moment of an earthquake (used to calculate the moment magnitude) is based on the area of fault that ruptures in the brittle crust, the average amount of slip (movement) that occurs between the two pieces of crust, and the force that was required to overcome the friction that was holding the pieces of crust together. The moment magnitude scale is logarithmic, meaning that each step up the scale corresponds to an increase of roughly 32 times the amount of energy released. For example, a M8 earthquake releases approximately 32 times more energy than a M7, and approximately 1,000 times more energy than a M_w 6. Conversely, larger earthquakes are less common than smaller earthquakes, such that the smallest earthquakes are extremely frequent, while the largest earthquakes are relatively infrequent. The moment magnitude scale succeeds the Richter and Local magnitude scales, which were based on the amplitude of shaking recorded on paper seismographs.

Earthquakes are also classified by their felt effects (e.g., the perceived shaking intensity). However, the effects of an earthquake are directly related to the distance from the earthquake rupture, among other parameters (such as the type of crust where the earthquake occurs). In general, the closer one is to an earthquake epicenter, the more severe the felt effects and damage will be. An earthquake's intensity is described by the Modified Mercalli Intensity (MMI) Scale. As shown in Figure 6-24, the MMI Scale consists of 10 subjective intensity levels ranging from "not felt" to "extreme," with varying amounts of damage associated with each.

Figure 6-24 also depicts the relation of Modified Mercalli Intensity and ground acceleration, percent (%) *g*), which is a measure of shaking strength.

PERCEIVED SHAKING	Not felt	Weak	Light	Moderate	Strong	Very strong	Severe	Violent	Extreme
POTENTIAL DAMAGE	none	none	none	Very light	Light	Moderate	Mod./Heavy	Heavy	Very Heavy
PEAK ACC.(%g)	<0.05	0.3	2.8	6.2	12	22	40	75	>139
PEAK VEL.(cm/s)	*<0.02*	*0.1*	*1.4*	*4.7*	*9.6*	*20*	*41*	*86*	*>178*
MMI scale	I	II–III	IV	V	VI	VII	VIII	IX	X+

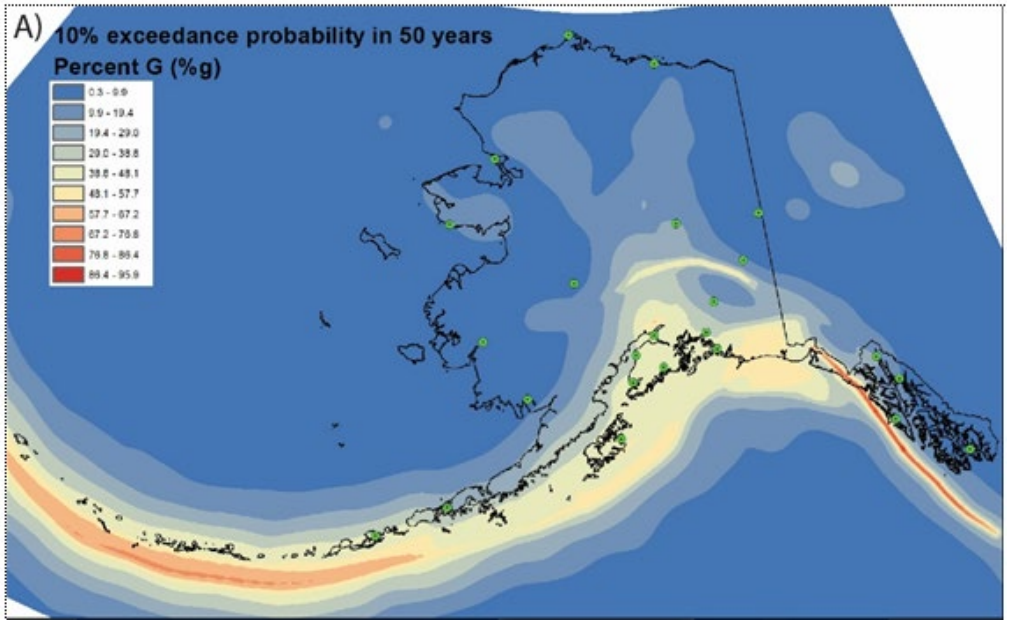
Figure 6-24 Perceived Shaking, Potential Damage, and Peak Ground Acceleration
Associated with rating on the Modified Mercalli Intensity scale. Source: modified from Worden and others 2012

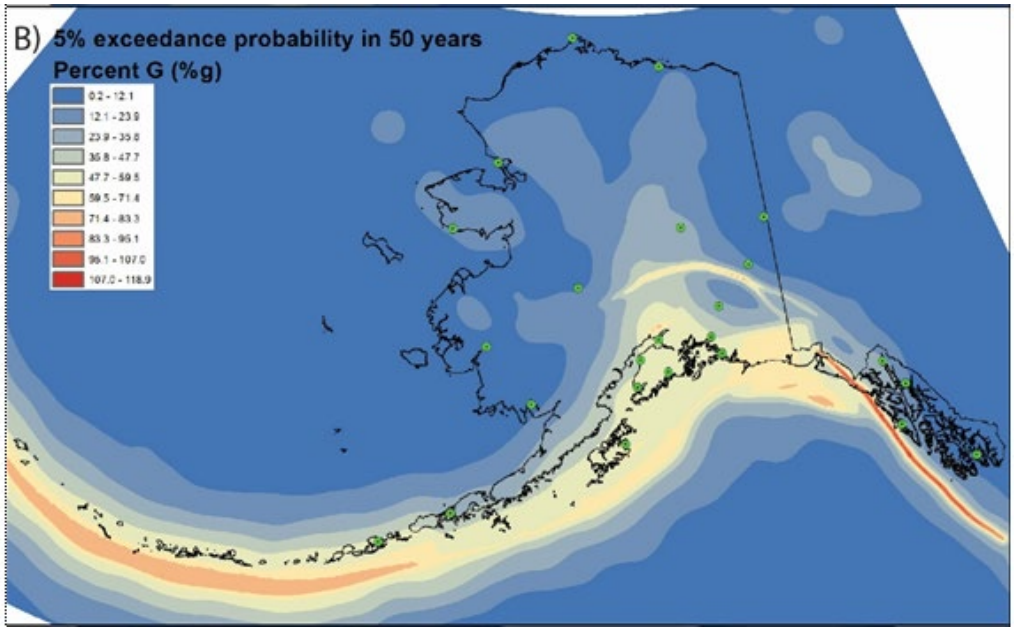
The varying degrees of damage associated with earthquakes are a direct result of the strong ground motions from seismic shaking. The objective classification of earthquake shaking at a point is based on ground accelerations. Ground accelerations (described as a percent of the acceleration of gravity, %g) are measured instrumentally and can be extrapolated between seismic stations after an earthquake occurs. Additionally, ground accelerations are described at different "spectral wavelengths" to describe the types of shaking that affect different building styles; for example, spectral wavelengths of 0.2 seconds affect short, rigid buildings whereas 1

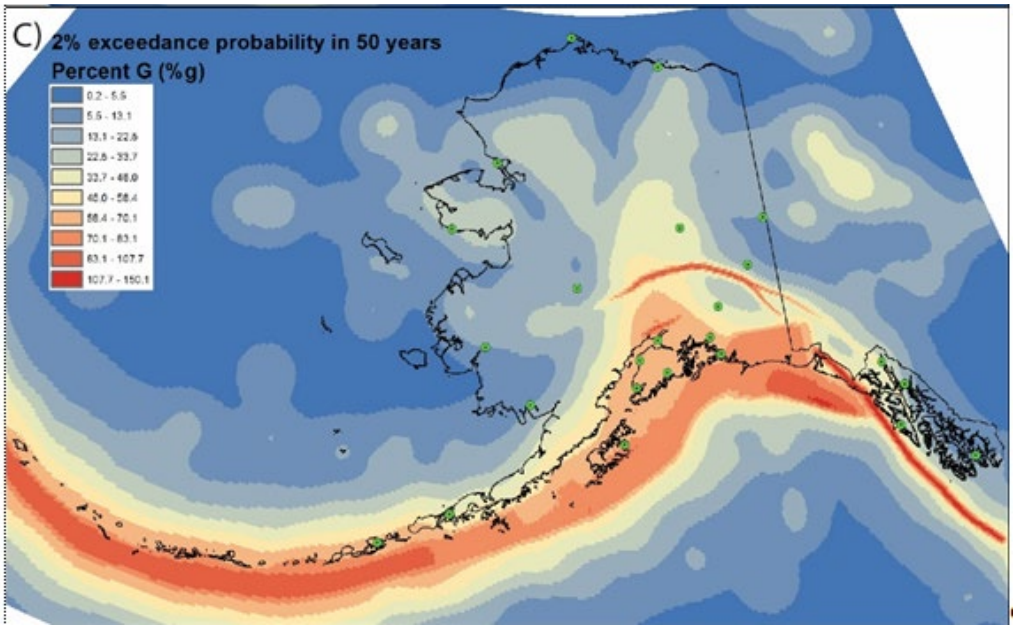
second wavelengths affect multi-story structures. The most universal metric used is the Peak Ground Acceleration (PGA) at a point.

Because earthquakes are impossible to predict, scientists must use a unique approach to describing the hazards posed by earthquakes. Probabilistic Seismic Hazard Analyses (PSHAs) describe earthquake shaking levels and the likelihood that they will occur in Alaska. PSHAs are based on known, mapped geologic faults throughout Alaska and all background seismicity from unknown faults. The result is a visual representation of the peak ground acceleration that has a certain percent chance of being exceeded in a given amount of time (usually 50 years). Figure 6.25 (includes three images) shows three peak ground acceleration maps, the 10, 5, and 2 percent probabilities that certain PGAs will be exceeded in the next 50 years in Alaska. The reason for three maps has to do with earthquake hazard characteristics and their magnitudes. Small earthquakes are frequent, and there is a higher percent chance that they will happen in any given year (a 10 % chance in 50 years means a 0.21% annual exceedance probability—there is a 0.21% chance that the earthquake will happen in a given year). Large earthquakes are infrequent, so there is lower percent chance that they will happen in a given year (a 2% chance in 50 years means a 0.04% annual exceedance probability—there is a 0.04% chance that the earthquake will happen in a given year). However, when the infrequent, large earthquakes occur, there are stronger ground accelerations.

To use these maps, first pick the type of earthquake in which you are interested. For infrequent, large, and destructive earthquakes you would use the 2% in 50 years exceedance probability (Figure 6-25 C). Next, choose your location, and note the color of the map there. For this example, choose Fairbanks, and see that the city is in the yellow zone. Look at the explanation on the map to see the range of ground accelerations that the color represents, in this case 34-53 %g for Fairbanks in Figure 6-25 C. That means that in Fairbanks, the peak ground acceleration that has a 2% chance of being exceeded in 50 years (or 0.04% chance in any given year) is 34-53 % g, which corresponds to shaking that is perceived as very-strong to severe, and may cause moderate to moderate/heavy damage (Figure 6-24).







Figures 6-25 PGAs – 10, 5%, and 2% Percent Exceedance Probabilities in 50 Years.
Green dots show locations of significant population centers. Earthquakes with a high exceedance probability (e.g., 10% in 50 years) are common, and therefore are smaller earthquakes with less severe ground shaking. Earthquakes with a low exceedance probability (e.g., 2% in 50 years) are uncommon, but when they do occur, the earthquakes are large and have more severe shaking. Source: USGS

The major earthquake hazards can be categorized as follows:

- Strong ground motion
- Surface rupture
- Subsidence and uplift
- Earthquake-related ground failure
- Seiche
- Tsunami

The most common and perceivable effect of an earthquake is ***Strong Ground Motion***, which is ground shaking. Strong ground motion intensity is directly correlated with earthquake magnitude (i.e., the larger the earthquake magnitude, the more intense and widespread the ground shaking will be). The strong ground motion severity is also dependent on distance from the energy source; the strongest shaking occurs near the earthquake epicenter. The damage extent at any given location is dependent on many factors: the magnitude of the earthquake; distance from the epicenter; local geology; and site-specific factors, such as building height and construction type.

A ***Surface Rupture*** occurs when the subsurface patch of fault that slips in an earthquake intersects the earth's surface. This causes discrete, differential ground movement during intense earthquake shaking. The relative crustal block motion is dictated by the rupture's fault type, which can be horizontal, vertical, or a combination of both. Earthquakes larger than M6.5 have sufficient energy to create surface ruptures, but whether or not this occurs is dependent on the earthquake's depth. The shallower a a depth at which a significant earthquake occurs, the more likely it is to create a surface rupture. The permanent displacement along faults can be substantial. For example, the 2002 Denali rupture (M7.9, right-lateral rupture) was roughly 211 miles in length and had maximum lateral offsets of 28.9 feet and maximum vertical offsets of 13.1 feet. Surface ruptures, as a product of intense strong ground motion, can cause severe damage to existing structures, including railways, highways, pipelines, and tunnels.

Subsidence is a widespread downward shift of the earth's surface relative to a stationary datum (such as sea level), and ***Uplift*** is the opposite, an earth surface area's upward shift. Large earthquakes potentially cause widespread subsidence and uplift. This makes coastal areas more prone to tsunami inundation. For example, the Alaska-Aleutian subduction zone, where the Pacific plate dives beneath the North American plate along southern Alaska's coastline. In many cases, the vertical changes occur under the ocean, affecting the seafloor. Subsidence and uplift occur because of the enormous amount of slip (up to 150 ft.) that can occur on the dipping plate boundary fault. The 1964 Great Alaska Earthquake (M_w 9.2) caused subsidence of more than 65,000 square miles (up to approximately 6 feet of lowering) and uplift of more than 55,000 square miles (up to approximately18 feet of uplift).

Earthquake strong ground motion heightens the possibility for ***Ground Failure***. Ground accelerations can de-stabilize materials or re-mobilize existing slide deposits. The most common phenomena include landslides, rock falls, debris flows, and avalanches. Of particular concern for coastal Alaska and communities on steep-sided lakes are subaerial (land-based) and submarine slope failures that may trigger local tsunami waves (see Tsunami).

Liquefaction describes the phenomenon in which saturated or partially saturated soil materials lose significant stiffness because of an applied stress, in this case, earthquake strong ground motion. The sudden shaking causes the soil to behave like a viscous fluid. Liquefaction or plastic flow in underlying materials can lead to ***Lateral Spread***, creating subsequent soil or rock mass movement. Liquefaction and lateral spread can occur even in moderate earthquakes, and are responsible for a tremendous amount of damage in historical earthquakes worldwide.

A ***Seiche*** is a temporary oscillation in the water level of a fully or partially enclosed water body (e.g., a lake or fjord). "Seiche" literally means "to sway back and forth," and can be caused by a number of things. A seismic seiche is typically caused by earthquakes with vertical motions: the seismic waves from the earthquake pass through the area, creating standing waves in the water body. It may be difficult to isolate a particular causative mechanism near an earthquake epicenter, as seismic waves, landslides (submarine or subaerial), tsunamis, and tectonic tilting all may play a role in water level disturbance. At greater distances (i.e., over 600 miles), a seiche is mainly generated by seismic surface waves.

Earthquakes that occur at the subduction boundary between the Pacific and North American plates have a high likelihood of generating ***Tsunamis***. Such large megathrust earthquakes cause widespread vertical displacement along the seafloor, providing potential energy for a tsunami wave. See Section 6.5 Tsunami and Seiche for a more detailed discussion of Alaska's tsunami hazards.

6.2.1.1. RELATED HAZARDS

Related hazards include ground failure, tsunami, seiche, snow avalanche, landslides, and debris flows.

6.2.2. EARTHQUAKE HISTORY

The AEC states,

> *The Earthquake Center detects an earthquake every fifteen minutes, on average. In 2014, we reported an all-time high of over 40,000 earthquakes in Alaska. As our monitoring network expands we report more earthquakes because we are able to detect smaller earthquakes across more of the state. Thus, we expect to report more and more earthquakes as the Transportable Array project adds new seismic stations in previously unmonitored areas.*
>
> *The subduction zone produces very large earthquakes—as large as anywhere in the world—including three of the twelve largest earthquakes ever recorded. Magnitude six and seven earthquakes can nearly happen anywhere in Alaska.*
>
> *We reported over 150,000 earthquakes in Alaska over the last five years. Thirty-one of those had magnitudes of 6 or greater, and four had magnitudes of at least 7. Seventy-five percent of all earthquakes in the United States with magnitudes larger than five happen in Alaska (AEC 2018).*

This activity is typical for Alaska as described by AEC:

> *During July 2018, the Alaska Earthquake Center located 3,250 earthquakes within the state. Of these, 24 were larger than or equal to magnitude 4.0. 13 events were felt. The largest earthquake located in Alaska this month was a moderate earthquake of magnitude*

5.8 that occurred on July 19 at 14:16:27.278 UTC (July 19, 06:16:27.278 AKDT), 64 miles SSW of Sand Point. Source AEC, 2018

This screen capture (Figure 6-26) shows Alaska's "recent" earthquakes that occurred within the 30-days previous to April 15, 2018.

This activity is typical for Alaska as described by AEC:

> *During July 2018, the Alaska Earthquake Center located 3,250 earthquakes within the state. Of these, 24 were larger than or equal to magnitude 4.0. 13 events were felt. The largest earthquake located in Alaska this month was a moderate earthquake of magnitude 5.8 that occurred on July 19 at 14:16:27.278 UTC (July 19, 06:16:27.278 AKDT), 64 miles SSW of Sand Point. Source AEC, 2018*

See figure 6-21 for a visual representation of one year of earthquakes in Alaska. Note that the majority of the earthquakes shown in 6-21 are small-magnitude events, as small earthquakes are exponentially more common than large, destructive earthquakes. For comparison, Figure 6-26 shows all Mw 5+ earthquakes from 1990 to mid-2018. There are significantly fewer Mw 5+ events.

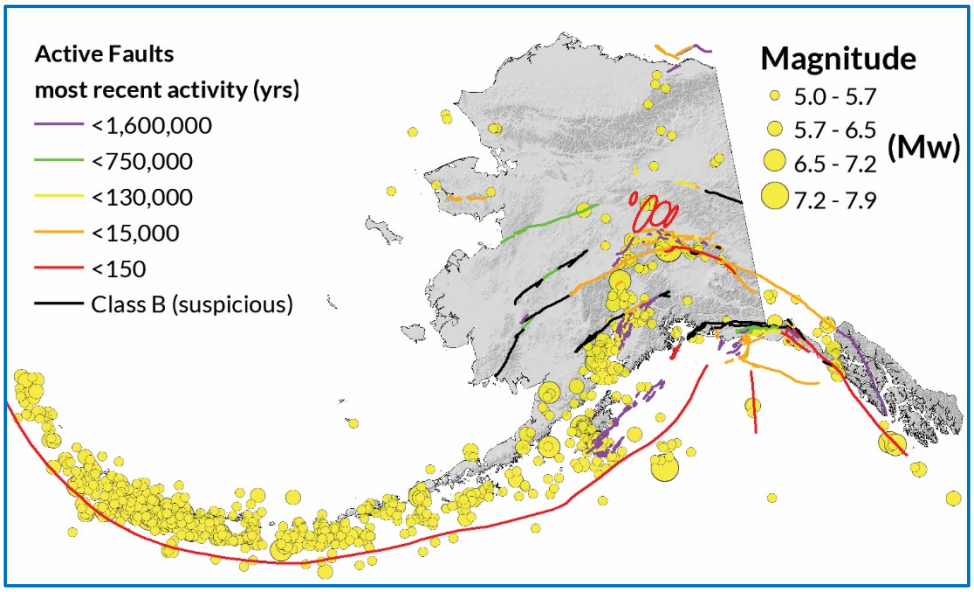


Figure 6-26 Displays all Mw 5+ Earthquakes From 1990 to mid-2018

Source: DGGS and AEC

Descriptions of Alaska's significant or notable earthquakes can be accessed via the AEC and the USGS. Some of the significant events include:

1964 Great Alaska Earthquake (Good Friday Earthquake)

The largest earthquake ever recorded in North American history (second-largest earthquake ever recorded worldwide) occurred along the east end of the Alaska-Aleutian subduction zone on Good Friday in 1964. The earthquake had a moment magnitude (M_w) of 9.2 and shook for ~5 minutes. Damages were heavy in many towns, including Anchorage, Chitina, Chenega Bay, Glennallen, Homer, Hope, Kasilof, Kenai, Kodiak, Moose Pass, Portage, Seldovia, Seward, Sterling, Tatitlik, Valdez, Wasilla, and Whittier. The earthquake caused significant ground deformation, and the triggered landslides,

liquefaction, lateral spread, and tsunamis resulted in major damage throughout much of Southcentral Alaska (Figure 6.27). This great (M>8) earthquake and ensuing tsunamis took 128 lives (tsunamis 113, earthquake 15), and caused about $311 million in property loss. More than 200 bridges were destroyed or damaged due to lateral spread; flow failures damaged port facilities in Seward, Valdez, and Whittier; and ground failures (such as landslides and debris flows) were responsible for a large portion of the damage.

Figure 6-27 Government Hill Elementary School
Destroyed by earthquake-related ground failure in the 1964 Great Alaska Earthquake. Source: USGS 1964

2002 M7.9 Denali Earthquake

A powerful (M_w 7.9) earthquake struck Alaska on November 3, 2002, rupturing the earth's surface for ~210 miles along the Susitna Glacier, Denali, and Totschunda faults. Thankfully, this earthquake ruptured through a sparsely-populated region, and while it caused thousands of landslides, there was very little structural damage and no deaths. Although movement on the Denali fault caused right-lateral displacements of ~20 feet beneath the Trans-Alaska oil pipeline, the pipeline did not break, averting a major economic and environmental disaster (Figure 6.28). This was largely the result of stringent design specifications based upon geologic studies performed 30 years earlier. The pipeline is supported by Teflon coated beams that allow it to flex during lateral ground movement where it crosses the Denali fault. The Trans-Alaska Pipeline System (TAPS) transports about 17% of the domestic oil supply for the United States.

Figure 6-28 Trans-Alaska Oil Pipeline's Earthquake Mitigation Offset

Located where it crosses the Denali fault, 2012. Note how pipeline is shifted to left of center on the Teflon-coated beams.

2016 M7.1 Iniskin Earthquake

A M_w 7.1 earthquake struck January 24, 2016, 53 miles west of Anchor Point and 161 miles southwest of Anchorage. The USGS reported an intermediate-depth strike-slip fault earthquake within the Pacific plate's subducted lithosphere. Intermediate-depth earthquakes have focal depths between 70 and 300 km and indicate movement within subducted plates rather than where plates meet. Thus, this earthquake was less damaging than would normally be associated with a shallow M 7.1. However, it did cause several power outages from Anchor Point to Willow, and opened a fissure in Kalifornsky Beach Road in Kasilof. In Kenai, a ruptured gas main was responsible for blowing the roofs off two homes, sending them 40 feet into the air. Two other nearby homes burned down. In Anchorage, the Anchorage School District's West High School and Romig Middle School sustained structural and non-structural damage. The Romig Middle School gymnasium was closed indefinitely due to a compromised roof, and the shared library with West High School was closed for a damaged ceiling.

1957 Andreanof Islands Earthquake

A M_w 8.6 earthquake in Andreanof Islands occurred in 1957. This great (M>8) earthquake destroyed two bridges on Adak Island, damaged houses, and left an 18-foot-wide crack in a road. On Umnak Island, part of a dock was destroyed, and Mount Vsevidof volcano erupted after being dormant for 200 years. The seismic shock generated a 50-foot tsunami that smashed into the coastline at Scotch Cap, totally destroying the lighthouse; and a 26-foot tsunami washed away many Sand Point buildings and damaged oil lines. This tsunami continued to Hawai`i, where it destroyed two villages and inflicted about $5 million in property damage on Oahu and Kauai Islands. The tsunami also caused minor damage in San Diego Bay, California, before traveling to such distant countries as Chile, El Salvador, Japan, and other areas in the Pacific region. More than 300 aftershocks were reported along the southern edge of the Aleutians, from Unimak Island to Amchitka Pass.

Other Alaska Earthquakes

Many large earthquakes have affected other parts of Alaska. Since the early 1900s, three M>7 earthquakes have occurred within 50 miles of Fairbanks. Southeast Alaska also receives earthquakes from Queen Charlotte-Fairweather fault movement, including a M_w 8.1 earthquake in 1949, and a M_w 7.9 in 1958 that triggered a giant landslide-generated tsunami in Lituya Bay. Areas at greatest risk from earthquakes along this fault zone are communities along the outer coast of Southeast Alaska. Source: DGGS 2018

6.2.3. LOCATION, EXTENT, IMPACT, AND RECURRENCE PROBABILITY

Location and Extent

The entire geographic area of Alaska is prone to earthquake effects. The Alaska Seismic Hazard Safety Commission's website provides the following:

Earthquake Risk in Alaska

Scientists have long recognized that Alaska has more earthquakes than any other region of the United States and is, in fact, one of the most seismically active areas of the world. The second largest earthquake ever recorded shook the heart of southern Alaska on March 27th, 1964, with a magnitude of 9.2. The 1964 earthquake was slightly larger than the magnitude 9.0 Sumatra-Andaman Islands earthquake that devastated northern Sumatra in December 2004 and generated a tsunami that killed more than 280,000 people. The largest on-land earthquake in North America in almost 150 years occurred on the Denali fault in central Alaska on November 3rd, 2002, with a magnitude of 7.9.

It is not possible to predict the time and location of the next big earthquake, but the active geology of Alaska guarantees that major damaging earthquakes will continue to occur. Scientists have estimated where large earthquakes are most likely to occur, and the probable levels of ground shaking to be expected throughout the state (see maps below). With this information, as well as information on soil properties and landslide potential, it is possible to estimate earthquake risks in any given area. It is also possible to estimate the potential for earthquakes to generate tsunamis, and to model the extent to which tsunamis will inundate coastal areas.

Alaska has changed significantly since the damaging 1964 earthquake, and the population has more than doubled. Many new buildings are designed to withstand intense shaking; some older buildings have been reinforced, and development has been discouraged in some particularly hazardous areas.

Despite these precautions, and because practices to reduce vulnerability to earthquakes and tsunamis are not applied consistently in regions of high risk, future earthquakes may still cause life-threatening damage to buildings, cause items within buildings to be dangerously tossed about, and disrupt the basic utilities and critical facilities that we take for granted.

The Federal Emergency Management Agency[1] estimates that with the present infrastructure and policies, Alaska will have the second highest average annualized earthquake-loss ratio (ratio of average annual losses to infrastructure) in the country. Reducing those losses requires public commitment to earthquake-conscious siting, design, and construction. The Seismic Hazards Safety Commission is committed to addressing these issues. Earthquake-risk mitigation measures developed by similar boards in other states have prevented hundreds of millions of dollars in losses and significant reductions in casualties when compared to other seismically active areas of

the world that do not implement effective mitigation measures. The San Francisco (1989), Northridge (1994) and Nisqually (2001) earthquakes caused comparatively low losses as a result of mitigation measures implemented in those areas. Many of these measures were recommended by the states' seismic safety commissions.

Source: 1. HAZUS 99 Estimated Annualized Earthquake Losses for the United States, Federal Emergency Management Agency Report 66, September 2000.

Figures 6-25 for a visual representation of where earthquake shaking can be expected in nearly 100 percent of the Alaska.

Impact

Impacts to communities such as significant ground motion, surface rupture, and ground failure may result in infrastructure damage or harm to Alaskans in nearly any part of the state. Again, Figure 6-25 depicts peak ground accelerations (PGAs) at three different exceedance probabilities.

Recurrence Probability

As indicated, while it is not possible to predict when an earthquake will occur, the USGS has conducted Probabilistic Seismic Hazard Analyses for the state (Figure 6-25). This modelling effort incorporates what is known about Alaska's active faults and current and past seismicity to develop the most current map available.

The hazard maps depict the peak ground accelerations expected at a point with 10%, 5%, and 2% exceedance probabilities in 50 years. A useful way to think about these exceedance probabilities is that a 10% chance in 50 years means that statistically this earthquake happens on average every 500 years (Figure 6-25 A). A 5% chance in 50 years means that statistically this kind of earthquake happens every 1000 years (Figure 6-25 B). A 2% chance in 50 years, is the rare, large earthquake, and statistically it happens on average every 2,500 years (Figure 6-25 C). For each of these exceedance probabilities, the color on the map at your location corresponds to a shaking intensity in percent of gravitational acceleration. See figure 6-24 for a description of shaking at different percent gravity values.

See Section 8 Vulnerability Assessment for detailed recurrence probability analyses.

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6.3. FLOOD AND EROSION

6.3.1. HAZARD CHARACTERISTICS

Approximately 6,600 miles of Alaska's coastline and many low-lying areas along the state's rivers are subject to severe flooding and erosion. The former U.S. General Accounting Office (now the U.S. Government Accountability Office [GAO]), reported in 2003 that flooding and erosion affect 184 out of 213 (86 percent) Alaska Native villages, most of which are coastal communities. Many of the problems are long-standing, although studies indicate that increased flooding and erosion are being caused in part by changing climate. *(Sources: Simmonds and Keay 2009; Terenziet al. 2014; Vermaire et al. 2013)*

Flood is the overflow of a body of water that inundates or submerges normally dry land. Water defeats natural or artificial barriers such as beaches, stream banks, and levees that would usually protect adjacent floodplains. Flooding is typically a natural event and considered a hazard only when people and property are at risk. Flooding is Alaska's most common disaster, often costing in excess of 1 million dollars annually, causing major disruptions to society and occasionally loss of life.

Erosion is the action of surface processes (such as from water or wind) that remove soil, rock, or dissolved material from one location and transport it to another location. Erosion can be gradual or occur quite quickly as the result of a flash flood, coastal storm, or other event. Most of the geomorphic change to a river system is due to peak flow events that can dramatically increase the erosion rate. Erosion is a problem in developed areas where disappearing land threatens development and infrastructure.

Alaska is unique in the U.S. because of how permafrost interacts with flooding and erosion to exacerbate the impacts of these hazards. Frozen ground can disintegrate under the compounding influences of permafrost thaw, flooding, and erosion in an escalating feedback loop that can result in damage that is much greater than would be expected from the individual processes alone. See "usteq" in the Permafrost section of this report for more information about this phenomenon.

Flood Categories

Flooding in Alaska occurs in riverine, coastal, and lake environments, with different processes and contributing factors. The major flood categories can be subdivided as follows:

Table 6-1 Flood Categories and Subdivisions

• Riverine Flood	• Coastal Flood
○ Overbank	○ Storm Surge
▪ Rainfall-Runoff	○ Sea Level Rise
▪ Snowmelt	• Fluctuating Lake Levels
○ Alluvial Fan	• Glacial Lake Outburst
○ Flash	• Groundwater
○ Ice Jam	• Aufeis (Ice Overflow)

Figure 6-29 shows the causes of 920 floods documented in Alaska between 1890 and 2017, as reported in local hazard mitigation plans, regional hazard mitigation plans, Alaska Pacific River Forecast Center (APRFC) River Notes, National Weather Service (NWS) Storm Database, NWS warnings and watches, and some site-specific reports.

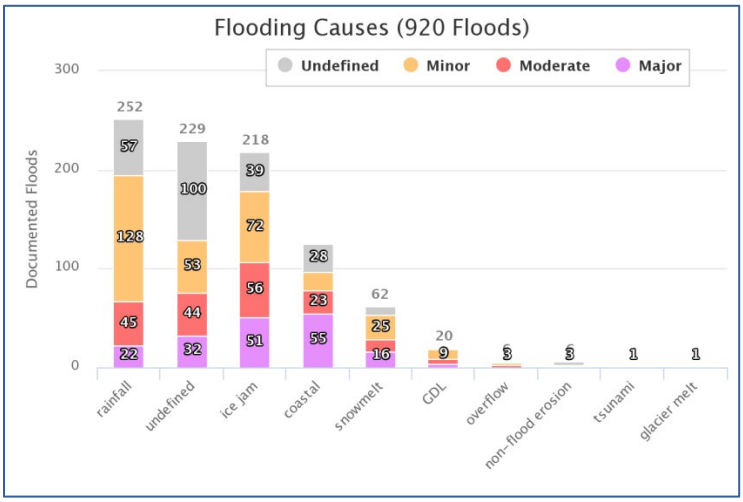

Figure 6-29 Flood Cause Chart

Tabulates documented Alaska flood events since 1890, color-coded according to event magnitude. Undefined event magnitudes, shown in gray, are floods whose magnitudes are not known. Undefined flood causes are floods for which the cause is not known. Glacial-dammed lake (GDL) floods include glacial lake outbursts.
Source: NWS 2017

Figure 6-30 shows the distribution of these flood hazards around the state. This map and chart may under-represent actual events, due to a general lack of documentation pertaining to these hazards in Alaska.

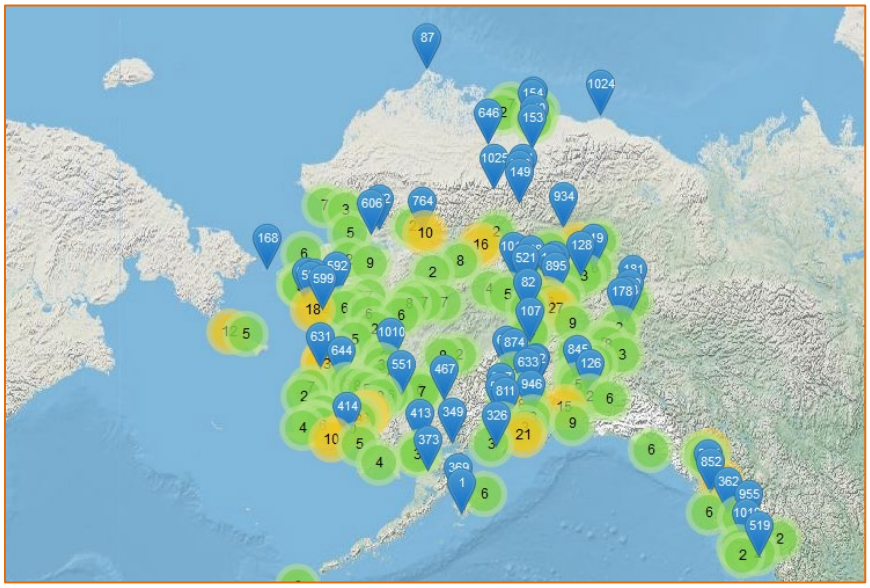

Figure 6-30 Documented Flood Event Map

Documented Alaska flood events from all causes since 1890. Blue tags are locations of single events, with NWS event identification number displayed; green circles are locations with 2-9 documented flood events, with number of

events displayed; orange circles are locations with 10 or more documented flood events, with number of events displayed. Source: NWS 2018

Riverine Flooding occurs when river levels rise and overflow their banks or the edges of their main channel and inundate areas normally above water level. The main driver of riverine flooding is rainfall, but additional factors may include temperature (for melting snow or ice), slope steepness, and the physical characteristics of the soil or rock forming the riverbed. The damage from a river flood can be widespread as the overflow affects smaller rivers downstream, often causing dams and dikes to break and inundate nearby areas.

Overbank Flooding is an umbrella term for when water rises and overflows the streambank. This is the most common form of riverine flooding world-wide, and can occur in any size channel, from small streams to huge rivers. Rainfall-runoff and snowmelt floods are examples of overbank flooding.

Rainfall-Runoff Flooding is the most common type of flooding in Alaska, typically occurring from late summer through the fall. These floods result from high rainfall amounts and accompanying high surface runoff rates. Rainfall intensity, duration, and distribution, as well as pre-existing soil moisture conditions and geomorphic characteristics of the watershed all contribute to a flood's magnitude.

Snowmelt Flooding occurs when the major source of water involved in a flood is from melting snow. Unlike rainfall, which can reach the soil almost immediately, snowpack can store water for an extended period of time until temperatures rise above freezing and the snow melts. This frozen storage can delay the arrival of water to the soil for days, weeks, or even months. Once the snow begins to melt, the water behaves much as it would if it had come from rain instead of snow by either running off, infiltrating into the soil, or both. Flooding occurs when there is more water than the soil can absorb or can be contained in the storage capacities of the soil, rivers, lakes, and reservoirs.

Snowmelt floods in Alaska typically occur from April through June, but are most common in the spring when rapidly warming temperatures quickly melt the snow. Snowpack depth, spring weather patterns, and geomorphic characteristics of the watershed determine the magnitude of flooding. Rainfall, high temperatures, and melting glacial ice can exacerbate snowmelt floods.

Alluvial Fan Flooding is flooding occurring on the surface of an alluvial fan or similar landform. An alluvial fan is a fan-or cone-shaped deposit of sediment that is built up by streams due to a decrease in the ability to carry material, typically where streams exit from a steep tributary valley onto a larger valley or flat plain. The floods originate at the valley or fan apex and are characterized by high-velocity flows; active erosion processes, sediment transport, and deposition; and unpredictable flow paths. When debris deposits fill the existing river channels on the alluvial fan, the water overflows the stream banks and floods land downstream. The overflow may establish new channels. Alluvial fan flooding frequently damages roads and infrastructure in the cities of Seward and Girdwood, and in communities along the Richardson, Haines, and Dalton highways (Figure 6-31).

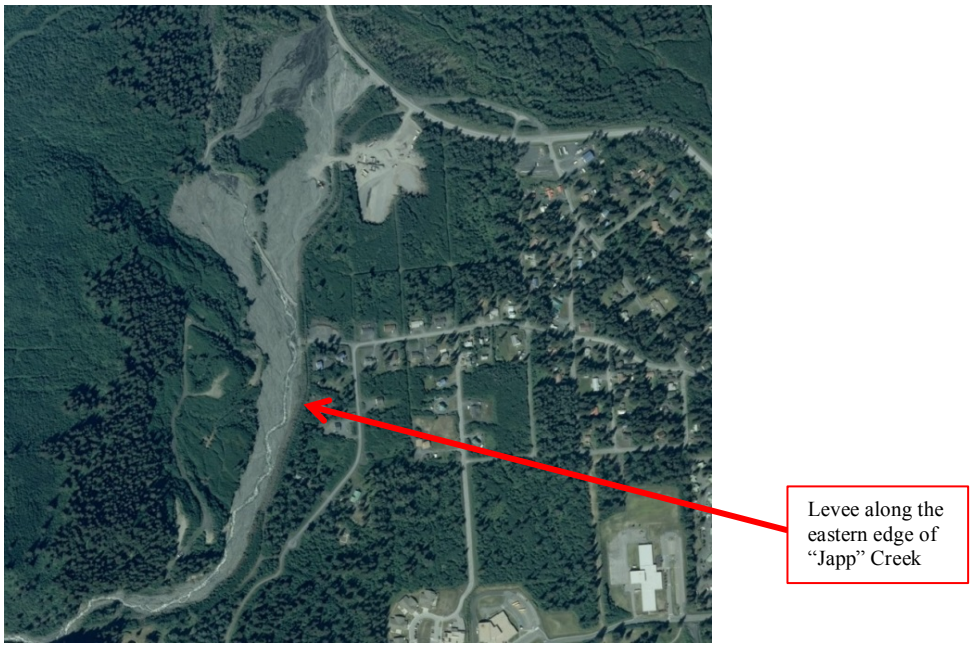

Figure 6-31 Aerial Image of Japanese Creek
An alluvial fan in Seward, Alaska. [A] Levee has been constructed to direct the flow of water and sediment away from developed areas. Source: GeoNorth Information Systems

Flash Flooding is a rapid and extreme high water flow into a normally dry area, or a rapid water level rise in a stream or creek above a predetermined flood level, beginning within six hours of the causative event. Flash floods are usually caused by heavy rain associated with a severe thunderstorm, hurricane, tropical storm, or meltwater from ice or snow flowing over ice sheets or snowfields. They may also be caused by breaches in natural or manufactured dams. Usually swift moving, debris laden, and very destructive, these floods are sudden and potentially violent events. Topography such as narrow canyons and steep slopes are prone to flash flooding.

Ice Jam Flooding occurs when water backs up into surrounding areas because a river or stream is blocked by ice buildup or other debris blockage. Ice jams may occur any time when ice is present, but typically form during the following three seasons:

- Fall freeze-up.
- Midwinter, when stream channels freeze and form anchor ice.
- Spring breakup, when the existing ice cover weakens and breaks apart, flows downstream, and jams together at narrow sections of the stream channel where the ice blocks are forced to sink to the bottom from upriver water forces, forming a dam.

Ice jams commonly develop in areas of decreased channel slope, shallow sections, or constrictions, and frequently impede waterways during spring break-up. The water level rises upstream behind the ice jam. If the ice jam is higher than the riverbank, the adjacent land will flood. This effect is analogous to a dam, and if a community or development is nearby, low-lying structures will be subject to significant flooding and ice impact.

When the stream breaches the ice jam, the dammed water will drain rapidly and further damage structures as it flows back into its channel. The water level downstream will rise quickly and behave much like a flash flood, carrying large chunks of ice, trees, vegetation, and other debris.

A serious ice jam will threaten areas upstream and downstream of its location. Six inch-thick ice can destroy large trees and knock houses off their foundations. Many of the record flood events along major rivers in Alaska are the result of ice jams, including recent large and destructive floods along the Kenai, Susitna, Kuskokwim, and Yukon rivers (Figure 6-32).

Figure 6-32 2013 Galena Ice Jam Flood
Source: NWS

Coastal Flooding occurs along the coast when the combined effects of coastal storm surge, tides, waves (marine total water level) and sea level rise exceed local land elevations of beaches and coastal plains (Figure 6-33).

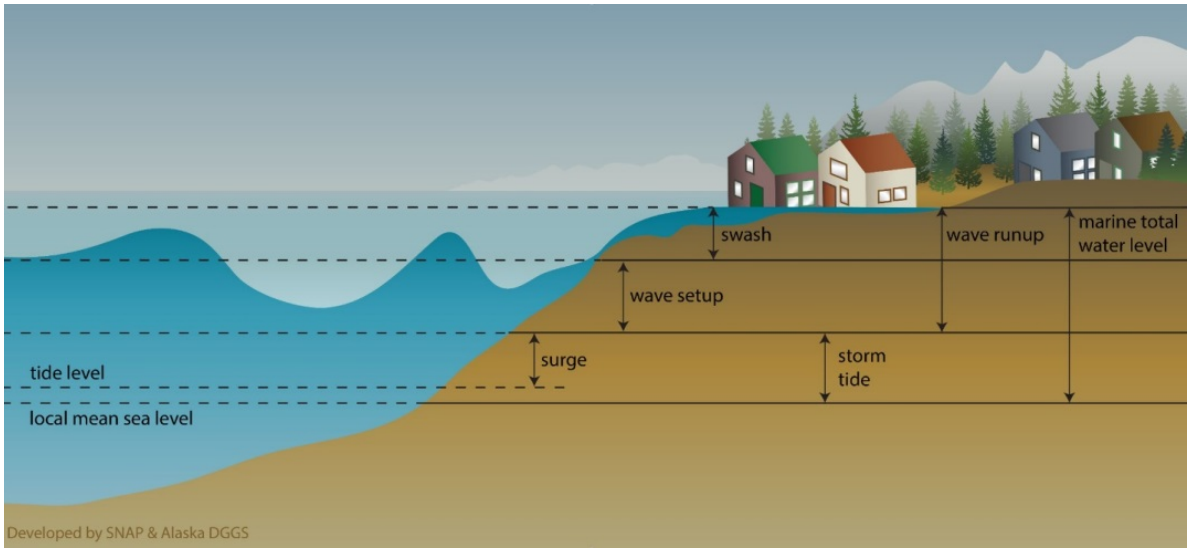

Figure 6-33 Schematic of Coastal Water Levels Leading to Flood Inundation
Source: DGGS

Storm Surge is caused by coastal storms, which start as low pressure weather systems moving across large bodies of water. These systems draw water toward the low pressure center, building a bulge of water that moves with the system; this bulge is called a storm surge. Flooding occurs when this storm surge reaches the coast and is driven landward. Storms also have high winds, which move across water bodies and generate wind-driven waves and “setup” (the increase in

water level due to the presence of breaking waves). The greater distance over which wind blows (i.e., fetch), the more wind energy can be converted into wave energy. Local tide fluctuations can result in increased or decreased flooding from a coastal storm, depending on their timing and magnitude (Figure 6-33).

The orientation and shape of the coast can result in variable amounts of flooding along the coastline. Shallow embayments, such as Kuskokwim Bay and Norton Sound, exert bottom friction on incoming storm surge, which enhances water elevation as it moves toward the coast. If the orientation of the storm is directly perpendicular to the coast (hits the coast straight on), the combined effects of storm surge and waves is translated directly onshore. Coastlines oriented slightly off-perpendicular may divert the high water levels to travel alongside the coast and hit it more obliquely, resulting in less flooding. Low elevation landforms such as deltas (e.g., the Yukon-Kuskokwim delta) is naturally more vulnerable to flooding, and even small events can cause substantial inundation. Low-lying sand spits and barrier islands, such as the islands on which Kivalina and Shishmaref are located, are also subject to flooding in the form of overwash events. Overwash is when storms push water, waves, and sediment over the top of the coastal landform, and results in net landward migration of the island.

In Alaska, coastal flooding primarily occurs on the northern and western coastlines. Storms (low pressure systems) from off-shore of Russia make their way across the Bering Sea to impact areas from the Alaska Peninsula to the northwest Arctic. Storm systems that move across the North Slope during ice-free ocean conditions can also result in flooding at North Slope communities. Coastal floods around the state have been identified using available data sources; however, many events go unreported due to the lack of observing systems and limited communication networks.

Sea Level Rise can impact the threshold for coastal flooding. Relative sea level change includes the combined effects of tectonically caused vertical land motion and changes in sea level due to changes in ocean water volume (Figure 6-34). Globally, sea level is rising due to ocean thermal expansion, caused by warming ocean water, and increased land-based ice melt, such as glaciers and ice sheets (National Oceanic and Atmospheric Administration [NOAA] 2018).

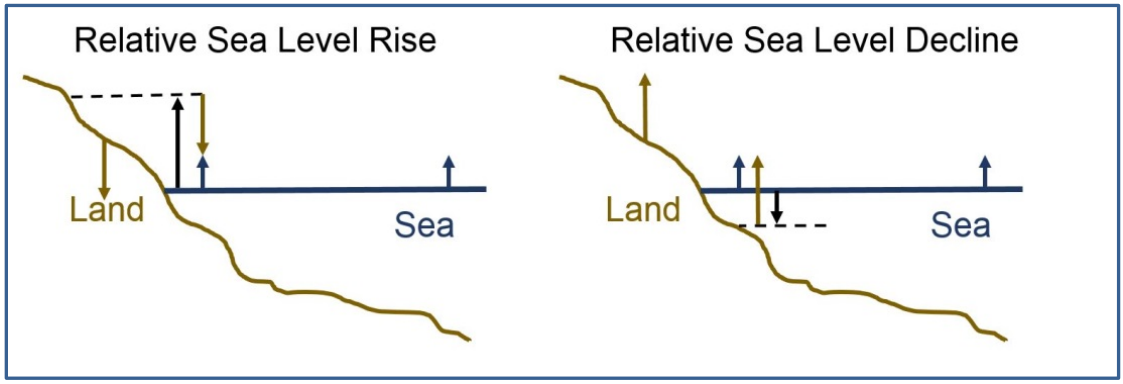

Figure 6-34 Schematic of Relative Sea Level Change

Represents the combined effects of vertical land motion and changes to eustatic sea level. "Eustatic sea level" means sea level driven only by the mass or volume of the oceans. In the first case, sinking land level coupled with rising sea level leads to relative sea level rise; in the second case, rising land level coupled with the same amount of sea level rise as in the first leads to relative sea level decline.
Source: DGGS

Relative sea levels in Alaska can either rise or fall, depending on local factors such as land subsidence, upstream flood control, erosion, regional ocean currents, variations in land height, and whether the land is still rebounding from the weight of glaciers from the last Ice Age (NOAA, 2018)(Figure 6-35). Regions of southeast Alaska are rebounding from the loss of their glacier ice faster than global sea levels are rising, resulting in relative sea level lowering. In contrast, sediment loading from the Yukon and Kuskokwim rivers is causing subsidence of the land relative to global sea levels on the Yukon-Kuskokwim delta. Actual rates for these processes were estimated using modelling and limited field data for northern and western Alaska *(DeGrandpre 2015)*, which had a high uncertainty of the calculated rates. Rates in the southeast, southcentral, and the Aleutian Islands, calculated using long-term ocean water level and land GPS observations, are better constrained (NOAA 2017).

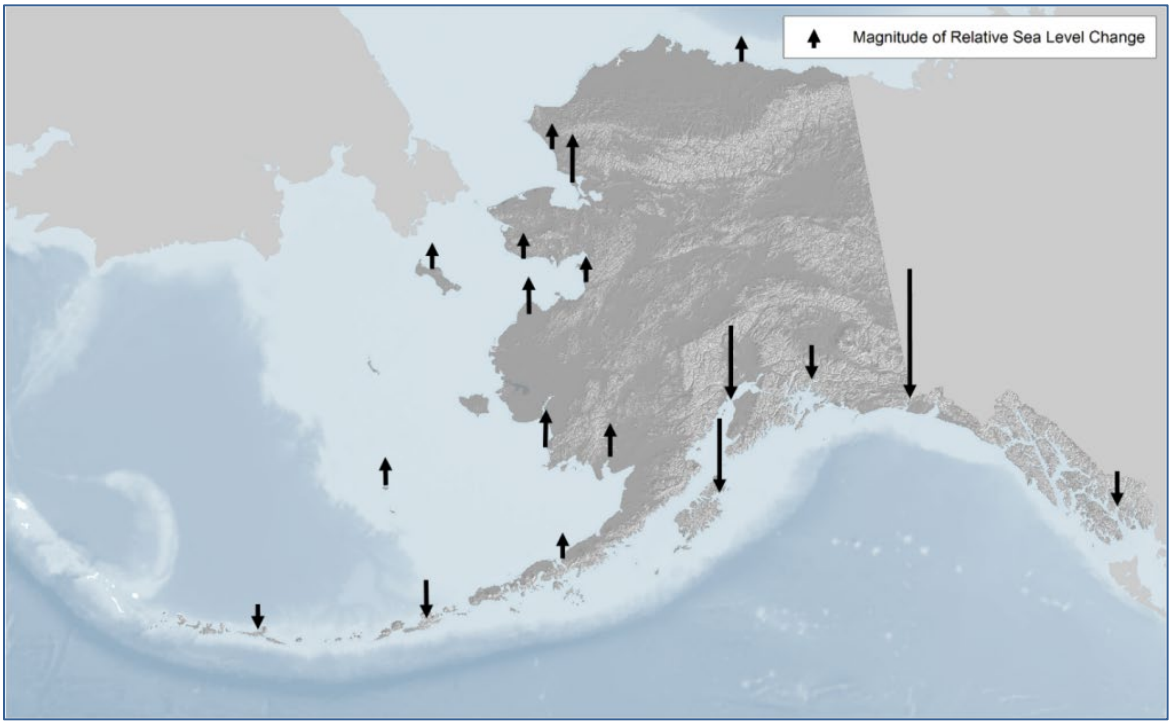

Figure 6-35 Alaska's Relative Magnitude of Relative Sea Level Change Rates
Arrows show the direction and magnitude of relative sea level changes across Alaska. Source: NOAA 2017 and DeGrandpre 2015

Fluctuating Lake Levels is flooding that occurs from overflowing lakes. Generally, lakes prevent downstream flooding by storing large amounts of runoff. However, the area around the lake may flood during periods of excessive inflow. The Kenai and Skilak lake areas occasionally flood due to excessive rainfall, snowmelt, and glacier-dammed lake releases.

Glacial Lake Outburst Flooding occurs when water is rapidly released from a glacial lake due to the sudden failure of an ice or moraine dam, or to water overtopping the dam as a result of waves caused by mass wasting (landslide) of nearby unstable slopes into the lake. Sub-glacial releases occur when enough hydrostatic pressure builds to float the glacial ice; water then drains rapidly from the bottom of the lake.

Glacial lake outburst flooding is possible in many parts of the state. A USGS study documented 750 glacier-dammed lakes with potential for outburst floods in Alaska and adjacent portions of Canada (Post and Mayo 1971). The Copper, Snow, Tazlina, and Kenai rivers all have periodic outbursts of approximately 2 to 5 year frequency, while the Kennicott Glacier at McCarthy and Valdez Glacier near Valdez outburst annually. See the Glacier Hazards section for a more detailed discussion of this hazard.

Groundwater Flooding occurs when water accumulates and saturates the soil. The water table rises to levels that flood low-lying areas, including structures, septic tanks, and other facilities. It has been a significant problem in Fairbanks, especially downstream of the Moose Creek Dam near Chena River Lakes. Additionally, the basements of structures along the Chena River may flood when the river stage remains high for more than a few days. Numerous rural or remote "boardwalk communities," such as Newtok and Atmautluak, experience dire living conditions due to groundwater flooding.

Aufeis (Ice Overflow) Flooding is caused by a surface ice mass (i.e., aufeis) that forms during the winter in a permafrost area by successive freezing of sheets of water that may seep from the ground or from a spring or river. Also known as "overflow ice," "glaciering," "icing," or "naled," most aufeis is less than a few hundred yards long; however, some can cover many square miles. Usually just a few feet thick, aufeis can reach a thickness of 30 feet or more. Aufeis in stream channels may force water up and over streambanks, resulting in flooding. In March of 2015, aufeis along the Sagavanirktok River caused flooding of the adjacent Dalton Highway (Figure 6-36). For more information about aufeis, see the Permafrost section.

Figure 6-36 2015 Dalton Highway Flooding
Caused by aufeis on the Sagavanirktok River, 2015. Source: DOT/PF 2015

Erosion Classifications

The USACE's 2009 Alaska Baseline Erosion assessment found that many of state's communities are subject to erosion hazards – 178 communities along Alaska's rivers and coastline, mostly villages, reported erosion problems (Figure 6-37). There are three main erosion types in Alaska:

- Coastal erosion
- Riverine erosion
- Wind erosion

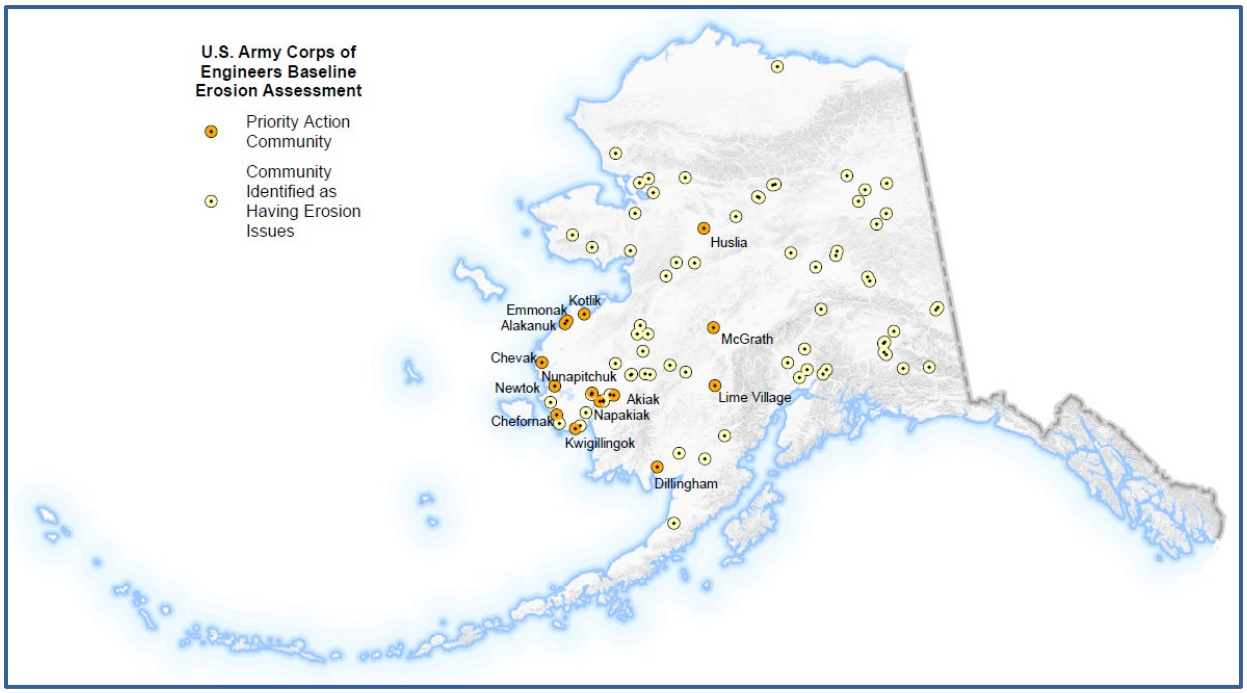

Figure 6-37 USACE Baseline Erosion Assessment Map
Alaska communities with reported erosion problems. Sources: USACE, 2009; Map by DGGS 2018)

Coastal Erosion (used interchangeably with scour) commonly occurs in Alaska because of the combination of hydrodynamic (waves and currents), physical (e.g., ivu [i.e., ice override] and human-caused), and thermal (e.g., permafrost thaw) processes that result in the transport of coastal sediments offshore or along the shoreline. Coastal retreat due to erosion can be significant and rapid.

Waves and currents act on the coastline on a wide range of time scales (from seconds to millennia). Coastal sediments are highly dynamic, shifting to respond to individual waves, tidal cycles, coastal storms, seasonal shifts in ocean currents and shelf circulation, relative sea level rise or fall, and others (Elko et al. 2014). Alaska's western and northern coastlines are subject to erosion from coastal storm waves and flooding (see Coastal Flooding). When sea ice is not present or is in low concentration, fall and winter storms can build storm surge and wave energy that significantly erode Alaska's coastline.

Engineered mitigation structures built in the nearshore zone (interface between ocean and land) work to:

1. Strengthen the shoreline to prevent erosion,
2. Capture sediment moving along the shoreline, or
3. Lessen wave energy as it moves toward the shoreline.

These structures can have both positive and negative impacts on the coastal sediment dynamics that drive coastal erosion. For example, coastal structures known as "groins" are built to capture sediment in the direction of dominant coastal currents and result in erosion on the leeward side. Other human activities, such as dredging and driving vehicles on beach surfaces, can work to erode coastal sediments. When sea ice is present in the nearshore, ice-pack movement can shift and result in ice override, or "ivu" (see Sea Ice). Ivus have been large enough to move buildings off their foundations and push nearshore sediments far inland.

Much of Alaska's coast also contains permanently frozen ground, or permafrost (see Permafrost). Permafrost is subject to thermal degradation from both air and ocean temperatures, greatly increasing its susceptibility to erosion. Coastal bluffs with high ice content (commonly found in northern and northwestern Alaska) develop thermoerosional niches from undercutting due to thermal degradation by waves at the bluff base, followed by collapse of entire blocks of frozen ground (Gibbs and Richmond 2015)(Figure 6-38).

Figure 6-38 Aerial Photograph Showing a Typical Northern Alaska Coast
An example between the Staines and Sagavanirktok rivers. Note collapsing coastal bluffs and drained thermokarst lake (yellowish-brown area). (Source: Gibbs and Richmond 2015)

Coastal erosion affects sand and gravel beaches and coastal bluffs throughout the state, but the regions impacted most dramatically are the North Slope, Northwest Arctic, Bering Strait, Yukon-Kuskokwim Delta, and Bristol Bay regions, as well as areas of southcentral Alaska. Much of Alaska, including regions in the Aleutian Islands, southeast, and southcentral, has rocky

coastlines. Rocky coastlines are much less vulnerable to coastal erosion as compared to sand and gravel beaches and coastal bluffs. Figure 6-39 shows coastal erosion rates from northern and western Alaska of which provides a visual of erosion hazards; the map is derived from analyses conducted by the DGGS, the National Park Service (NPS) (Manley and Lestak 2012), and the USGS (Gibbs and Richmond 2015). Shorelines were compared throughout time to determine how quickly they eroded; more negative means greater erosion. Shoreline change rates were calculated for some of the most vulnerable parts of the state, although some locations that experience erosion were not included because of limited availability or access to data.

Coastal erosion is also more likely to occur during sea ice-free conditions; normal fall and winter storms can have much greater impacts on a coastline unprotected by offshore and nearshore sea ice. Off-shore, sea ice mitigates wave and surge development, while nearshore ice provides a physical buffer to wave attack. In the future, sea ice in the Bering, Chukchi, and Beaufort seas is expected to form later in the year and break up earlier in spring (Douglas 2010). Sea ice concentration and thickness are also expected to decrease, allowing storms to more easily break up sea ice and thus impede its capability to reduce a storm's coastal impacts. Ice-free ocean conditions will also result in changing ocean processes, which will likely impact the distribution and behavior of coastal sediments.

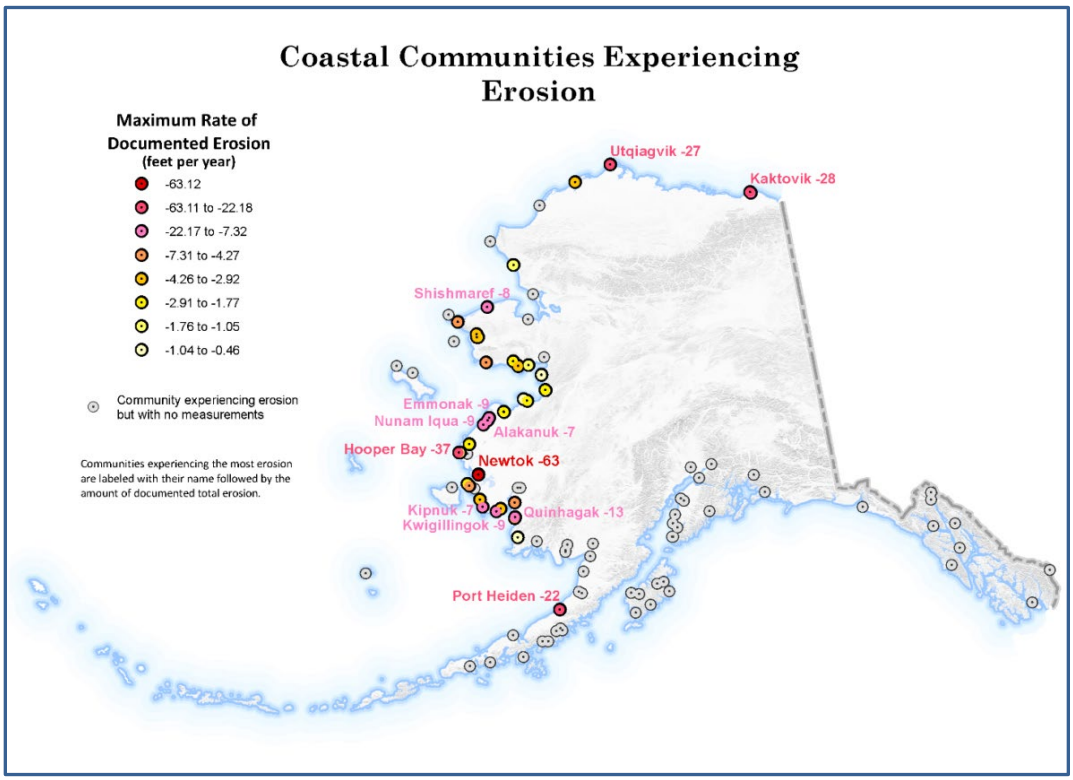

Figure 6-39 Coastal Community Erosion Map

Showing maximum documented erosion rates (ca. 1950–2016) for Alaska coastal and tidally-influenced communities, where data or past studies were available. Coastal communities identified as possibly experiencing coastal erosion problems by the U.S. Army Corps of Engineers, but did not have measurements available, are shown as light gray circles. (Source: DGGS 2018)

Riverine Erosion or scour occurs from high water flow forces and ice formations that wear away rock and soil along a riverbed and its embankments. This erosion also involves the breaking down of rock particles being carried downstream by the river. Eroded sediment is deposited in slower-moving sections of the river, such as the insides of river bends, places where the river widens, or where a river enters a lake or ocean. River erosion and deposition leads to lateral stream movement, with the streams meandering across the valley bottom by alternately eroding the sediment on the outsides of curves (cut banks) and depositing sediment on the insides of curves (point bars). Over time, the entire stream can move great distances across its floodplain and even cut into areas beyond the floodplain.

People in Alaska are losing the ground beneath their feet because of erosion (Figure 6-40). Not only do thawing permafrost and high river flow rates (such as during breakup) contribute to increased erosive scour, climate change has accelerated the normal process along Alaska's rivers; warmer temperatures degrade the permafrost that helped bind together the soil, and heavier rains produce more floods and swollen rivers that wash away the soil. Riverine erosion threatens many Alaska villages and major mitigation measures are needed whether these communities remain in place or relocate.

Figure 6-40 Newtok Riverine Erosion

Newtok, Alaska's severely damaged bank reinforcement structures caused this steel shipping container to slide into the Ninglick River. Source: State of Alaska

Wind Erosion moves soil from one location to another by wind power. Even a light wind can roll some soil particles along the surface, and strong winds can lift a large volume of soil particles into the air to create dust storms (Figure 6-41). Wind erosion is a relatively common occurrence in flat, bare areas; dry or sandy soils; or anywhere the soil is loose, dry, and finely granulated. The wind moves the finest particles (less than 0.1 mm in diameter) by suspending them in the air, and soil particles 0.1-0.5 mm in size are moved in a hopping or bouncing fashion, known as "saltation." Soil particles greater than 0.5 mm in size are generally moved by rolling.

Windblown sand creates sand dunes along beaches and in dune fields, such as the great Kobuk Sand Dunes of northwestern Alaska. Windblown silt, called "loess," can be carried many miles and redeposited on the ground as fertile loess soils, such as those covering large areas of Europe and North America (where highly productive farming has developed), and in the Matanuska-Susitna and Tanana River areas of Alaska.

While wind erosion is most common in deserts and coastal sand dunes and beaches, certain land conditions (e.g., bare soils) will exacerbate wind erosion in agricultural areas, where it can cause significant economic and environmental damage. Susceptibility to wind erosion is increased during drought periods, such as in the American and Canadian prairies in the 1930s during the Dust Bowl.

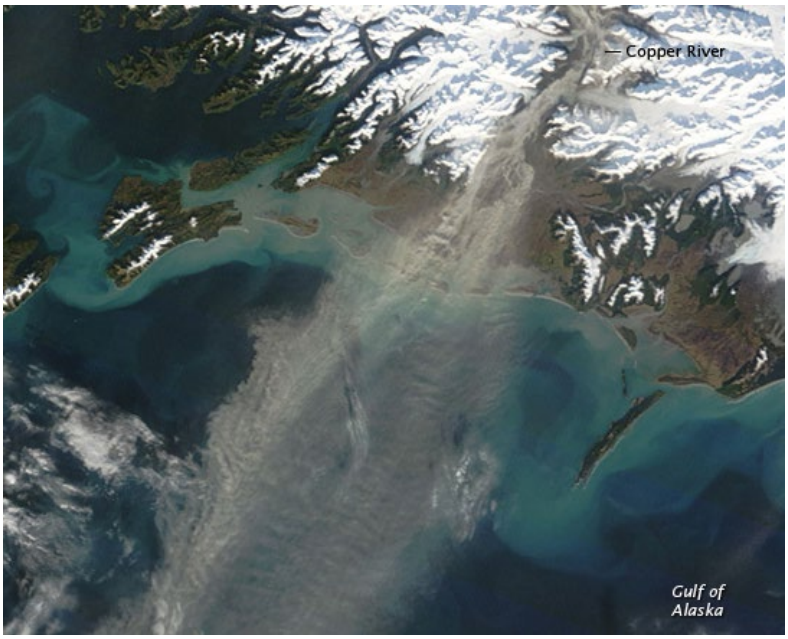

Figure 6-41 Satellite Image of Windblown Dust from the Copper River Floodplain
Source: NASA Earth Observatory, https://earthobservatory.nasa.gov/IOTD/view.php?id=40973

6.3.2. CLIMATE FACTORS

Climate and weather are the two primary drivers of flooding and erosion in Alaska. Weather (i.e., the day-to-day state of the atmosphere) affects these hazards on the short term with individual episodes of rainfall, wind, and temperature that initiate or intensify individual episodes of flooding or erosion. Climate is affecting the long-term incident rate and severity of these hazards, especially in Alaska, which is particularly vulnerable due to its high northern latitude and the unique importance of snow, ice, and permafrost. Longer sea ice-free seasons, higher ground temperatures, and sea level rise are expected to exacerbate flooding and accelerate erosion in many regions that ultimately increases risk.

In 2012 and 2013, Alaska's riverine communities experienced two of the quickest spring thaws on record. The Special Supplement to the Bulletin of the American Meteorological Society (published in August 2013) noted that the climate of the Arctic in 2012 was dominated by continued significant changes in the cryosphere, with new records for minimum sea ice extent

and permafrost warming in northernmost Alaska. Southerly airflow into the Arctic had a major impact on lake ice break-up, snow cover extent, and mass loss from Arctic glaciers and ice caps. Meltwater inundated many watersheds and the swollen rivers broke their ice cover prematurely, forming large ice dams downstream. The 2013 Spring Floods disaster (DR-4122) was one of the largest events of its kind in Alaska's history.

Global sea level rise is expected to continue due to increased glacier and ice sheet melting, which add water volume to oceans, and thermal expansion of the ocean as ocean water warms (NOAA, 2018). Sea level rise is location dependent. Figure 6-42 depicts this inconsistency along Alaska's coastlines. Sea ice that annually forms offshore of Alaska's western and northern coasts is expected to form later and break up earlier in the year (Douglas, 2010). The extent of sea ice is also expected to be reduced during winter months (Wang and Overland, 2009). Reduction of sea ice during fall and winter storms expose the coast and open ocean to storm surges and waves, and is expected to increase coastal flooding impacts (Simmonds and Keay 2009; Terenzi et al. 2014; Vermaire et al. 2013).

6.3.2.1. RELATED HAZARDS

Hazards related to flooding and erosion include glacier hazards (see Glacier Hazards), usteq (see Permafrost), sea ice hazards (see Sea Ice), and ground failure (see Ground Failure). Flooding and erosion commonly occur together because of increased water currents that get raised above the normal tide line or riverbank. Figure 6-42 illustrates how commonly coastal flooding and erosion occur together to threaten communities in western and northern Alaska.

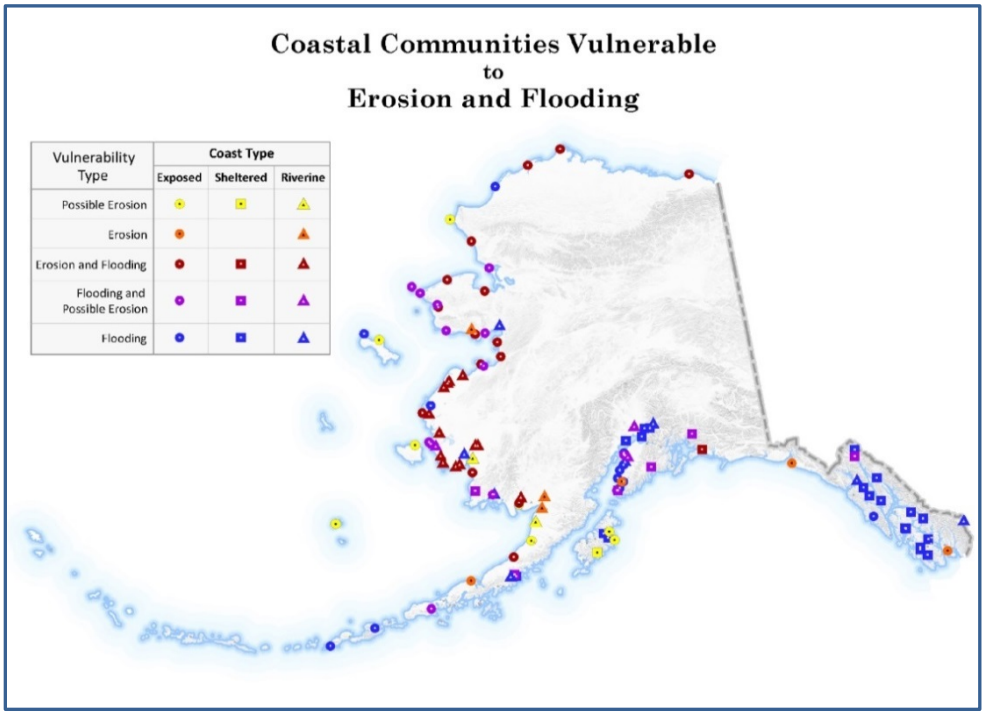

Figure 6-42 Map of Alaska Erosion and Flood Threatened Coastal Communities
Experiencing known flooding (blue), erosion (yellow and orange), or both flooding and erosion (red and purple). The coasts of northern and western Alaska are particularly vulnerable to the combination of flooding and erosion. Source: DGGS 2018

6.3.3. FLOOD AND EROSION HISTORY

Coastal and riverine communities throughout the state have lengthy flooding and erosion histories. Rapid snowmelt, ice jams, heavy precipitation, ice-free oceans, and seasonal variations all increase the risk. Flooding has overwhelmed wastewater treatment facilities, warranted entire community evacuations, inundated road systems, and forced agencies under considerable pressure to rebuild before winter. Given the limited highway infrastructure in Alaska, damaged runways, roads, and bridges may isolate communities for weeks and hamper disaster recovery projects for months or years.

- ***Rainfall-Runoff Floods***

2013 October KPB Flood Disaster (DR-4161)
Beginning October 27, 2013, heavy rains inundated much of the Kenai Peninsula. Seward, Homer, Kenai, Anchor Point, and the Tyonek area along Beluga Road all reported major flood damage, prompting the Kenai Peninsula Borough to declare a local disaster and request state and federal assistance.

2012 September Storm (DR-4094)
On September 4, 2012, a strong weather system produced high winds and heavy rains, resulting in severe and widespread wind damage and flooding throughout much of Southcentral and Interior Alaska. The series of storms threatened life and property in the Matanuska Susitna Borough, Kenai Peninsula Borough, Alaska Gateway Regional Educational Attendance Area (REAA), and the Chugach area. The magnitude of the storm necessitated emergency protective measures enacted by the Rescue Coordination Center (RCC). Damages from wind and flooding were substantial and widespread.

2012 October Kuskokwim Delta Flood (AK-12-241)
On October 5, 2012, a strong fall storm moved north into the Bering Sea and produced severe winds, heavy rain, and storm surges up to 4 feet above mean tide levels in the Kuskokwim Delta, with severe impact to the Native Village of Napaskiak. The storm resulted in floodwaters surrounding the tribal-owned maintenance garage, undermining and shifting the building and foundation; damage to the driveway ramp to the maintenance yard; and substantial damage to community boardwalks.

2008 Tanana Valley Flooding (DR-1796)
From July 27–August 6, 2008, flooding from excessive storm activity destroyed property and threatened life in the interior region of the state. The most severely damaged were buildings and infrastructure near the City of Nenana [Figure 6-43]. *In particular, the sewage lift stations required costly and extensive repairs. The lengthy unavailability of the sewer system created an unhealthy environment for the community. Following repairs, the City completed a hazard mitigation project to protect the sewer system from future flooding.*

Additionally, the Alaska Railroad Company (ARRC) temporarily stopped all northbound freight and passenger rail service due to track failures in the City of Nenana and Healy Canyon. The ARRC completed a series of mitigation projects designed to prevent future flood damage and service interruption in the Nenana area.

Figure 6-43 Rainfall-Runoff Flooding in Nenana
Source: DHS&EM 2008

- ***Snowmelt Floods***

2015 Fort Yukon Flooding (AK-15-252)
Abnormally warm temperatures in mid-May 2015 rapidly melted snow in the highlands of northeastern Alaska and elevated water levels in the Yukon and Porcupine rivers. By May 20, the water levels overtopped the Porcupine River in some locations and inundated the Fort Yukon area with up to two feet of water.

- ***Ice Jam Floods***

2013 Spring Floods (DR-4122)
From May 17 through June 10, 2013, excessive snowpack and ice thickness, combined with rapid spring warming, resulted in ice jams and caused severe flooding throughout communities along the Yukon and Kuskokwim rivers [Figure 6-44]. *Large ice jam floods severely damaged approximately 194 homes and much of the infrastructure, prompting evacuations. Loss and damage to personal property and multiple businesses, including loss of revenue, resulted from this event. Impacts to public infrastructure included: hazardous and non-hazardous debris removal; emergency protective measures (leading to ongoing mass care operations); and damage to city and state roads, bridges, water and sewer systems, electrical generation and distribution systems, recreation areas, and fuel storage facilities.*

Figure 6-44 Ice Jam Flooding in Galena
Source: DHS&EM 2013

2009 Spring Ice Jam Flooding on the Yukon River (DR-1843)
The 2009 flood event was the largest disaster in Alaska in more than a decade, and involved communities along thousands of miles of the Kuskokwim and Yukon river systems. Ice jams formed along various points of the rivers, damming them and causing water levels to rise and flood nearby communities. Additionally, enormous ice chunks—some more than 15 feet thick—crashed into structures in the already-flooded communities of Eagle and Stevens Village [Figure 6-45].

Thirty-nine communities along the river systems, including the entire length of the Yukon River (1,980 miles long), sustained flood and ice damage in the month-long disaster. Challenges to the recovery teams were the remoteness of the communities and the fast-approaching winter season. The recovery effort included Public Assistance (PA), Individual Assistance (IA), SBA disaster loans, and temporary housing.

Figure 6-45 Ice and Flooded Structures in Stevens Village (left) and Eagle (right)
Due to the 2009 spring ice jam floods on the Yukon River. Source: DHS&EM 2009

2007 Kenai River Ice Jam Flood (triggered by glacial lake outburst flooding)
In the winter of 2007, the Skilak glacier-dammed lake breached and released a four-foot high surge of water into the Kenai River. The sudden rise in water level dislodged the river ice. The ice moved downriver and impacted public and private riverbank fishing platforms, stairs, and elevated walkways. Ice continued downriver and formed ice jams in multiple locations. Behind the ice jams, water and ice overtopped the riverbanks and flooded several public campgrounds, fishing parks, and residential homes [Figure 6-46]. *Damage in the Kenai Peninsula Borough (KPB) extended from the community of Sterling to the City of Soldotna. Approximately 150 homes and riverside businesses reported damage to their buildings, fishing structures, and docks. Another 775 homes within the KPB sustained damage from the floodwaters and ice, and some roads became inundated and impassable.*

Figure 6-46 Kenai River Ice Jam Flood
Triggered by a glacial lake outburst flood in its headwaters. Source: KPB 2007

- ***Storm Surge Floods***

2017 Alaska Severe Storm (DR-4369)
A storm from the Gulf of Alaska on December 4, 2017, resulted in heavy rain and a storm surge that caused significant damage to the Lowell Point area in the City of Seward on the Kenai Peninsula. High tides and a storm surge swept over the road and, along with waves, caused millions of dollars of damage [Figure 6-47]. *Lowell Point Road was reduced to one lane of traffic in some locations, with the road edge on the ocean side suffering damage from storm water erosion in most areas. Rock slides triggered by the storm also deposited loose rock on the roadway.*

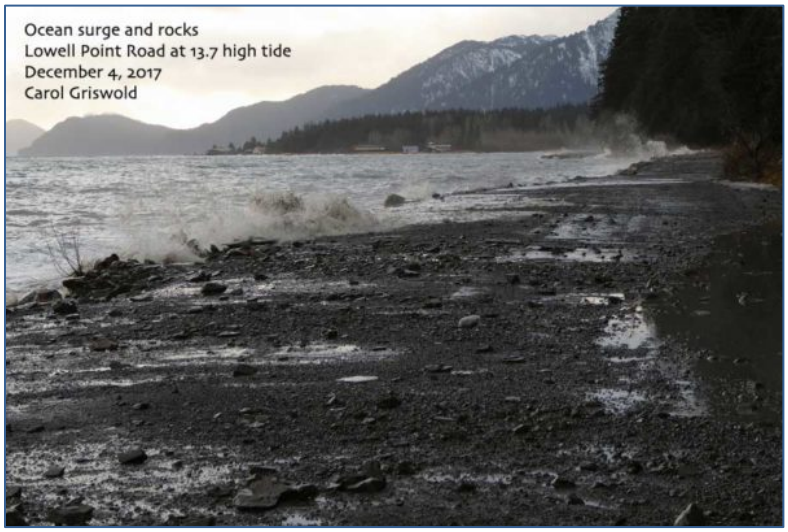

Figure 6-47 Seward's Storm Surge Flooding of Lowell Point Road
Source: Carol Griswold, Seward City News 2017

2011 Alaska Severe Winter Storms and Flooding (DR-4050)
The November 2011 Bering Sea cyclone was one of the most powerful extratropical cyclones to affect Alaska on record. A 10-foot storm surge caused damage or flooding in some 40 villages across western Alaska. The storm shredded roofs, damaged portions of seawalls in Nome and Unalakleet, flooded homes in Golovin [Figure 6-48]*, and knocked out electricity in several areas. The damage, though generally minor and likely underreported, was widespread, covering a nearly 700-mile swath.*

Figure 6-48 Golovin Storm Surge Flooding
Source: Toby Anungazuk Jr., Chinik Eskimo Village [two photos spliced] 2011

- ***Glacial Lake Outburst Floods***

In Alaska, significant glacial lake outburst floods have been documented at Hubbard, Skilak, and Valdez glaciers, among others. See the Glacier Hazards section of this report for more information about glacial lake outburst floods.

- ***Aufeis***

2015 Dalton Highway Flooding (AK-15-253)
Beginning on March 13, 2015, the Sagavanirktok River on the North Slope experienced an unprecedented ice overflow flood between mileposts 390 and 415 of the Dalton

Highway, about 25–30 miles south of Deadhorse. Road clearing and overflow diversion efforts were hampered by very cold temperatures, high winds, and poor visibility.

- ***Coastal Erosion***

2017 Coastal Erosion at Shishmaref
The community of Shishmaref, located on a barrier island on the Chukchi Sea coast, experienced an erosion event from a fall storm in 2017. The storm did not result in significant flooding, but storm waves caused erosion of the community dump access road and land fronting the community's only airstrip [Figure 6-49].

Figure 6-49 Photos Showing Coastal Erosion
Occurring between 2012 and 2017at two sites in Shishmaref, Alaska. Colored arrows point to the same locations in each of the two series of photos. Far right photo shows aftermath of November 2017 erosion event, which washed out the road to the dump. Source: Photos include staff from DGGS and the Native Village of Shishmaref

- ***Riverine Erosion***

Figure 6-50 shows riverine communities identified by the USACE as "priority action for erosion issues or as having erosion issues, but not priority action" (USACE, 2009). Some communities are located on tidally influenced rivers, so may experience both coastal and riverine erosion.

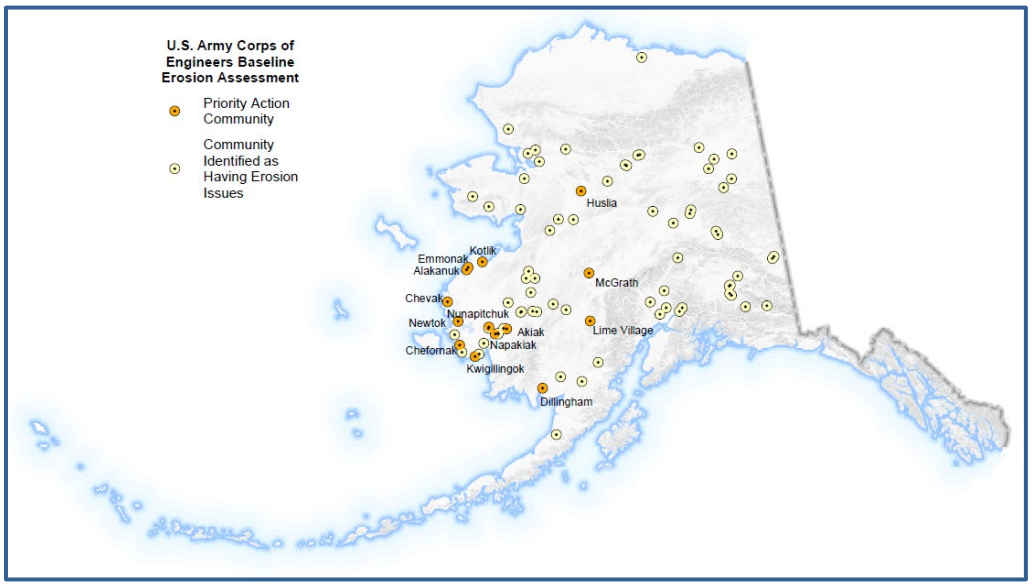

Figure 6-50 USACE Riverine Erosion Prone Communities
Source: USACE 2009

2016 Ninglick River Erosion at Newtok

An erosion event along the Ninglick River at Newtok in the fall of 2016 resulted in approximately 150 feet of lateral erosion, damaging residences and exposing a fuel header (Figure 6-51). Despite the amount of damage done in this and other events, FEMA denied the request for a major disaster declaration for the village.

Newtok has experienced many historic erosion events, with an average rate of erosion of 63 feet per year. The total amount of documented landward erosion between 1951 and 2015 is 3,680 feet; that is, in the last 66 years the riverbank has migrated almost three-quarters of a mile toward and into the town. Erosion has already claimed the community solid waste site, sewage lagoon, and barge landing site. The community anticipates the river will destroy the community water source, school, and airport by 2019.

Erosion is a particularly serious hazard in Newtok because the community is not only located on a riverbank and subject to typical riverine erosion, but coastal storms also enter the mouth of the river, raising the water level at town and exacerbating the destruction.

Figure 6-51 2016 Ninglick River Erosion at Newtok
Source: Romy Cadiente, Newtok Village Relocation Coordinator 2016

6.3.4. EXTENT, IMPACT, AND RECURRENCE PROBABILITY

Extent

Flood and erosion hazards impact many communities around the state. As described in Section 8 Vulnerability Exposure Analysis, the extent of flooding and erosion has been defined as a 0.5 mile buffer along communities identified as threatened by coastal flooding (DGGS), community locations identified as experiencing coastal erosion (USACE), and a 0.25 mile buffer along riverine threatened communities (USACE). See Section 8 Vulnerability Exposure Analysis for detailed assessment.

Impact

Nationwide, floods result in more deaths than any other natural hazard. Flooding is Alaska's greatest threat causing extensive property damage and losses, which include the following:

- Structure flood inundation, causing water damage to structural elements and contents.
- High water flow storm surge floods scour (erode) coastal embankments, coastal protection barriers, and result in infrastructure and residential property losses. Additional impacts can include roadway embankment collapse, foundations exposure, and damaging impacts.
- Damage to structures, roads, bridges, culverts, and other features from high-velocity flow and debris carried by floodwaters. Such debris may also accumulate on bridge piers and in culverts, decreasing water conveyance and increasing loads which may cause feature overtopping or backwater damages.
- Sewage, hazardous or toxic materials release, materials transport from wastewater treatment plant or sewage lagoon inundation, storage tank damages, and/or severed pipeline damages can be catastrophic to rural remote communities.

Floods also result in economic losses through business and government facility closure; utilities such as energy generation, communications, potable water, and wastewater; and transportation service disruptions. Floods result in excessive expenditures for emergency response, and generally disrupt the community's normal function and quality of life.

Impacts and problems also related to flooding are deposition as well as embankment, coastal erosion, and/or wind. Deposition is the accumulation of soil, silt, and other particles on a river bottom or delta. Deposition leads to the destruction of fish habitat, presents a challenge for navigational purposes, and prevents access to historical boat and barge landing areas. Deposition also reduces channel capacity, resulting in increased flooding or bank erosion. Embankment erosion involves material removal from the stream or river banks, coastal bluffs, and dune areas. When bank erosion is excessive, it becomes a concern because it results in loss of embankment vegetation, fish habitat, and land, property, and essential infrastructure. *Source: BKP 1988*

Recurrence Probability

Alaska has historically experienced flood and erosion events. Many of these events are under-reported or not measured and very few communities have a 100-year flood analysis. For this reason, recurrence probabilities are not easily computed for coastal flood and erosion hazards. Section 8 Vulnerability Assessment provides a rough recurrence probability analysis.

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6.4. GROUND FAILURE

6.4.1. HAZARD CHARACTERISTICS

Ground failure results when rock and soil lose their mechanical stability, leading to failure, collapse, and/or material movement. "Mass wasting" and "mass movement" are terms used for events that include downslope movement from the originating location. Topography (i.e., slope), geologic setting, lithology (i.e., rock or sediment type), vegetation, and water content are important factors that influence the movement type (i.e., style) and speed as well as the amount and type of damage that may result from failure. Ground failure can occur due to natural processes, human activities, or a combination of the two.

Ground Failure Types

Landslide is a catch-all term that describes a wide variety of processes that result in the downward and outward movement of slope-forming materials including rock, soil, artificial fill, or a combination of these. "Landslide" is often used interchangeably with "slope failure" or "mass movement." Anything that alters the slope gradient, vegetation cover, surface drainage, or groundwater infiltration can potentially destabilize vulnerable slopes and lead to landslides. In Alaska, degrading permafrost, steep slopes, heavy rain, retreating glaciers, and ground shaking from earthquakes are some of the important natural mechanisms that can trigger devastating landslides. Human activity—such as construction that undercuts or overloads dangerous slopes, or redirects surface or groundwater flow—can trigger landslides, as can forest clearing or tundra vegetation disturbance.

In general, landslides are classified based on the type of material being transported and the mechanics material movement (Table 6-2). Transported materials include rock, soil (fine-grained material), and debris (coarse-grained materials). The materials may move by falling, toppling, sliding, spreading, or flowing.

Table 6-2 Landslide Classifications

Type Of Movement		Type Of Material		
		Bedrock	Engineering Soils	
			Predominantly coarse	Predominantly fine
Falls		Rock fall	Debris fall	Earth fall
Topples		Rock topple	Debris topple	Earth topple
Slides	Rotational	Rock slide	Debris slide	Earth slide
	Translational			
Lateral spreads		Rock spread	Debris spread	Earth spread
Flows		Rock flow (deep creep)	Debris flow (soil creep)	Earth flow
Complex		Combination of two or more principal types of movement		

Source: Varnes, 1978

Landslides are often complex, involving multiple movement and material types, and they may begin as one mass movement type and evolve into another as materials collect and continue to move downslope. The most common landslide types can be categorized as listed in Table 6-3 and displayed in Figure 6-52.

Table 6-3 Landslide Types

- Rotational Landslide
- Translational Landslide
- Directed Blast
- Rockfall
- Topple
- Debris Flow
- Debris Avalanche
- Earthflow
- Creep
- Lateral Spread

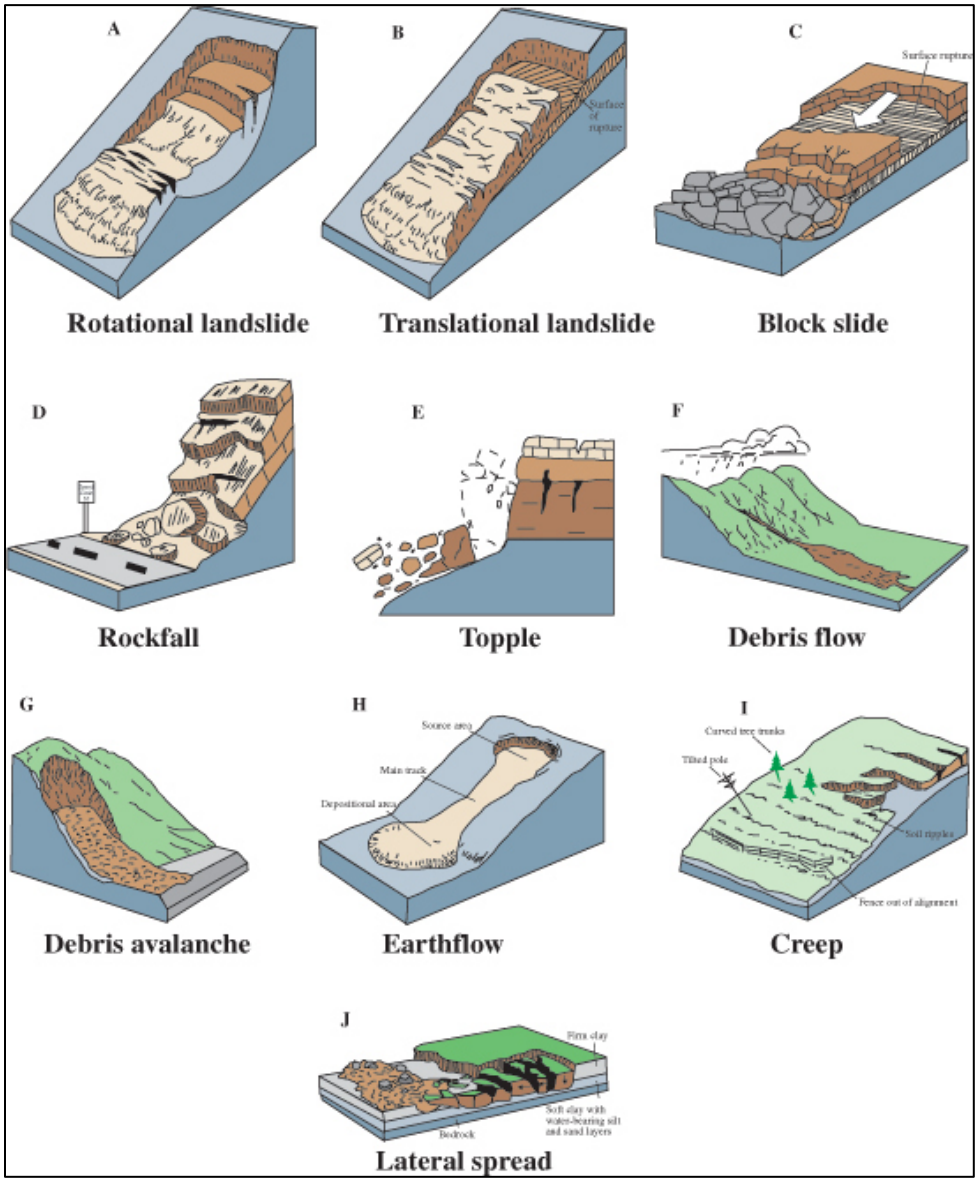


Figure 6-52 Diagram – Most Common Types of Landslides
Source: USGS

A ***Rotational Landslide*** is a landslide in which earth material slides on a failure surface or thin failure zone that curves upward. The slide movement is more-or-less rotational about an axis that is parallel to the slope contour. Rotational landslides generally occur on steep slopes (greater than 20 degrees).

A ***Translational Landslide*** moves downslope along a relatively planar failure surface, and has little rotational movement or backward tilting. Translational landslides commonly occur along geologic discontinuities, such as faults, joints, bedding surfaces, or at the contact between rock and soil. If the failure surface slope is steep, these slides can have considerable run-out distances. In Alaska, the top of permafrost can form the failure surface for a translational landslide; the frozen layer is impermeable to water, which accumulates on top of the permafrost and acts as a lubricant that facilitates sliding of overlying unfrozen materials. These types of translational landslides are called "active layer detachments."

Block Slides occur when material remains relatively coherent as it moves downslope, with little or no internal deformation. The sliding surface may be curved or planar.

A Rockfall is an abrupt, downward rock movement that detaches from a steep slope or cliff. Falling material may bounce or break on impact and then continue to roll downslope. Rockfalls can occur where natural processes (such as weathering and erosion) or human activities (such as digging or blasting) have resulted in an over-steepened slope.

A Topple describes the forward rotation of a mass of soil or rock about a pivot point that separates it from adjacent material. Toppling can be caused by natural processes, for example, stress from the weight of upslope material or freeze-thaw action in cracks or fractures. Columnar-jointed rocks are notably susceptible to toppling.

A ***Debris Flow*** is a rapid mass movement in which a saturated slurry of loose soil, rock, organic matter, air, and water flows downslope. Debris flows are commonly composed of a large proportion of silt- and sand-sized material, and are triggered by intense surface-water flow, due to heavy precipitation or rapid snowmelt, that erodes and mobilizes loose soil or rock on steep slopes. This landslide type is prevalent in areas with steep canyons and gullies, de-vegetated areas, and in volcanic regions with weak soils. Debris flows may develop from other types of landslides (such as rotational or translational) as they increase in velocity and the internal mass loses cohesion and/or gains water. A special form of debris flow that occurs on the slopes of volcanoes is called a "lahar" (see Volcano).

Debris Avalanches are very fast-moving debris flows. Debris avalanches occur in steep terrain from collapse of weathered slopes, or when bedrock disintegrates during a rotational or translational landslide as material moves downslope at high velocity.

Earthflows occur on moderately steep slopes, usually under saturated conditions, when earth materials lose shear strength and behave like a liquid. The flows are elongate and commonly occur in fine-grained soil (e.g., marine clay [quick clay] or silt) but granular materials or weathered bedrock with high clay content are also susceptible. Earthflows grow in size through a process known as "head scarp retrogression," which is erosion of the upper portion of a failure surface, and may evolve from slides or lateral spreads (described below) as they move downslope. Earthflows can destroy large areas and flow for several miles.

Soil Creep is a slow earthflow that is characterized by almost imperceptibly slow, steady, downslope movement of the uppermost few feet of soil or rock. Creep can pull apart or crack pipelines, highways, and other manmade structures. Creep is indicated by curved tree trunks, bent fences or retaining walls, tilted poles or fences, and small soil ripples or ridges. Creep may be seasonal, where movement within the soil is affected by changes in moisture or temperature, or it may be continuous. In some cases creep may progressively increase and produce other landslide types.

Solifluction is soil creep resulting from alternating cycles of freezing and thawing. It occurs when fine-grained soil thaws, becomes oversaturated due to poor drainage, and then begins to flow. If sufficient water is present, debris flows may develop. In areas of permafrost and deep seasonal freezing, the near-surface material (active layer) thaws seasonally and moves slowly downslope over the underlying frozen material; this process is called **gelifluction**.

Lateral Spread is the extension or disruption of a normally coherent upper rock or soil layer on top of a softer, weaker layer that has liquefied or flowed. During a lateral spread event the stronger upper unit may subside into the weaker lower unit, or material from the lower unit may be squeezed into the upper unit. This mass-movement type generally occurs on flat or very gentle slopes. Lateral spreads can be prevalent in seismically active areas with liquefiable soils (see Earthquake). For example, the Bootlegger Cove Clay (quick clays) in the Anchorage area is particularly susceptible to liquefaction, resulting in catastrophic lateral spreading during the 1964 Good Friday Earthquake.

A ***Slump*** is a form of mass wasting that occurs when a coherent mass of loosely consolidated materials or rock layers moves a short distance down a slope. Slumps often occur as material drops off an eroding surface, for example, on the cutbanks of rivers or along undercut coastal bluffs.

Subsidence is any sinking or settling of the earth's surface, often due to removal of subsurface material. Subsidence is common in areas of thermokarst (see below). Other causes include underground mining; groundwater and petroleum extraction or movement; and degassing and other changes in hydrothermal systems. Tectonic subsidence occurs when the ground surface is lowered by sinking of the Earth's crust as crustal plates move. In Alaska, sediment compaction, thawing ice-rich permafrost, and earthquakes are common subsidence causes.

Thermokarst describes the land surface, landforms, and processes that result from thawing ice-rich permafrost. Ice-rich soil and ice lenses become exposed and thaw as surface material warms and erodes during summer, resulting in abundant water that mobilizes sediment to flow or slide downslope along the surface of the frozen permafrost; ice becomes exposed in steep headwalls, melting causes material to slump. ***Retrogressive Thaw Slumps*** and ***Retrogressive Thaw Slides*** form as permafrost ice continues to melt, scarps migrate upslope, and material continues to slump and slide (Figure 6-53). This process persists until displaced vegetation buries and insulates the ice-rich head scarp, slowing further degradation.

Figure 6-53 Large Retrogressive Thaw Slump on the Noatak River
The top of the slump is 900 ft. above the river. (Source: NPS)

Frozen Debris Lobes (FDLs) are a unique kind of slow-moving landslide, which have recently been recognized in permafrost-affected mountainous regions of Alaska, particularly the Brooks Range (Figure 6-54). Frozen debris lobes are lobate or tongue-shaped features consisting of soil, rock, organic debris, and massive ice from infiltrating water. The largest FDLs measured in Alaska are almost 100 feet wide and 0.75 miles long. Some are more than 80 feet high—as tall as an eight-story building. These masses of material move at rates of up to 165 feet per year, and one is threatening to overrun the Dalton Highway because they cannot be slowed or stopped, the only viable solution is to move the road.

Figure 6-54 Frozen Debris Lobe next to the Dalton Highway
Source: DGGS

Many regions of Alaska are especially prone to landslides. For example, the U.S. Forest Service has identified hundreds, if not thousands, of landslides just within the Tongass National Forest area of Southeast Alaska. Landslide maps help raise awareness and promote public safety, but very few landslide maps exist for the state.

6.4.2. CLIMATE FACTORS

Studies show that changing climate conditions can increase the frequency of fast-moving, catastrophic landslides. Alaska's warming surface temperatures and thawing permafrost are impacting slope stability and increasing a variety of ground failures risks. Warming climate has caused many areas to become unstable, and future warming will increase landslide risk throughout the state, especially in permafrost and glacial regions. Increases in tsunami-producing landslides in Southeast Alaska can be attributed to retreating glaciers and thawing permafrost. Rock-ice face collapse is most common in areas with glaciers and steep topography, frequently the same areas that attract tourists. At the same time, population growth and the expansion of settlements and lifelines over potentially hazardous areas are increasing the likelihood of landslide impacts.

Increased permafrost thaw causes thermokarst and subsidence due to loss of ground ice. Additionally, increased water from thawing amplifies potential for ground failure slides, flows, and creep. Degrading alpine permafrost in the Haines area is causing increased debris flow incidents that repeatedly inundate and block the highway, making it one of the most expensive maintenance stretches in the state for DOT/PF (Figure 6-55).

Figure 6-55 Aerial View of Haines Highway Debris Fan

Haines highway crosses a debris fan that is repeatedly inundated by debris flows near milepost 19 from the Takshanuk Mountains. Source: DGGS

Glacial retreat due to warming climate increases ground failure potential as steep slopes are exposed and become unstable due to glacier ice overburden or lateral support removal. This is believed to have contributed to the June 28, 2016, landslide at Lamplugh Glacier, Glacier Bay National Park, where more than 100 million tons of rock, snow, and ice slid down a mountainside and sent debris 6 miles across the glacier surface (Figure 6-56).

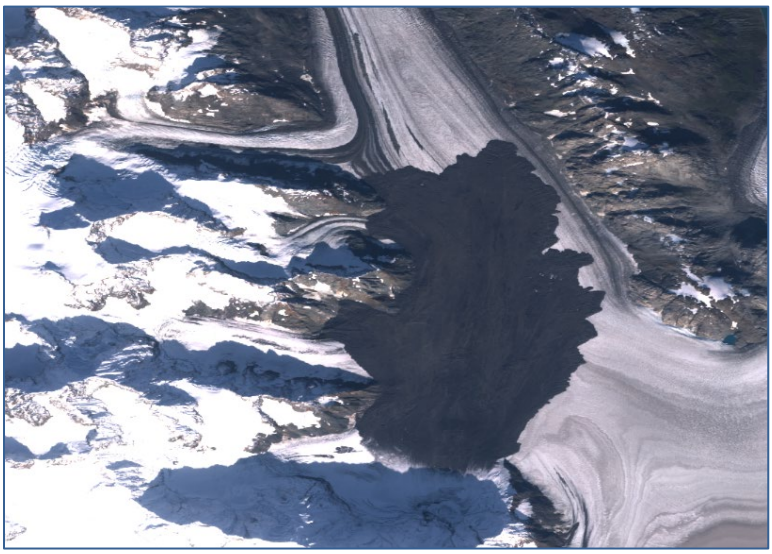


Figure 6-56 2016 Lamplugh Glacier Landslide – via Satallite
The dark mass of the landslide extends 6 miles across the white ice of Lamplugh Glacier, Glacier Bay National Park. Source: European Space Agency, Copernicus Sentinel 2016

Permafrost temperatures changes measured across the North Slope Borough and much of western and interior Alaska reveal they are clearly rising in direct relation to rising air temperatures. Alaskan communities depend upon a stable permafrost layer to support their buildings and infrastructure. Built on once-stable permafrost, the Dalton Highway has also been damaged by both frost heaving and subsidence (Figure 6-57).

Figure 6-57 Dalton Highway, Alaska, June 2015
Thawing permafrost caused significant damage to the Dalton Highway in the North Slope of Alaska in June 2015. Source: DOT/PF and Climate Central 2015

6.4.2.1. RELATED HAZARDS

Ground failure is associated with many other hazards because these hazards can directly initiate mass movement, or else destabilize slopes, making them more susceptible to failure. For example,

- Flooding can add weight to a surface (through water and sediment), causing it to be overloaded and unstable
- Erosion can remove material at the base of a steep slope, resulting in loss of lateral support
- Thawing permafrost can leave voids in the ground, resulting in subsidence
- Ground motion (shaking) from earthquakes commonly initiates a variety of ground failures

6.4.3. HISTORY

The DGGS Hazard profile project lists the following ground failure events:

2015 Sitka Landslides

On August 18, 2015, heavy rainfall resulted in more than 70 landslides in the vicinity of Baranoff Island, Southeast Alaska. Four debris flows impacted roads and infrastructure in Sitka, including one on Harbor Mountain that was more than 1,200 feet long and resulted in the death of three people and massive property damage on Kramer Avenue [Figure 6-58].

Figure 6-58 South Kramer Landslide in Sitka, 2015
This landslide took the lives of three people. Source: DGGS 2015

Ground Failures of the 1964 Great Alaska Earthquake
Some of the most dramatic ground failure events in Alaska were associated with the 1964 Great Alaska Earthquake, which triggered a wide variety of falls, slides, flows, and lateral spreads throughout Southcentral Alaska. Anchorage was heavily impacted because of failures in the Bootlegger Cove Clay Formation. Significant failure events occurred at Fourth Avenue, L Street, Government Hill, and Turnagain Heights, with several less-devastating slides in other areas, such as at Point Woronzof and Potter Hill.

The Government Hill Elementary School was severely damaged by a complex translational slide where the south wing of the school dropped ~30 feet while the east wing split lengthwise and collapsed. Part of this slide became an earth flow spreading 150 feet across the flats into the Alaska Railroad yards. The Turnagain Heights landslide was the largest and most complex translational slide, and likely began as a block slide

that evolved to include lateral spreading, slumping, and possibly other movement types. This landslide caused serious damage to a housing development in which three people died.

The earthquake caused at least one rock avalanche. A slab of rock became detached from the mountain peak overlooking Sherman Glacier. The rock slab disintegrated as it moved downhill, helping it achieve great velocities and extend a large distance over the glacier.

The 1964 Great Alaska Earthquake also caused extensive subsidence. The subsidence zone covered about 110,000 square miles, including the north and west parts of Prince William Sound, the west part of the Chugach Mountains, most of Kenai Peninsula, and almost all the Kodiak Island group. In some areas, subsidence exceeded seven feet. Part of the Seward area is about 3.5 feet lower than before the earthquake, and portions of Whittier subsided more than five feet. The village of Portage, at the head of Turnagain Arm of Cook Inlet, subsided six feet, partly due to tectonic subsidence and partly due to sediment compaction during the earthquake.

2009 Alaska Severe Storms, Flooding, Mudslides, and Rockslides (DR-1865)
In October 2009, the remnant of a typhoon brought the Kodiak Islands their second largest rainfall event ever recorded. More than 9.5 inches of rain fell in five days, resulting in mudslides and rockslides that damaged roads and infrastructure. The event was declared a federal disaster and included the Kodiak Island Borough and the Kodiak Electric Association.

Ground Failure Events in Juneau
Multiple mass movements have affected Juneau in the past 100 years. One of the most destructive occurred on November 22, 1936, when prolonged heavy rainfall triggered a debris flow that struck a residential area and caused numerous injuries and deaths. On July 16, 1984, heavy rain fell on already-waterlogged soils and triggered a debris avalanche/flow that destroyed a small hydroelectric dam, damaged two houses, and left debris on the Glacier Highway and inside several local businesses.

Other Ground Failure Events in Alaska
On November 29, 1969, a debris flow caused by the overflow of an emergency spillway destroyed Ketchikan's Upper Lake Silvis powerhouse, plunging the city into partial darkness.

A rock avalanche on April 11, 2009, blocked the tunnel connecting the town of Whittier to the main highway system. The avalanche deposited a 300-foot-long by 30-feet-tall pile of rubble on the solitary access road, completely isolating Whittier. The town has no commercial airstrip, so the slide completely stopped all transportation and commerce until the rubble pile was removed days later. Falling rock inside the tunnel contributed to Whittier isolation in June 2014.

6.4.4. LOCATION, EXTENT, IMPACT, AND RECURRENCE PROBABILITY

Location

Ground failure can occur anywhere in Alaska where soil conditions, geology, slope, and weather (especially rain events) combine to destabilize the ground surface. Degrading permafrost, steep slopes, heavy rain, retreating glaciers, and ground shaking from earthquakes are some of the important natural mechanisms that can trigger devastating landslides in Alaska. Human activity—such as construction that undercuts or overloads dangerous slopes, or redirects surface

or groundwater flow—can trigger landslides, as can forest clearing or tundra vegetation disturbance.

Extent

Damage from ground failure could range from minor—with some repairs required and little to no damage to transportation, infrastructure, or the economy—to major if a critical facility (such as an airport) were damaged and transportation was affected.

The extent of ground failure impacts throughout Alaska will vary (depending on the type of failure, its size or extent, and location). Impacts can occur quickly or over time with warning signs. This hazard could cause injuries or death, or shut down critical facilities and services without foreknowledge, and property could be severely damaged.

Impact

Impacts associated with ground failure include surface subsidence or upheaval, and infrastructure, building, and/or road damage. Ground failure can pose a sudden and catastrophic hazard in the event of a large landslide. Most ground failure damage from non-landslide causes occurs from improperly designed and constructed buildings that settle as the ground subsides, resulting in structure loss or expensive repairs. It may also impact buildings, communities, pipelines, and airfields, as well as road and bridge design costs and location. To avoid costly damage to these facilities, careful planning and location and facility construction design is warranted.

Recurrence Probability

Communities may experience annually recurring landslides (debris flows) and other ground failure damages to residential and public structures, roads, harbor areas, and airports. The probability for ground failure is location specific.

6.5. TSUNAMI AND SEICHE

A tsunami is a series of waves in a water body caused by large, sudden water displacement (Figure 6-59). Subduction zone earthquakes, subaerial (land-based) and submarine landslides, volcanic eruptions, calving glaciers, underwater explosions, and even meteorite impacts have the potential to generate tsunamis. In Alaska, subduction zone earthquakes pose the primary tsunami threat.

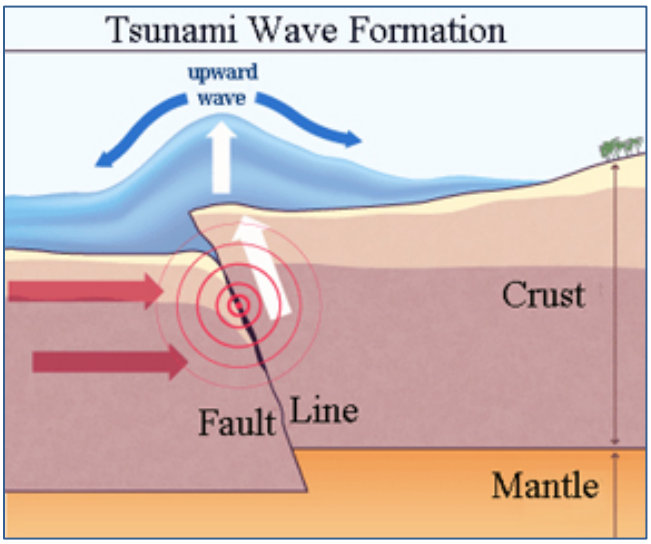


Figure 6-59 Most Tsunamis Occur from Underwater Earthquakes
Source: California Seismic Safety Commission, modified from How Stuff Works

A seiche is a series of standing waves sloshing in a semi- or fully enclosed water body, typically caused when strong winds, rapid atmospheric pressure changes, earthquakes, tsunamis, or severe storm fronts "pile up" water on one end of the basin (Figure 6-60). When the driving force stops, the water rebounds to the other side of the enclosed area. The water then continues to oscillate back and forth for hours or even days. Because they are standing waves, they move vertically more than horizontally.

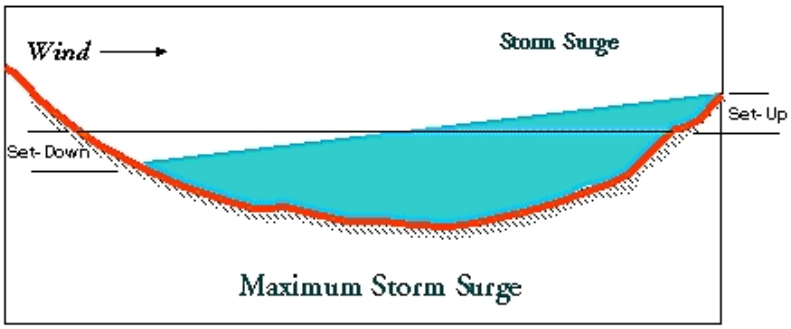


Figure 6-60 Storm Surges Can Cause Seiches in Large Lakes
Strong storm winds blow across the lakes and pile up water on the downwind shore of the lake, resulting in wind set-up. On the opposing upwind shore, the storm surge lowers the water the exact amount that has risen at the downwind shore, resulting in a wind set-down. When the wind stops, the water sloshes back and forth.
Source: Michigan State University Department of Geography

Tsunamis are far more destructive than seiches in Alaska. In the last 60 years, Pacific plate subduction under the North American plate has resulted in numerous great earthquakes, and is the source of locally generated tectonic tsunamis that have killed more than 100 people and destroyed entire towns. Some previously inhabited areas are now permanently abandoned because of this threat. Alaska has an enormous amount of coastline and, in addition to local and distant tectonic tsunamis, there are other tsunami triggers that may occur without warning.

6.5.1. HAZARD CHARACTERISTICS

Many potential tsunami causes are present in Alaska. For example, submarine landslide-generated tsunamis threaten numerous communities where nearby rivers deliver fine-grained sediment into the ocean e.g. Valdez, Seward, Whittier, Skagway, Haines, Juneau, Wrangell. These locally generated tsunamis can make community landfall within minutes.

The National Tsunami Warning Center (NTWC), University of Alaska Fairbanks, Geophysical Institute (UAF/GI), and emergency management offices primarily focus on seismically-induced tsunami waves because there is typically sufficient time to warn communities of the potentially pending danger. Tectonic tsunamis originating in the vicinity of the Aleutian Islands, Alaska Peninsula, and the Gulf of Alaska are of particular concern to Alaskans because waves can reach coastal communities within minutes to hours after the earthquake that caused them.

Tsunamis generated by subsea earthquakes exhibit long wave periods, can have wavelengths extending up to several hundred miles, and travel at speeds that can exceed 500 miles per hour in the open ocean. In contrast, a typical wind-generated wave may have a period of ~10 seconds and a wavelength of ~300 feet. A main difference between the tsunamis and wind-generated waves is that the latter are only surface disturbances and do not cause movement of water at the ocean bottom. Rather than resembling normal sea waves, a tsunami is similar to a rapidly fluctuating tide and, depending on the area in question; the fluctuations can persist for ~24 hours. In the open ocean, the amplitude (height) of a tsunami may only be a few feet and, combined with wavelengths of hundreds of miles, is practically imperceptible to boaters. The word “tsunami” is Japanese for “harbor wave,” because fisherman on the open ocean would not perceive a tsunami but would return to their harbors to discover they had been destroyed.

The energy of a tsunami wave train affects the entire ocean column from sea surface to sea floor. As the tsunami enters shallow water, the wave is forced to slow down, resulting in increased amplitude (height). The two mechanisms by which tsunamis cause damage are:

- The smashing force of incoming water as land is inundated; and
- The destructive force of water draining off the land while carrying a tremendous amount of debris (even knee-deep tsunami water contains enough debris to make walking impossible).

Note that is also important to consider the natural tidal fluctuations in an area: a 3-foot tsunami on a very low tide may go unnoticed, but the same 3-foot tsunami on a very high tide may cause significant damage.

Tsunamis are categorized according to the distance from source mechanism to inundation zone:

- Local Tsunami
- Regional Tsunami
- Distant Tsunami

A ***Local Tsunami*** is any tsunami inundation that occurs near the source. The total elapsed time from the source event to the community is usually less than 1 hour. Alaska local tsunami event sources include:

- Subduction zone earthquakes
- Volcanic eruption or edifice collapse
- Landslides
- Glacial calving
- Rockfalls, or
- Any combination thereof.

Recall that strong earthquake shaking can increase gravity-driven mass movement potential. If the source event is not immediately observed (e.g., underwater slope failure), there may be no warning. A local tsunami is likely to reach coastlines before an official evacuation notice can be made by the Tsunami Warning Center or local authorities. If a causative source event is observed or experienced (such as an earthquake so strong residents can barely remain standing), coastal residents and visitors will need to quickly self-evacuate.

A ***Regional Tsunami*** may travel 1 to 3 hours before reaching the community. This tsunami type allows for more accurate and timely evacuation notices.

A ***Distant Tsunami***, also referred to as tele-tsunami or ocean-wide tsunami, usually takesg more than 3 hours to arrive. In many cases, tele-tsunamis allow for sufficient warning time and evacuation. Most tele-tsunamis reaching Alaska are not damaging. For example, Massacre Bay on Attu Island has historically received tele-tsunamis with less than one foot recorded amplitudes. In one rare instance, the 1960 Chilean earthquake, Massacre Bay recorded a tsunami wave more than 6 feet in amplitude. This same tsunami damaged docks and pilings at MacLeod Harbor, Montague Island, and Cape Pole, Alaska.

A ***Seiche*** *as* summarized on page 6-75 and depicted in Figure 6-60, is a temporary water level oscillation within a fully or partially enclosed water body (e.g., a lake or fjord). “Seiche” literally means “to sway back and forth.” Seismic seiches are typically caused by earthquakes that result in vertical motions. It may be difficult to isolate a specific causative mechanism near an earthquake epicenter, as seismic waves, landslides (submarine or subaerial), tsunamis, and tectonic tilting all may play a role in water level disturbance. At greater distances (i.e., over 600 miles), seiches are generated mainly by seismic surface waves.

Seismic waves from the 1964 Great Alaska Earthquake were so powerful that they caused water bodies to oscillate at many places in North America. Although they had rarely been reported following previous earthquakes, seiches were recorded at hundreds of surface-water gaging stations; in fact, four seiches were observed in Australia. Some of the 1964 seiches were very

large, waves as high as 6 feet were reported on the Gulf Coast of the U.S., probably because they were generated in resonance with the seismic surface waves.

6.5.2. TSUNAMI AND SEICHE HISTORY

Given the extent and dynamic Hazard Characteristics of Alaska's coastline, there are far too many tsunamis to document here. Instead, here are some of the most notable and destructive historical tsunamis.

1883 Augustine Volcanic Tsunami

In 1883, a debris flow from the Augustine volcano inundated Port Graham with >20 foot tsunami waves.

1946 Unimak Island Earthquake Tsunami

A M 8.6 earthquake occurred near Unimak Island on April 1, 1946. The resulting tsunami had a run-up of approximately 100 feet and totally destroyed the Scotch Cap lighthouse, a reinforced concrete structure. All five occupants and the lighthouse washed out to sea. The tsunami caused about $250,000 in damages in Alaska, with widespread effects elsewhere. Relatively minor damage was reported in Washington and Oregon, as well as in French Polynesia and Chile. California suffered $10,000 in damages and one death. Hawai'i was heavily impacted, with $26 million in damages and 159 fatalities.

1957 Andreanof Islands Earthquake Tsunami

AM 8.6 earthquake west of Unalaska generated <75 foot tsunami waves along Aleutian shores and a distant tsunami in Hawaii with maximum run-up of 53 feet. The tsunami event destroyed two bridges on Adak Island and damaged houses. On Umnak Island, tsunami waves destroyed part of the community dock. Additionally, Mount Vsevidof volcano erupted after being dormant for more than 200 years. The northwestern side of the Island of Kauai, Hawai'i, experienced more inundation and damage than the 1946 tsunami. The tsunami damaged boats and docks in San Diego Bay, California, and reached Chile, El Salvador, and Japan. Although there were no reported fatalities from this event, the Hawaiian Islands suffered more than $5 million dollars in damages.

1958 Lituya Bay Tsunami

A M 7.8 earthquake on the Fairweather fault triggered a landslide into the head of Lituya Bay in Glacier Bay National Park and generated a devastating tsunami. The wave traveled up the adjacent mountainside to a height of more than 1,720 feet [Figure 6-61]. *Two fishing vessels anchored in the bay were sunk, killing two people. A third boat was swept over the La Chaussee Spit and back into the bay, landing upright. Lituya Bay is a tsunami-prone area, and at least three other fatal, landslide-generated tsunamis have occurred there in the past. The 1958 earthquake triggered at least eight separate landslide-generated tsunamis, including the Yakutat Bay tsunami that caused three fatalities.*

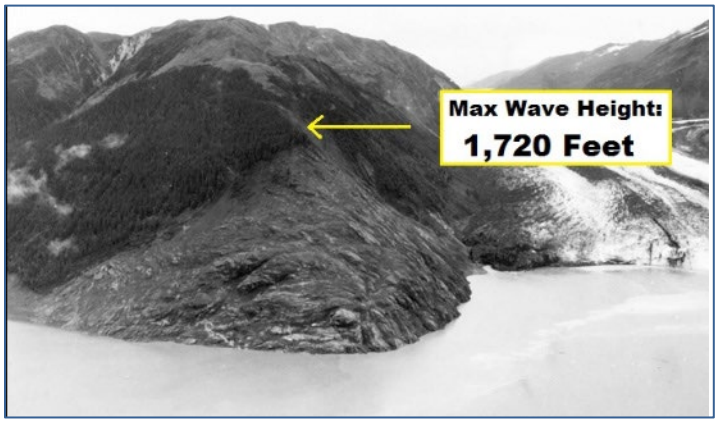


Figure 6-61 The 1958 Landslide-Generated Tsunami Wave in Lituya Bay
Trimlines along the bay that are still visible today. Source: USGS

1964 Great Alaska Earthquake Tsunamis

The 1964 Great Alaska Earthquake in Southcentral Alaska triggered several tsunamis, including one major tectonic tsunami and about 20 local submarine- and subaerial-landslide tsunamis. The tectonic tsunami hit 20–45 minutes after the earthquake, depending on location. The locally-generated tsunamis struck between two and five minutes post-earthquake and caused most of the deaths and damage. Tsunamis caused more than 90 percent of the deaths associated with this earthquake: 106 Alaskans and 16 California/Oregon residents were killed. Alaska's damages were most extensive in Kodiak Island, Seward, Whittier, and Valdez, with significant tsunami damage throughout areas adjacent to the Gulf of Alaska.

Kodiak: Witnesses to the Kodiak tsunami event observed ten waves that damaged or destroyed everything they reached, including the dock pier, roads, houses, and other facilities. They also destroyed the main electrical and water distribution systems. The tsunami caused $31.3 million in damages, destroyed 80 percent of the city's industrial base, and rendered 600 people homeless out of a population of 2,658. There were only six reported fatalities as most residents moved to high ground when they felt the earthquake [Figure 6-62].

Figure 6-62 1964 Tsunami Damage Along the Kodiak Waterfront
Source: USGS 1964

Seward: *The earthquake caused regional subsidence (~4 ft.) that exacerbated a local tsunami event. The local tsunami destroyed most of the facilities near the former shore, including a fuel tank farm that started the first of many fires. Additionally, the local tsunami spread floating, burning oil, which ultimately engulfed another large fuel tank farm further inland. The main dock collapsed with the waterfront and sank 30 fishing boats and 40 pleasure craft in the small boat harbor. The local tsunami also heavily damaged the railroad yards, moving a 120-ton locomotive 100 feet, and a 75-ton locomotive 300 feet* [Figure 6-63]. *About 25 minutes after the earthquake and local tsunami event, the tectonic tsunami event arrived in Seward. The waves carried flaming oil and debris into Seward and set fire to a large section of the town. Overall, Seward lost about 95 percent of its industrial base and 15 percent of its residential properties. There were 12 fatalities, 200 injuries, and approximately $14 million in damages.*

Figure 6-63 1964 Tsunami Damage in Seward
A few months after the earthquake. Source: USGS 1964

Whittier*: A series of at least eight tsunami waves struck Whittier destroying two saw mills, the Union Oil Company, the Alaska Railroad depot, and several houses. The small boat harbor was also heavily damaged. The tsunamis were responsible for 13 deaths and approximately $10 million in damages in Whittier.*

Chenega: *The Native village of Chenega was severely damaged by a tsunami. With 26 people killed, the community lost more than one-third of its population.*

Valdez: *Much like Seward, a portion of the Valdez waterfront subsided into the bay during the earthquake, exacerbating a local tsunami. The earthquake and local tsunami heavily damaged or destroyed all structures near the former waterfront (Figure 6-64). Half of the downtown business district was totally destroyed, and fires burned uncontrolled for two weeks. Almost the entire town's fishing fleet (68 out of 70 boats) sank. The local tsunami swept away twenty-eight people gathered to watch a freighter unload. Shifting cargo in the freighter's hold caused additional fatalities.*

Figure 6-64 Aerial Image of Valdez, Alaska
Showing the extent of inundation and destruction (dark area along the coastline) after the 1964 earthquake. Source: USGS 1964

1994 Skagway Tsunami and Seiche

On November 3, 1994, an underwater landslide collapsed a cruise ship wharf undergoing construction at the head of Taiya Inlet. The landslide generated a tsunami within the harbor, followed by a seiche, and resulted in one fatality and more than $25 million in damages. The cause of the landslide is not definitively known.

Many Alaska communities are in close proximity to historic tsunamigenic events that have occurred along the Aleutian Trench. The NTWC lists the following earthquake generated tsunamis with observed or measured tsunami waves that have occurred since 1996 with measurable inundation heights (Table 6-4)

Table 6-4 Alaska's Tsunami Events Since 2013

Date	Location	Earthquake Moment Magnitude (MW)	Wave Height	Source	
			Ft/In M/Cm	Latitude	Longitude
January 23, 2018	Kodiak, Alaska	7.9	~10 Cm	56.046	-149.073
October 25, 2013	Honshu, Japan	7.1	< 1 Cm	37.156	-144.661
October 27, 2012	Queen Charlotte Island, (Haida Gwaii), BC	7.7	~6 Cm	52.788°	-132.101
January 13. 2007	Kuril Islands	8.1	Undefined	46.230	-154.550
June 10, 1996	Andreanov, Alaska	7.9	~ 3 Cm	51.593	-51.593

6.5.3. LOCATION, EXTENT, IMPACT, AND RECURRENCE PROBABILITY

Location and Extent

Alaska has a long earthquake and tsunami history, as documented by both the geologic and historic record. Tsunami threats vary by location along the coastline, by distance from the tsunami source, and according to the type of disturbance that generates the tsunami. Communities located on the open coast of Alaska Peninsula, Aleutian Islands and Southcentral Alaska all may experience local, regional, and distant tsunamis. Local landslide-generated tsunamis are more likely to occur near mouths of rivers draining into the ocean, glacial moraines, and other areas with high sedimentation rates. Even if there is no significant over-land inundation, tsunamis can generate dangerous ocean currents in narrow passages, straits, breakwaters, and near the tips of peninsulas.

Many communities believe their relatively protected location on the inward side of an island – away from Aleutian Trench, Queen Charlotte Fault zone or other open ocean created tsunami sources would protect them from severe impacts. However these perceived protected locations may be hit by significant waves propagating around the islands and through narrow channels. The 2011 Tohoku tsunami, originated in Japan, was registered both in Skagway and Juneau.

NOAA Center for Tsunami Research, PMEL describes their tsunami forecasting process through their real-time Deep-ocean Assessment and Reporting of Tsunami (DART) buoy system depicted as red triangles in Figure 6-65.

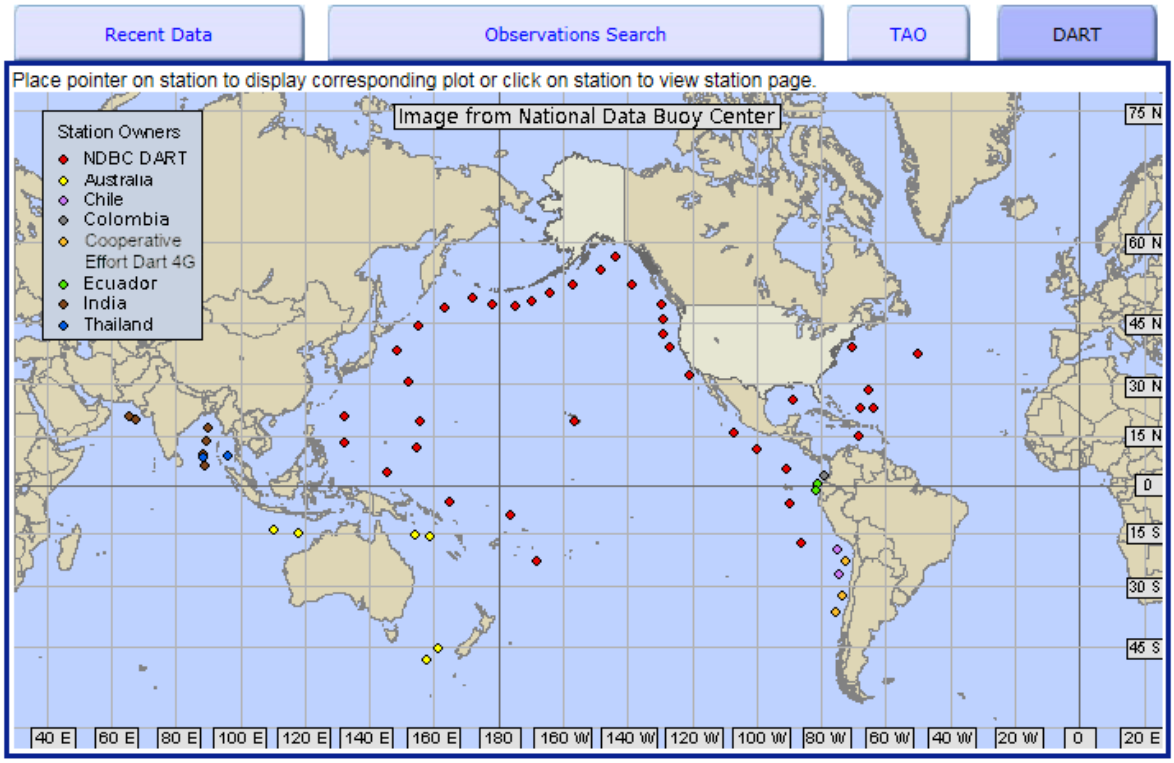


Figure 6-65 NOAA DART Locations (July 2018)
Source PMEL, 2018: https://nctr.pmel.noaa.gov/Dart/

The DART buoy system and other operational tools provide critical real-time threat data to enable emergency managers to anticipate potential impacts. The NOAA Tsunami Warning Centers use the "Short-term Inundation Forecasting for Tsunami" (SIFT) system to quickly estimate tsunami information as it travels through the open ocean. Figure 6-66 provides a representation of the SIFT forecasting process.

SIFTView

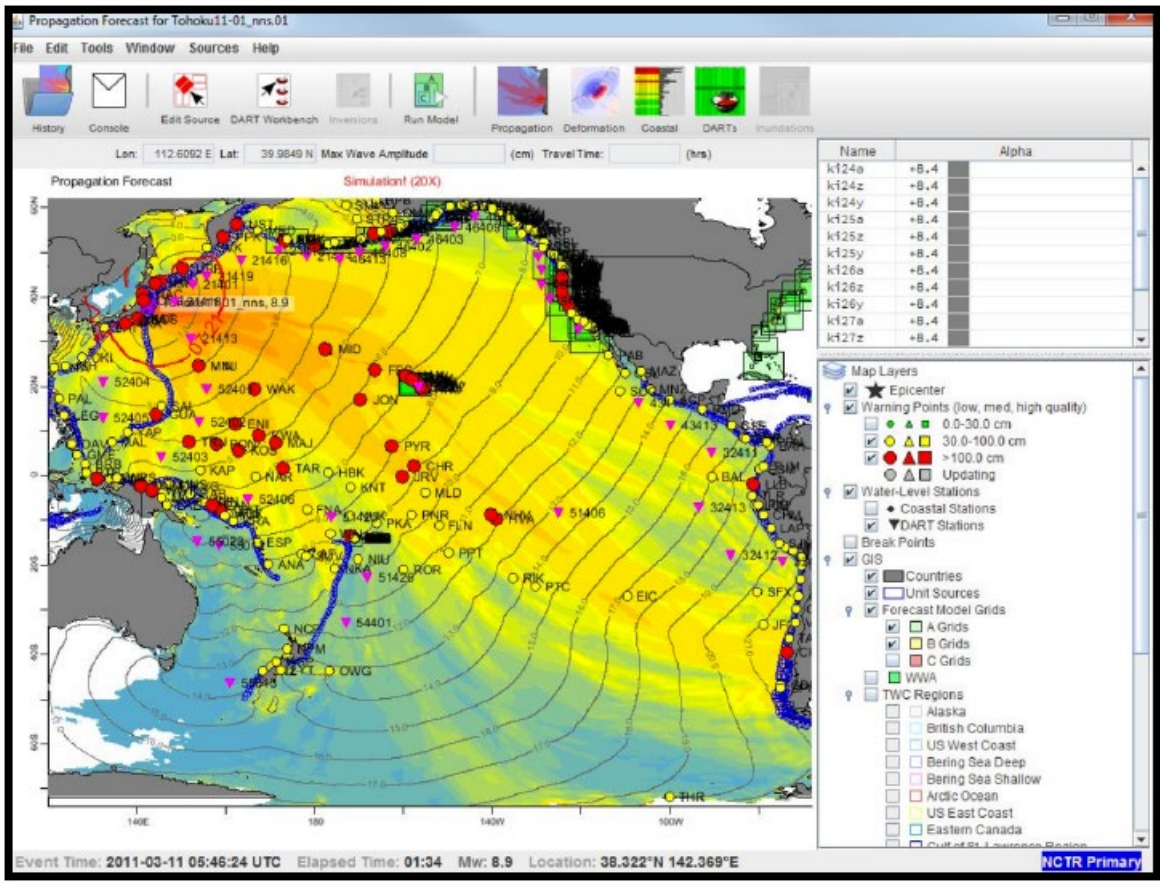


Figure 6-66 SIFT Forecast Landfall Locations and Impacts

*Primary **SIFTView** window, the propagation forecast map. Icons along the top provide access to SIFT utilities and tools. Source SIFT, 2018 https://nctr.pmel.noaa.gov/Pdf/brochures/sift_Brochure.pdf*

The UAF/AEC tsunami inundation map website lists (Table 6-5) the following inundation map in draft form ("draft," "draft-low resolution," or, "in-review"):

Table 6-5 Tsunami Inundation Maps - Status

Community	Status	Community	Status	Community	Status
Adak	**	Karluk	**	Port Graham	**
Akhiok	**	Ketchikan	**	Port Lions	**
Anchor Point	**	Larsen Bay	**	Saint George	*
Atka	**	Nanwalek	**	Saint George Airport	*
Chiniak	**	Nelson Lagoon	**	Saint Paul	*
Craig	**	Old Harbor	**	Seldovia	+

Table 6-5 Tsunami Inundation Maps - Status

Community	Status	Community	Status	Community	Status
Dillingham	**	Ouzinkie	**	Shemya	**
False Pass	**	Perryville	**	Skagway	+
Haines	+	Platinum	**		
Homer	+	Port Alexander	**		

Key: * Draft, ** Draft, Low Resolution, + In Review
Source: AIC - https://earthquake.alaska.edu/tsunamis/atom

The UAF/AEC tsunami inundation map website lists the following inundation map depicting "flow," "max estimated inundation area," and/or with "Scenarios" (Table 6-6):

Table 6-6 Tsunami Inundation Maps No Status Indicated

Community	Status	Community	Status	Community	Status
Akutan	* / **	Juneau	**	Tatitlek	* / **
Chenega	**	King Cove	**	Unalaska	* / ** / +
Cold Bay	**	Kodiak	**	Valdez	* / ** / +
Cordova	**	Nikolski	**	Whittier	* / **
Elfin Cove	**	Sand Point	**	Yakutat	**
Gustavus	**	Seward	* / ** / +		
Hoonah	**	Sitka	* / **		

Key: * Flow Depth, **Max estimated Inundation Area, + Scenarios
Source: AIC - https://earthquake.alaska.edu/tsunamis/atom

Impact

Alaska is subject to diverse tsunami impacts from a multitude of tsunamigenic sources. Potential impacts of tsunamis on Alaska communities are described in a series of modeling and mapping reports, which are available at the DGGS web-site (http://dggs.alaska.gov/pubs/tsunami). Potential impacts span the entire range of possibilities--from a barely detectable tsunami to completely destructive.

Recurrence Probability

Because tsunamis that affect Alaska's coast can be generated by a number of phenomena, none of which themselves can be predicted, it is impossible to define a recurrence probability for tsunamis. However, the active geology of Alaska guarantees that there will be tsunamis in the future.

6.6. VOLCANO

6.6.1. HAZARD CHARACTERISTICS

Volcanoes are openings on the earth's surface where magma and gases escape from the subsurface. Lava flows and lava fragments (tephra) that are ejected from the openings, or vents, build the landforms we know of as volcanoes. A volcano vent connects to one or more linked underground storage areas of molten or partially molten rock (magma) through a series of cracks within and beneath the volcano. Magma originating many tens of miles beneath the ground forces its way upward by pressure from gas within it. Magma is lighter, less dense, and more buoyant than surrounding solid rock. It may ultimately break through weak areas to reach the surface; if so, an eruption begins. The connection to fresh magma allows a volcano to erupt over and over again in the same location.

The Alaska landscape has been profoundly shaped by volcanic processes. An average of one to two eruptions per year occurs in Alaska. During the last 2 million years, more than 130 volcanoes or volcanic fields have been active within the state (6-67). Of these volcanoes, about 90 have been active within the last 10,000 years (and might be expected to erupt again), and more than 50 have been active within historical time (since about 1760, for Alaska).

Figure 6-67 Alaska's Historically Active Volcanos *Source: DGGS/AVO 2018*

In 1912, the largest eruption of the 20th century occurred at Novarupta and Mount Katmai, located in what is now Alaska Peninsula's Katmai National Park and Preserve. These young volcanoes primarily stretch from the Wrangell Mountains to the far-western Aleutians (Figure 6-77). Volcanoes in Alaska and Russia have the potential to permanently displace entire communities and disrupt all travel modes (Figure 6-68).

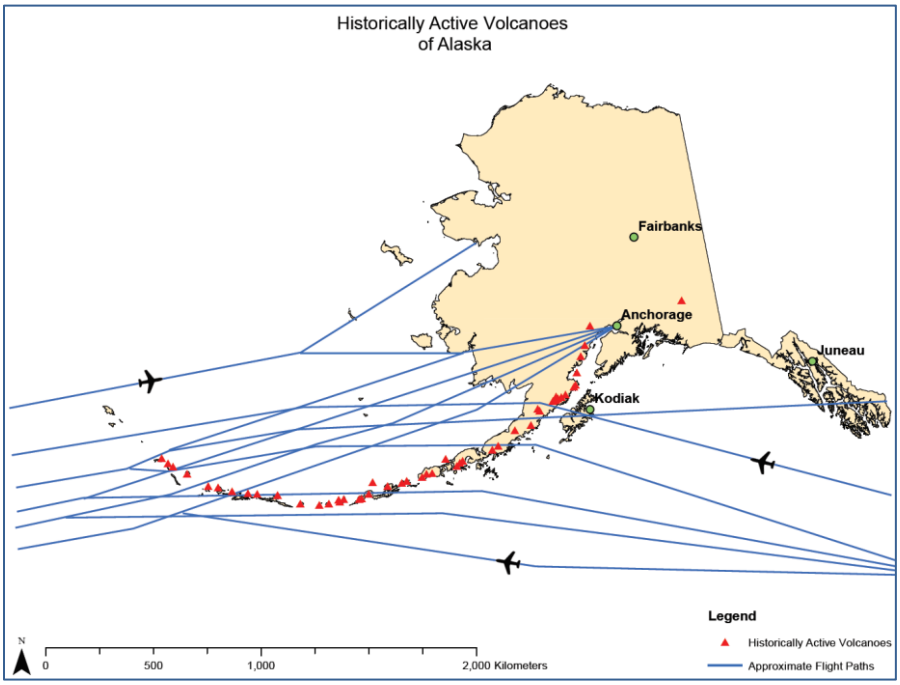


Figure 6-68 Simplified Flight Paths of the North Pacific

Simplified illustration of approximate flights paths traveling over the historically active volcanoes of Alaska. Aircraft flying along these routes, some of the busiest in the world, carry more than 50,000 passengers and millions of dollars of cargo each day to and from Asia, North America, and Europe. Source: AVO/USGS https://www.avo.alaska.edu/volcanoes/hazards.php

The significant trans-Pacific and intrastate air traffic traveling directly over or near Alaska's volcanoes, has necessitated developing strong communication and warning links between the Alaska Volcano Observatory (AVO), other government agencies with responsibility for aviation management, and the airline and air cargo industry.

As of April 2018, the Alaska Volcano Observatory (AVO) maintains monitoring networks on 32 of Alaska's more than 50 active volcanoes. Data from these networks includes seismic, infrasound, and ground deformation information that is recorded and examined for precursory signs of eruptive activity. AVO also examines Alaska volcano satellite images daily for signs of eruptive activity, ash clouds, or possible precursory ground heating. These methods aid in assessing volcanic activity.

Volcano Types

Volcanoes display a wide variety of shapes, sizes, and behaviors. However, they are commonly classified into three main types: cinder cone, shield, and composite (stratovolcano or stratocone).

Cinder cones are the simplest volcano type. They are formed when lava is ejected from a single vent. As the lava is blown into the air, it breaks into small fragments and solidifies into cinders (small pieces) and bombs (chunks larger than 2.5 inches in diameter) before it hits the ground. These fall out of the air and accumulate around the vent to form a circular or oval cone. Most cinder cones have a bowl-shaped crater at the summit, and rarely rise more than a thousand feet above the ground surface. Cinder cones may form as flank vents on the sides of larger volcanoes, such as Aniakchak and Okmok volcanoes.

Shield volcanoes are formed of very fluid lava flows that accumulate to form broad, gently sloping volcanoes. The most famous shield volcanoes are the Hawaiian Islands. Wrangell, Yunaska, and Westdahl are examples of Alaska's shield volcanoes.

Most Alaska volcanoes are of composite type, for example, the Cook Inlet volcanoes: Iliamna, Redoubt, Spurr, and Augustine. **Composite volcanoes,** sometimes called stratovolcanoes, are typically steep-sided, large, symmetrical cones built by layers of lava, ash, and cinders. Composite volcanoes tend to erupt explosively because of the viscous magma within the volcano. Some volcanoes in Alaska exhibit evidence of having previously had explosive eruptions large enough to deplete underlying magma chambers, resulting in summit collapse and the formation of a caldera (i.e., a large, basin-shaped volcanic depression with a diameter many times larger than included volcanic vents). Caldera-forming eruptions are among the largest eruptions on earth. The 1912 eruption of Novarupta in Alaska is only one of several caldera-forming eruptions that have occurred since the 20th century.

Volcano Hazards

Volcanoes produce a wide variety of hazards (Figure 6-69) that can kill people and destroy property. Large explosive eruptions can endanger people and property hundreds of miles away, and even affect global climate. Some volcanic hazards, such as landslides, can occur even when a volcano is not erupting.

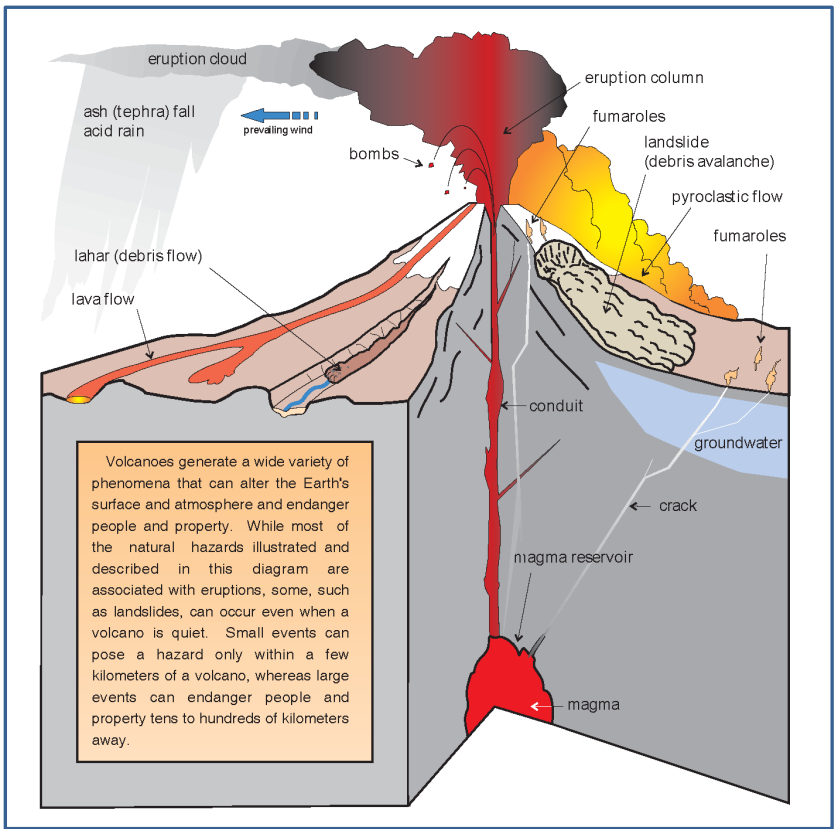


Figure 6-69 Simplified Sketch of a Stratocone and Associated Eruption Hazards
Depicted phenomena do not necessarily occur simultaneously during a particular eruption.
Source: USGS 2018

The major volcanic hazards are shown in Table 6-7.

Table 6-7 Major Volcanic Hazards

• Volcanic Ash Cloud	• Lahar	• Lava Flow
• Volcanic Ashfall	• Pyroclastic Density Current	• Ballistics
• Volcanic Gases	• Debris Avalanche	• Directed Blast
• Acidification	• Rockfall and Landslide	• Tsunami

A ***Volcanic Ash Cloud*** is created when volcanic ash is explosively blasted high into the atmosphere during an eruption and then drifts away from the volcano with the wind. This is Alaska's principal future volcanic hazard associated with explosive eruptions. Ash-rich clouds produced during large eruptions can reach heights of 30,000 to 65,000 feet or more above the volcano, although most Alaska eruptions are smaller (a few thousand feet to 20,000 feet). Prevailing North Pacific winds usually carry ash clouds eastward from the volcano, but dispersal in other directions is possible, depending on wind patterns at the time of the eruption.

Alaska airspace is extremely busy with long-range, wide-body aircraft, as well as bush planes and smaller aircraft. The Ted Stevens Anchorage International Airport is the fifth-busiest cargo airport in the world. More than 50,000 people fly over or very near Alaska volcanoes as they travel the North Pacific (NOPAC) and Russian Far East air routes. Alaska's unique geographic location generates high air traffic volume—all direct air routes between the U.S. (even Los Angeles and New York) and Asian cities, such as Tokyo and Hong Kong, pass along the NOPAC routes. Most of the aircraft carrying freight between Europe and Asia come through Alaska for refueling, so a considerable percent of all air freight on earth passes near Alaska's many volcanoes (Figure 6-68).

Encounters between aircraft and volcanic ash are serious because the ash can cause severe damage to the engines as well as other equipment. Volcanic ash is abrasive, and melts at the high operating temperatures of modern jet engines. When ingested into a jet engine, volcanic ash erodes turbine blades, and the melted ash can adhere to critical parts, causing engine failure. Any forward-facing surface of an airplane engulfed in a volcanic ash cloud is likely to be eroded, including the cockpit, forward cabin windows, and landing-light covers. Cockpit windows may be abraded enough to prevent forward visibility. Ash entering sensitive electronics can interfere with navigation and other onboard systems. A flight crew may also lose the ability to transmit a distress call due to ash cloud electrical disturbances. Sulfur and other gases released in large eruptions also affect aircraft and their occupants. Acidic aerosols formed by the hydration of these volcanic gases produce a corrosive mist that causes passenger and flight crew respiratory problems, and accelerates vulnerable aircraft component deterioration. There were at least 79 aircraft-volcanic ash encounters worldwide that resulted in damage to the aircraft between 1953 and 2010. Nine of these encounters resulted in engine shutdown during flight.

Alaska's most serious ash-aviation incident took place on December 15, 1989, when a Boeing 747-400 aircraft temporarily lost power to all four engines after encountering an ash cloud from Redoubt volcano as the airplane descended for a landing in Anchorage. After steeply gliding through a descent of more than 14,000 feet, the pilot was able to restart the engines and land safely in Anchorage. While there were no injuries to passengers, the damage to engines,

avionics, and aircraft structure from this encounter was estimated at $80 million. Recent eruptions of Alaska volcanoes have resulted in numerous flight delays and cancellations for regional and international flights, including eruptions of Augustine in 2005, Kasatochi in 2008, Redoubt in 2009, multiple Pavlof eruptions, and most recently, Bogoslof volcano in 2016 and 2017.

A typical example in Alaska that illustrates aviation impact was the 2008 Okmok eruption on Umnak Island in the Aleutian Islands. On July 12, 2008, Okmok erupted explosively, sending ash to 50,000 feet (Figure 6-70). During successive eruptions over five and a half weeks, the residents of Nikolski were stranded due to flight cancellations. Unalaska/Dutch Harbor, (65 miles northeast) was dusted with ash on several occasions; outbound flights were grounded and inbound flights were diverted elsewhere.

Figure 6-70 August 3, 2008 Okmok Volcano Eruption Plume
This photo was taken from Fort Glenn, Bering Pacific Ranch, on the eastern flank of the volcano.
Source: Jess Larsen AVO 2008 image URL: http://www.avo.alaska.edu/images/image.php?id=15392

Volcanic Ashfall is ash that falls to earth from an eruption cloud. The fragments in the ash cloud vary in size, and the heavier particles fall near the source while finer particles travel farther downwind. Transported ash will fall out of the cloud and accumulate on surfaces and structures, contaminate water sources, and infiltrate electronics and motors. The weight of significant accumulations may collapse structures and cause other damage. Chronic exposure to ash may be a significant public health hazard. Essential items, including dust masks, clean water, non-perishable food, and eye protection, are key in preparation, as significant ashfall may keep people housebound for extended time periods (Figures 6-71 and 6-72).

The largest eruption of the 20th century was the 1912 Novarupta-Katmai eruption, on the Alaska Peninsula. This eruption produced ashfall as far away as Dawson City (Yukon, Canada), Ketchikan (Southeast Alaska), and the Puget Sound in Washington. During the three days of the eruption, darkness and suffocating conditions caused by falling ash and sulfur dioxide gas

immobilized the population of Kodiak, Alaska. Sore eyes and respiratory distress were rampant, and water became undrinkable. Radio communications were totally disrupted, and with visibility near zero, ships could not dock. Roofs in Kodiak collapsed under the weight of more than a foot of ash, buildings were wrecked by ash avalanches that rushed down from nearby hillslopes, and other structures burned after being struck by lightning from the ash cloud. Similar conditions prevailed elsewhere in southern Alaska, and several villages were abandoned forever. Within 50 miles of the erupting vent, animal and plant life was decimated by ash and acid rain. Bears and other large animals were blinded by ash and starved when large numbers of the plants and small animals they lived on were wiped out. Millions of dead birds that had been blinded and coated by volcanic ash littered the ground. Aquatic organisms, such as mussels, insect larvae, and kelp, as well as the fish that fed upon them, perished in ash-choked shallow water. Alaska's salmon-fishing industry was devastated, especially from 1915 to 1919, because of the starvation and failure of many adult fish to spawn in ash-choked streams.

Figure 6-71 Kodiak Building Partially Buried by Volcanic Ash

Photograph of a building in Kodiak partially buried by volcanic ash from the 1912 eruption of Novarupta/Katmai. Source: Amelia Elkinton Collection, accession number UAF-1974-175-399, Archives, Alaska and Polar Regions Collections, Rasmuson Library, UAF; http://vilda.alaska.edu/u?/cdmg11,1191

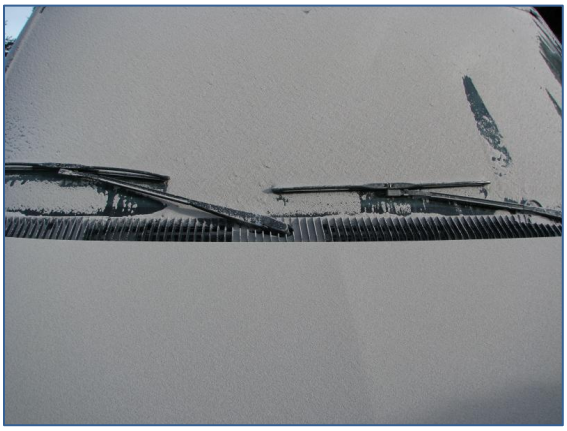


Figure 6-72 Ashfall on a windshield in Homer, Alaska

Ashfall resulted from the April 4, 2009, eruption of Redoubt volcano.
Source: Dennis Anderson; AVO-UAF, image URL: http://www.avo.alaska.edu/images/image.php?id=17800

During the most recent eruptions in Alaska, communities have received no more than trace amounts of ashfall (i.e., 1/32nd of an inch), although even small amounts of volcanic ash have resulted in transportation delays, school and business closures, and presented challenges to power and water systems. Recent eruptions of Cook Inlet volcanoes (Augustine, Spurr, Redoubt) have produced trace amounts of ash to Southcentral Alaska, especially the Kenai Peninsula, resulting in airport, school, and business closures, as well as ash cleanup costs and emergency supply stockpiling. The Kasatochi 2008 eruption deposited a small amount of ash on Adak, and eruptions of Pavlof often result in very minor ashfall on nearby communities. The Okmok 2008 and the Bogoslof 2016-2017 eruptions deposited trace amounts of ash in Unalaska and Dutch Harbor. Looking further back in time, the geologic record clearly shows that many Alaska communities are underlain by significant amounts of volcanic ash from prehistoric eruptions.

Volcanic Gases are corrosive acidic mists that irritate eyes and respiratory systems. The gasses are dissolved in the magma but can be released during eruptions or through passive degassing activity. The gases consist largely of water vapor, carbon dioxide (CO_2), sulfur dioxide (SO_2), hydrogen sulfide (H_2S), and chlorine compounds, but may include other substances. Volcanic gases are released by both historically-active and older volcanoes.

Large eruptions can release large amounts of gas in a short period of time. This gas can be transported away from the eruption by wind on ash particles and as aerosols. Acid rain can be produced when high concentrations of these gases are leached out of the atmosphere. This acid rain can affect vegetation, livestock, humans, infrastructure, and machinery. Gases can also collect and be concentrated in topographic lows.

Acidification occurs when a large amount of volcanic gas is dissolved in a water body, producing a highly acidic water volume. Vegetation and wildlife can be greatly affected by this contaminated water source. Acidified water may be transported great distances from the original source.

Between November 2004 and early May 2005, magmatic heat within Chiginagak volcano melted ice and snow on the summit, filling the crater with acidified water. In early May 2005, the water overtopped the crater wall at the base of the summit glacier and the acidic water and sulfurous debris flowed 17 miles downslope and into Mother Goose Lake, the headwaters of the King Salmon River. The flow killed all vegetation in its path and all aquatic life in the lake, preventing the annual salmon run (Figure 6-73). The few fishing lodges and guide services in the area lost revenue. Scientists from various government agencies studied the event and the Alaska Volcano Observatory deployed a data-logging seismometer for about one month but recorded no significant seismicity.

Figure 6-73 Orange Colloidal Iron-Oxides
Colloidal iron-oxide found along the shore of acidified Mother Goose Lake, August 2005.
Source: Paul Tickner, AVO-UAF image URL: http://www.avo.alaska.edu/images/image.php?id=4262

Lahar is an Indonesian term describing a mixture of water and rock fragments flowing down the slopes of a volcano and/or river valleys. Sometimes called volcanic mudflow, a moving lahar looks like a mass of wet concrete consisting of rock debris ranging in size from clay to boulders more than 30 feet in diameter. Lahars vary in size and speed. Small lahars less than a few yards wide and several inches deep may flow a few feet per second. Large lahars hundreds of yards wide and tens of feet deep may flow several tens of feet per second; much too fast for people to outrun. They form in a variety of ways, but are routinely associated with volcanic eruptions (Figure 6-74). Lahars may also form from intense rainfall on loose volcanic rock deposits, breakout of a lake dammed by volcanic deposits, or water-saturated debris avalanches.

Figure 6-74 Gray Mud, Boulders, and Debris from the April 4, 2009, Lahar
Lahar and flood in Drift River Valley, downslope of Redoubt volcano. Note prominent tree scars, and diffuse mud line that is up to 3 feet higher than the tree scars. Source: Chris Waythomas, AVO-UAF 2009. Image URL: http://www.avo.alaska.edu/images/image.php?id=18367

Lahars are common in Alaska due to the abundance of volcanoes capped with snow and ice. When there is thermal activity at a volcano (either above or below the surface), there is potential for significant melt, producing large water volumes. This water can cause floods or can mix with sediment, ash, and other deposits to form lahars, debris flows, and mud flows.

Pyroclastic Density Currents, or "pyroclastic flows," are turbulent avalanches of hot gases and rock, typically traveling more than 50 mph at temperatures of approximately 400°F to 1300°F. They may flow directly from an erupting volcanic vent, form from a collapsing lava dome (a steep-sided mass of viscous and often blocky lava extruded from a vent), or result from the collapse of an eruption column (the ascending, vertical part of the mass of *erupting* debris and volcanic gas that rises directly above a volcanic vent). Pyroclastic density currents incinerate and smother everything in their path, and are among the most hazardous of volcanic phenomena. Pyroclastic flows and surges tend to follow valleys and other low-lying terrain, and can travel over topographic features such as lakes, ridges, and hills.

Debris Avalanches occur when a mass of volcanic rock fragments and soil moving down a steep mountain slope or hillside behaves like a snow avalanche because of its high water content. They can happen without warning and travel quickly. The mass moves as a fluid and can attain speeds of 100 to 180 miles per hour. Their runout may extend many miles, and their high velocity and momentum allow them to cross valleys and run several hundred feet up slopes. Debris avalanches that occur near the coast can generate tsunamis if the debris advances into the water. Washington's Mount St. Helens eruption began as the largest debris avalanche in recorded history. Large debris avalanche deposits are seen in the geologic record at several Alaska volcanoes, including Tanaga, Shishaldin, Okmok, Yantarni, Augustine, Spurr, and Iliamna.

Rockfall and Landslide are volcanic hazards because many volcanoes, and especially caldera walls, are steep-sided and constructed of accumulated products from previous eruptions. This material can be poorly consolidated, heavily weathered, or altered due to volcanic gases, creating unstable slopes that are collapse-susceptible. Earthquakes near or associated with volcanoes can lead to increased rockfall, as well as increased landslide frequency and size.

Lava Flows, moving outpourings of molten rock (i.e., lava), commonly erupt from volcanoes in Alaska; however, due to their chemistry, they are often slow moving and usually pose little hazard to humans. Explosions can occur when lava interacts with water, producing ash and other ballistics (e.g., lava or rock projectiles). Many Alaska volcanoes develop very thick lava flows called lava domes. Lava domes form directly at an eruptive vent by extruding slow, viscous lava. Their chemistry varies, although the lava typically has high silica content. A dome often appears as a pile of unstable rubble. Volcanic domes commonly occupy summit craters or the flanks of large composite volcanoes. The Novarupta dome, for example, measures 800 feet across and 200 feet high, and was formed at the end of the 1912 Katmai Volcano eruption (Figure 6-75). The Cook Inlet's 2009 Mount Redoubt eruption produced many lava domes, the largest one measuring 3,300 feet in length, 1,640 feet in maximum width, and at least 650 feet high. The total volume of this 2009 Redoubt lava dome would fill more than 500 Conoco-Philips buildings, which is the tallest structure in Anchorage at 300 feet.

Figure 6-75 Novarupta Lava Dome from the 1912 Eruption

Novarupta is located in Valley of Ten Thousand Smokes, Katmai National Park and Preserve. Source: Jennifer Adleman; AVO 2012. Image URL: http://www.avo.alaska.edu/images/image.php?id=3120

Ballistics, lava or rock projectiles ranging in size from a few inches to tens of feet in diameter, can be produced by explosive volcanic eruptions. These objects usually land within about three miles of the vent. Ballistics can pose a substantial threat to humans and can cause considerable damage. Eruptions that involve magma and water interaction are especially capable of producing ballistics. As hot material comes into contact with water, violent steam explosions will shatter rocks and throw ballistics into the air.

Directed or lateral, ***Blasts*** are eruptions radiating primarily outward from a volcano, as opposed to upward. The shock wave flattens forests and structures, while the super-heated blast debris and gasses disperse over the local area, incinerating and burying everything in their path. The deadly May 18, 1980, Mount St. Helens, Washington, eruption was a lateral blast. Calculations have shown that the blast's initial velocity of about 220 miles per hour quickly increased to about 670 miles per hour. The blast was heard hundreds of miles away in the Pacific Northwest, including parts of British Columbia, Montana, Idaho, and northern California, and caused widespread devastation as far as 19 miles from the volcano.

Volcanic Tsunamis can be created by underwater eruptions, volcanic flank collapses that send large amounts of debris into a water body, or pyroclastic flows entering a water body. Communities surrounding Cook Inlet may be at an increased risk for volcanic tsunamis generated by activity from volcanoes near shore. Augustine volcano in Cook Inlet has generated at least one tsunami with deposits found near Homer.

6.6.2. HISTORY

This section describes a brief history of select eruptions in Alaska. For a more comprehensive look at the eruptive history of select volcanoes, the Alaska Volcano Observatory has published

detailed hazard reports for some of the most high-threat volcanoes including Hayes, Spurr, Redoubt, Iliamna, Augustine, Katmai group, Aniakchak, Emmons Lake Volcanic Center (includes Pavlof), Shishaldin, Fisher, Akutan, Makushin, Okmok, Kanaga, and Tanaga. Each report contains a description of the eruptive history of the volcano, the hazards they pose, and the likely effects of future eruptions to populations, facilities, and ecosystems. The reports can be freely downloaded from the Alaska Volcano Observatory website www.avo.alaska.edu, or by direct link at https://avo.alaska.edu/downloads/classresults.php?pregen=haz.

The largest volcanic eruption of the 20th century occurred at the Novarupta Volcano in June 1912. It generated an ash cloud extending over thousands of miles during the 3 day event (Figure 6-76). Within 4 hours of the eruption, the ash reached Kodiak and paralyzed the city (Figure 6-71). Many structures eventually collapsed and some buildings were destroyed by ash avalanches; ash tainted the drinking water and the air. Entire villages on the Alaska Peninsula evacuated, including Katmai and Savonoski. The volcanic ash and acid rain also killed animals and plants; many animals starved to death. The amount of ashfall from this eruption (Figure 6-76 and 6-77) was significantly greater than the recent eruptions of Redoubt, Spurr, and Augustine volcanoes. Fourteen earthquakes of M6 and M7 were associated with this event. An event of similar magnitude in the future is possible at a number of volcanoes along the Aleutian Arc.

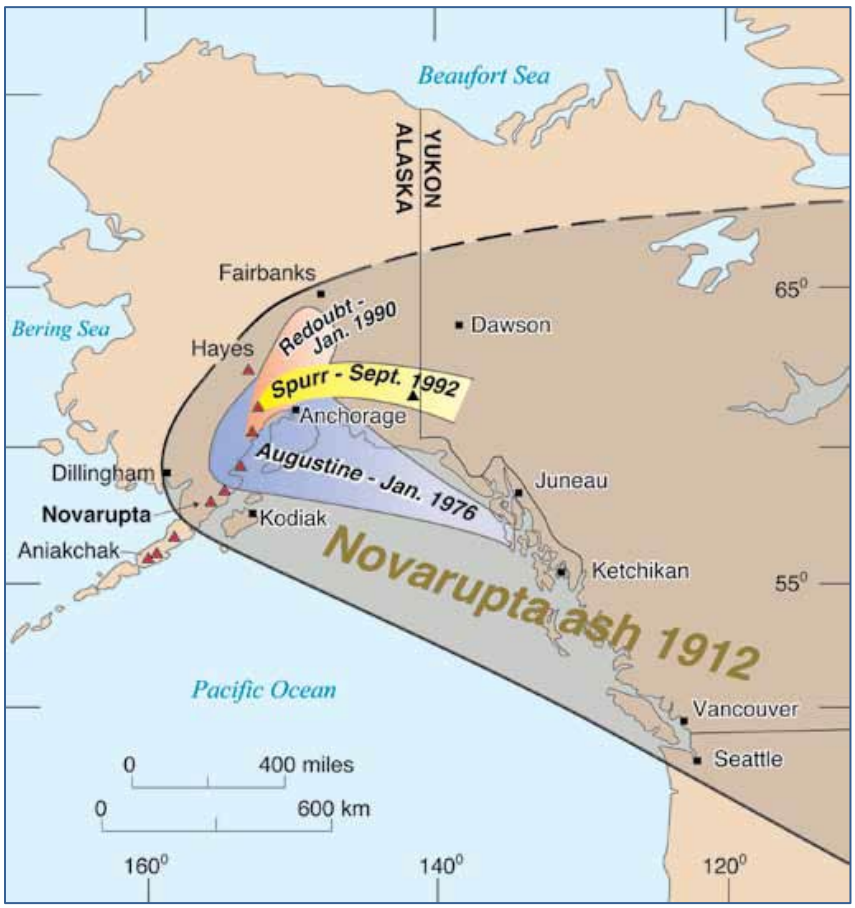


Figure 6-76 1912 Novarupta Ash Distribution
Source, USGS, https://prd-wret.s3-us-west-2.amazonaws.com/assets/palladium/production/s3fs-public/vhp_img397.png

Figure 6-77 1912 Ashfall Remains as a ~1½ Foot Thick Unit Under Organic Material
As a result of the 1912 Novarupta eruption, volcanic ash fell on Kodiak Island, ~100 miles to the east. Decades later, this ashfall remains as a ~1-½ foot thick unit under just a few inches of organic material developed since 1912.
Source: Jennifer Adleman; AVO image URL: http://www.avo.alaska.edu/images/image.php?id=13227

Archaeological and geologic evidence suggests that an eruption of Aniakchak volcano 3,500 years ago spread ash over much of Bristol Bay and generated a tsunami which washed up onto the tundra around Nushagak Bay. Within the past 10,000 years, Aniakchak volcano has significantly erupted on at least 40 occasions.

Examples of recent eruptions include Augustine Volcano in 1986 and again in 2005–2006. During both eruptions, repeated ash plumes rose to 30,000 feet above sea level or higher, disrupting air traffic and dusting Cook Inlet communities with ash. A lava dome formed in the summit crater towards the end of each of these eruptions. A concern during both eruptions was the possibility of a flank collapse and debris avalanche into Cook Inlet. Such an event could trigger a tsunami along lower Cook Inlet, as happened in 1883 when a debris avalanche flowed down the north flank of Augustine and into the ocean on the morning of October 6. Sea level rise of up to 20 feet was reported at English Bay across Cook Inlet.

Recent eruptions of Redoubt Volcano occurred in 1989–1990 and again in 2009. During both eruptions, voluminous lahars temporarily closed the Drift River Oil Terminal 27 miles downstream (Figure 6-78). This ash encounter in 1989 resulted in an estimated $80 million in damage to the aircraft. In Alaska, disruption of air transportation is a major issue with volcanoes due to the numerous flight routes across the North Pacific downwind of historically-active volcanoes (Figure 6-67).

Figure 6-78 Runway, Helipad, and Service Buildings at the Drift River Oil Terminal
View west of the runway, helipad, and service buildings at the Drift River Oil Terminal, inundated by lahars from Redoubt Volcano's 2009 eruption. The lahar deposit is at least 20 inches thick at the buildings.
Source: Game McGimsey (AVO/UAF); AVO image URL: https://avo.alaska.edu/images/image.php?id=16988

The 1989-1990 eruption of Mt. Redoubt seriously affected the population commerce, and oil production and transportation throughout the Cook Inlet region.

> *Redoubt Volcano is a strato-volcano located within a few hundred kilometers of more than half of the population of Alaska. This volcano has erupted explosively at least six times since historical observations began in 1778. The most recent eruption occurred in 1989-90 and similar eruptions can be expected in the future. The early part of the 1989-90 eruption was characterized by explosive emission of substantial volumes of volcanic ash to altitudes greater than 12 kilometers above sea level and widespread flooding of the Drift River valley. Later, the eruption became less violent, as developing lava domes collapsed, forming short-lived pyroclastic flows associated with low-level ash emission. Clouds of volcanic ash had significant effects on air travel as they drifted across Alaska, over Canada, and over parts of the conterminous United States causing damage to jet aircraft, as far away as Texas. Total estimated economic costs are $160 million, making the eruption of Redoubt the second most costly in U.S. history (USGS 1998).*

Mt. Spurr's 1992 eruption brought business to a halt and forced a 20 hour Anchorage International Airport closure. Communities 400 miles away reported light ash dustings.

> *Eruptions from Crater Peak on June 27, August 18, and September 16–17, 1992, produced ash clouds (fig. 11) that reached altitudes of 13 to 15 kilometers [8-9 miles] above sea level. These ash clouds drifted in a variety of directions and were tracked in satellite images for thousands of kilometers beyond the volcano (Schneider and others, 1995). One ash cloud that drifted southeastward over western Canada and over parts of the conterminous United States and eventually out across the Atlantic Ocean (fig. 12) significantly disrupted air travel over these regions but caused no direct damage to flying aircraft (USGS 2002)*

In 1992, another eruption series occurred, resulting in three separate eruption events. The first, in June, dusted Denali National Park and Manley Hot Springs with 2 millimeters of ash, a relatively minor event. In August, the mountain again erupted, covering Anchorage with ash, bringing

business to a halt and forcing officials to close Anchorage International Airport for 20 hours. St. Augustine's 1986 eruption caused similar air traffic disruption.

- Small ash clouds from the 2001 eruption of Mt. Cleveland were noted by USGS to have reached Fairbanks. These clouds dissipated somewhere along the line between Cleveland and Fairbanks. A full plume, visible on satellite imagery, was noted in a line from Cleveland to Nunivak Island.

The USGS Fact Sheet 030-97 "Volcanic Ash – Danger to Aircraft in the North Pacific" and the active volcanoes which could easily disrupt air travel during significant volcanic eruptions with ashfall events.

The DGGS Makushin Hazard Assessment, Report of Investigation 2000-4, Figure 8 (Figure 6-79), also depicts how an explosive Makushin Volcano eruption's plumes could impact airline flight routes.

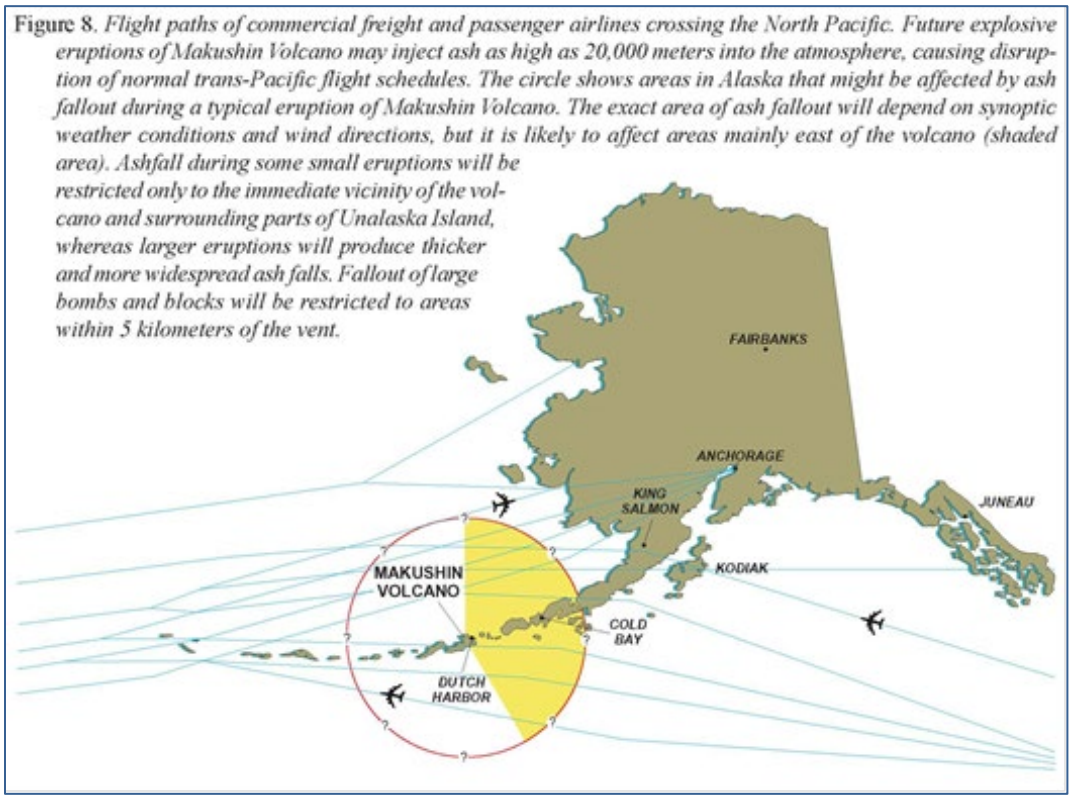


Figure 6-79 Makushin Volcano Flight Proximity
Source, AVO: https://avo.alaska.edu/pdfs/MKhazrpt.pdf

6.6.3. LOCATION, EXTENT, IMPACT, AND RECURRENCE PROBABILITY

Location

Alaska is at continual risk for volcanic eruptions from over 50 active volcanoes (Figure 6-68). Most of Alaska's volcanoes are far from settlements that could be affected near-field hazards such as pyroclastic flows and lava flows; however ash clouds and ashfall have historically caused significant impact to Alaska's human populations.

When volcanoes erupt explosively, high-speed flows of hot ash (pyroclastic flows) and landslides can devastate areas 10 or more miles away, and huge mudflows of volcanic ash and debris (lahars) can inundate valleys more than 50 miles downstream... Explosive eruptions can also produce large earthquakes... the greatest hazard posed by eruptions of most Alaskan volcanoes is airborne dust and ash; even minor amounts of ash can cause the engines of jet aircraft to suddenly fail in flight (USGS 1998).

Extent

Geographic ashfall extent along with a record of ashfall layers found in stratigraphic sections illustrate at-risk areas for this hazard. During the last approximately 2 million years, active volcanoes have produced ash clouds that have covered nearly the entire state with at least one significant ash layer (Figure 6-80).

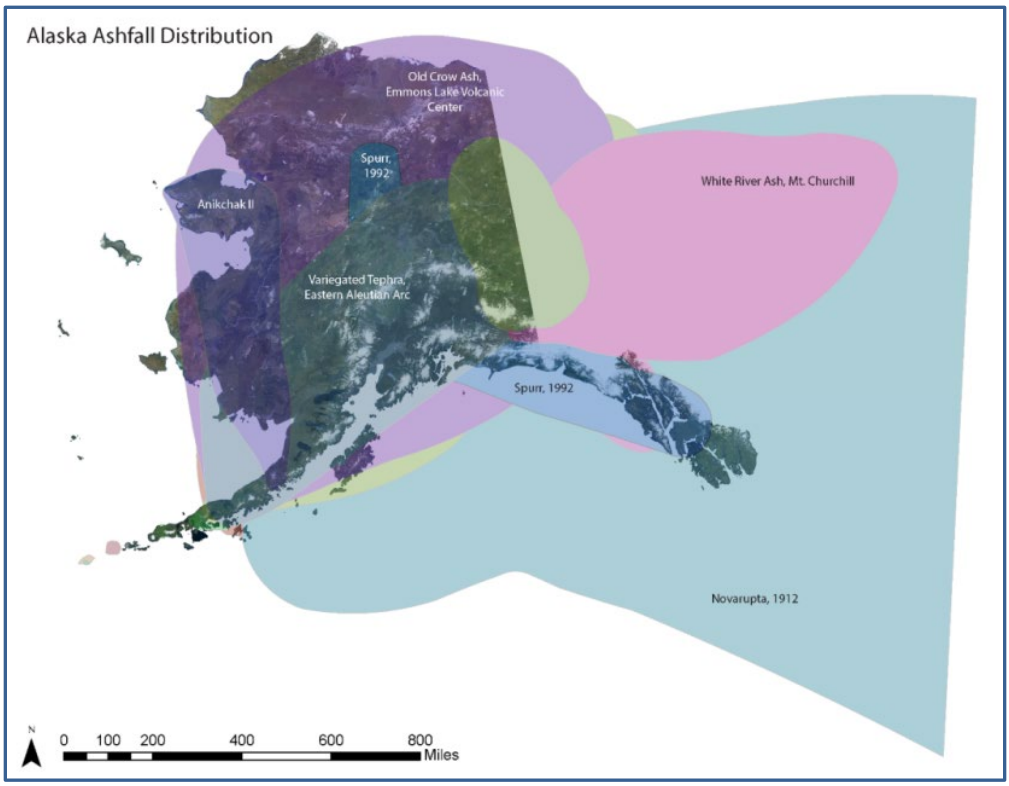


Figure 6-80 Alaska Ashfall Distribution Map

Distribution shows simplified extents of documented volcanic ash (tephra) from more than 39 separate eruptive events, compiled from previously published sources. Selected large ash distributions are labeled. Separate ashfall events are denoted in different colors. Not all overlapping ashfalls are visible in this map. Source: Mulliken et al. 2018

Geologic deposit investigations across the state have identified locations where more than 30 individual ashfall events have occurred (Figure 6-81). This record is a significant "at-risk indicator" for future ash events. For example, there are locations near Dutch Harbor that have received over 40 separate ashfall events over the last 8,000 years as indicated by separate layers of tephra ("tephra count") preserved in the soil. Small communities along the Alaska Peninsula and Aleutian Islands are at risk from volcanic eruptions for extended time periods. Regional periodic eruptions may severely impact seasonal and subsistence lifestyles.

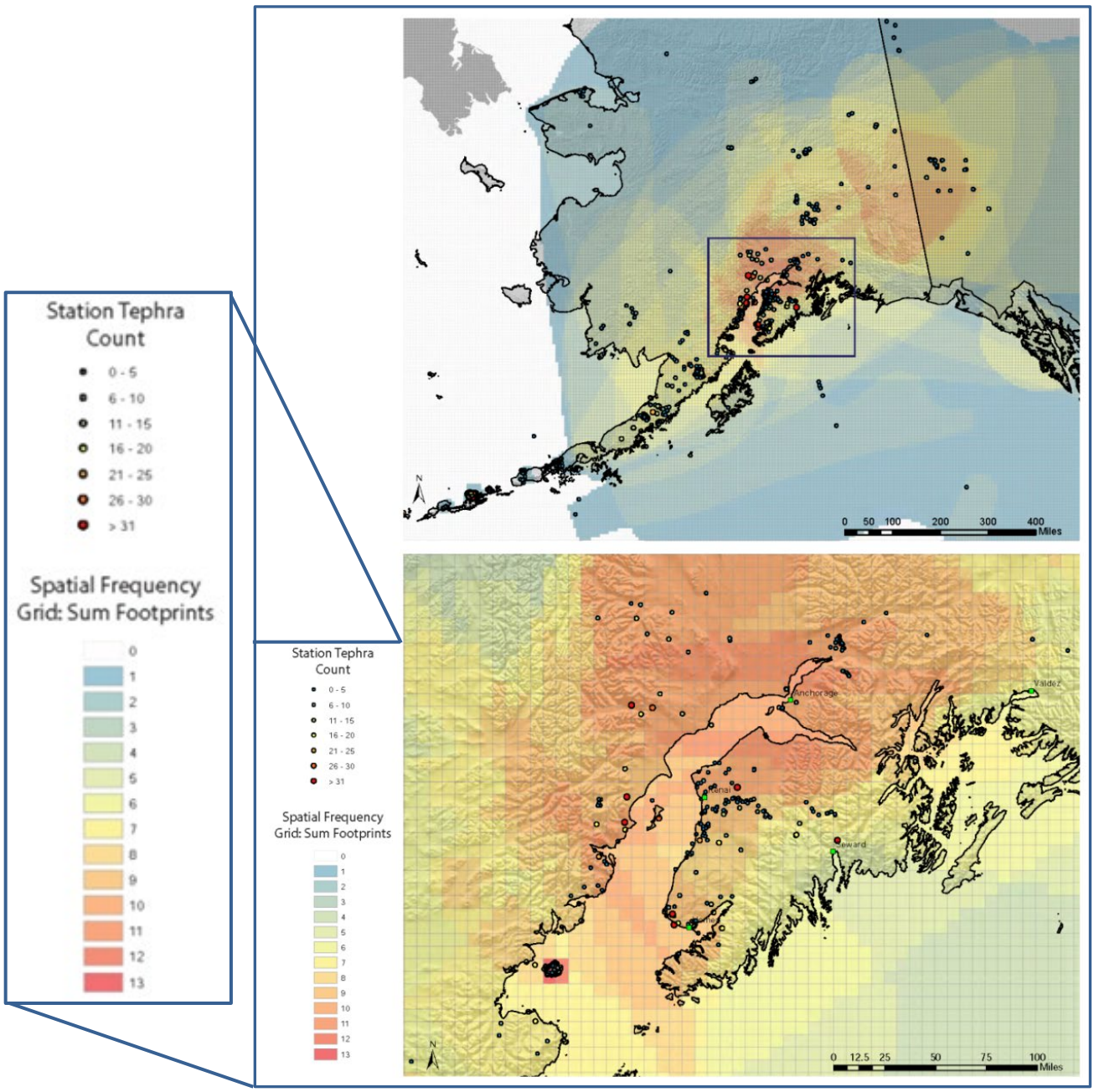


Figure 6-81 Tephra Occurrence Layer Maps

Tephra occurrence information compiled from investigations of geologic deposits throughout Alaska. Inset map highlights Cook Inlet region. Colored dots represent the number of discrete tephra layers seen at each location. Colored grid indicates number of tephra footprints recorded for the area.
Source: Mulliken et al. 2018 and DGGS staff, 2018 written communication.

Alaska residents will likely experience ashfall during a massive volcanic eruption. A tsunami is possible if the eruption included a massive, high speed pyroclastic flow into the open ocean or adjacent large water body. A much more likely affect would be caused by drifting ash clouds that would result in prolonged traffic disruptions (air, land, or rail) preventing essential community

resupply (e.g. food and medicine delivery), and medical evacuation service capabilities to full service hospitals.

A massive eruption anywhere on earth, as depicted in Figure 6-82, could severely affect the global climate; radically changing everyone's long-term weather event risks for weeks, months, or years.

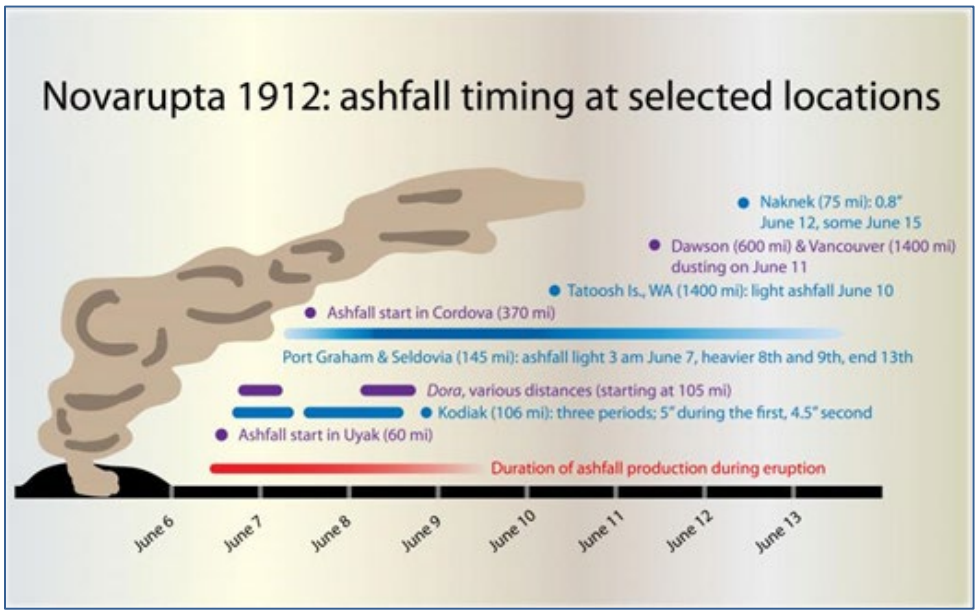


Figure 6-82 Novarupta's Historic Ashfall Timeline
Source, AVO 2012: https://www.avo.alaska.edu/images/image.php?id=42381

Impact

Over the last few hundred years, an average of one to two eruptions occur each year in Alaska. Eruptions in the western Aleutian Islands impact local and trans-Pacific aircraft. Eruptions near or within Cook Inlet have the potential to impact a significant portion of the state's population and infrastructure. An ashfall event would undoubtedly be devastating to Alaska residents by straining its resources as well as transportation (air, ocean, land, and rail routes); especially if other hub communities are also significantly affected by a volcanic eruption. Residents would likely experience respiratory problems from airborne ash, personal injury, and potential residential displacement or lack of shelter with general property damage (electronics and unprotected machinery), structural damage from ash loading, state/regional transportation interruptions, loss of commerce, as well as water supply contamination.

These impacts can range from inconvenience, a few days with no transportation capability; to disastrous, heavy, debilitating ashfall throughout the state, forcing residents to be completely self-sufficient.

Recurrence Probability

Geologists can make general long-term forecasts associated with individual volcano activities by carefully analyzing past activity, but these are on the order of trends and likelihood, rather than specific events or timelines. Short-range forecasts are often possible with greater accuracy.

Several signs of increasing activity can indicate that an eruption will follow within weeks or months. Magma moving upward into a volcano often causes a significant increase in small, localized earthquakes, and measurable carbon dioxide and compounds of sulfur and chlorine emissions increases. Shifts in magma depth and location can cause ground level elevation changes that can be detected through ground instrumentation or remote sensing.

6.7. WEATHER, SEVERE

6.7.1. HAZARD CHARACTERISTICS

This section defines Alaska's weather-related hazard threats, which influence Alaska's weather, and defines or explains each weather event's characteristics, location, extent (impact areas), actual or potential impacts or damage, and their general recurrence probability. Damaging weather impacts occur from seasonal, as well as sudden, climate change related conditions. Climate change affects all weather related events such as:

- Heavy rain
  - Freezing rain
  - Ice storms
- Extreme Cold
- Winter storms
- High Winds
- Storm Surge
- Ivu
- Excessive Snowfall
  - Drifting Snow
- Hail
- Thunderstorms and Lightening
- Tornadoes
- Water Spouts

6.7.1.1. CLIMATE CHANGE INFLUENCES

In contemporary usage, climate change commonly refers to the change in global or regional climate patterns that spans from the mid- to late 20th century to the present. Evidence collected by scientists and engineers from around the world tells an unambiguous story: the planet is warming. Climate change at high northern latitudes, such as Alaska, is causing rapid and severe environmental change.

Alaska's temperature rise rate has been twice the average of the rest of the U.S. in recent decades. During the period from 1949 to 2014, the statewide average annual air temperature increased by 3°F and average winter temperature increased by 6°F (ACRC 2018). This included considerable annual and regional variability, and was accompanied by a greater number of extremely warm days and fewer extremely cold days (CCSP 2008). The statewide average annual precipitation during this same period has increased by about 10 percent, with recent decades showing amounts largely above normal throughout Alaska, but with substantial annual and regional variability. S*ources: Shulski and Wendler 2007; ACRC, 2018*

Global climate is projected to continue changing over this century, and changes to Alaska's climate are expected to be unprecedented (Chapin et al. 2014). Average annual temperatures in Alaska are projected to rise by an additional 2°F to 4°F by 2050, and by 6°F to 12°F by the end of the century (depending on emission levels; Stewart et al. 2013). Projections of annual precipitation show an increase across Alaska as part of the broad pattern of increases projected for high northern latitudes.

The state's rapidly changing climate impacts are already pronounced, and will intensify as climate continues to change. The societal impacts of a changing climate are exacerbated as the frequency and magnitude of the physical processes that control climate-related natural hazards are amplified, threatening community resilience and increasing natural hazard vulnerability of infrastructure and property.

Alaska's glaciers are in steep decline and are among the fastest-melting glaciers in the world. Increases in the duration and intensity of melt on glaciers will lead to more runoff and flooding

in some catchments and declining dry-season flow in others as water storage is reduced. As glaciers continue to melt, an increase in glacial lake outburst floods is expected.

Arctic sea ice extent has decreased dramatically and is now declining at an accelerated rate. This is leading to ice-free conditions during intense coastal storms that enhance flooding and erosion, in particular accelerating erosion of ice-rich coastal terrain.

Snow cover extent and depth have been decreasing in most places in Alaska for nearly three decades. Warmer winter temperatures change the precipitation frequency of snow and rain, and are producing more frequent rain-on-snow events that increase avalanche hazards.

Permafrost has warmed by several degrees in northern Alaska and has already started thawing in many other parts of the state. Thawing permafrost will impact many communities and thousands of miles of road as landscape water balances shift and subsidence occurs.

As the distribution and frequency of snow, ice, and permafrost continue to change, slopes become more unstable, increasing the probability of large, damaging landslides and erosional events that threaten infrastructure and public safety.

Climate change is described as a phenomena of water vapor, carbon dioxide, and other gases in the earth's atmosphere acting like a blanket over the earth, absorbing some of the heat of the sunlight-warmed surfaces instead of allowing it to escape into space the more gasses, the thicker the blanket, the warmer the earth. Trees and other plants cannot absorb carbon dioxide through photosynthesis if foliage growth is inhibited. Therefore, carbon dioxide builds up and changes precipitation patterns, increases storms, wildfires, and flooding frequency and intensity; and substantially changes flora, fauna, fish, and wildlife habitats.

The governor's Alaska's Climate, Ecosystems and Human Health Work Group is tasked with determining how the changing ecosystems may impact human health and to identify, prioritize, and educate Alaskans about the connection between their health and changing environmental patterns.

Extreme Cold varies according to a region's normal climate; near freezing temperatures are considered "extreme" in areas unaccustomed to winter weather. Extreme cold usually involves temperatures between -20 to -50°F in Alaska. Excessive cold may accompany winter storms or can occur without storm activity during clear skies with high barometric pressure. Extreme cold accompanied by wind exacerbates exposure injuries such as frostbite and hypothermia.

Extreme cold interferes with infrastructure across Alaska for days or sometimes weeks at a time. Liquid fuels may congeal or freeze denying motorized transportation, heat, and electricity generation. In desperation, some people choose to burn propane stoves indoors, increasing their risk to carbon monoxide poisoning. Aircraft may be grounded, delaying the resupply to remote villages. Water and sewer pipes often freeze and rupture, flooding occurs later when they thaw.

Winter Storms include a variety of phenomena described above and as previously stated may include several components such as wind, snow, and ice storms. Ice storms include freezing rain, sleet, and hail can be the most devastating of winter weather phenomena; often causing automobile accidents, power outages, and personal injury. Freezing rain coats every surface it falls on with an icy glaze. Freezing rain most commonly starts in a narrow band on the cold side of a warm front, where surface temperatures are at or just below freezing temperatures. Ice

crystals high in the atmosphere grow by collecting water vapor molecules, sometimes supplied by evaporating cloud droplets. As the crystals fall, they encounter a layer of warm air where they particles melt and collapse into raindrops. As the raindrops approach the ground, they encounter a layer of cold air and cool to temperatures below freezing.

Heavy or Excessive Snow accumulation of more than 12 to 24 inches inside of 24 hours will immobilize a community and bring transportation to a halt. Airports and major roadways will close, disrupting supply flow and emergency response service access. Excessive accumulation will collapse roofs, knock down trees and power lines, damage parked light aircraft, and capsize small boats. Heavy snow dramatically increases avalanche and flooding risks. Snow removal, damage repairs, and business loss will financially impact communities. Heavy snow is associated with vehicle accidents, overexertion, hypothermia, and lost travelers. Heavy snow is most common in coastal areas and is rarely experienced in interior Alaska.

High Winds in excess of 60 miles per hour (mph) occur frequently over the coastal areas along the Bering Sea and the Gulf of Alaska. They can also combine with loose snow to produce blizzards. Alaska's high wind can equal hurricane force but fall under a different classification because the winds are not cyclonic, nor do they possess other hurricane characteristics. High winds occur when there are winter low-pressure systems in the North Pacific Ocean and the Gulf of Alaska, and in the interior due to strong pressure differences.

Down slope wind storms created by temperature and pressure differences on mountainous terrain can produce winds in excess of 120 mph. Areas like the Coast Mountains, Brooks Range, and the Alaska Range experience down slope winds.

Localized downdrafts, downbursts, and microbursts, are also common wind hazards in Alaska. Downbursts and microbursts are often generated by thunderstorms. Downbursts are areas of rapidly falling rain-cooled air. Upon reaching the ground, the downburst spreads out in all directions in excess of 125 mph. Microbursts are smaller scale, more concentrated downbursts reaching speeds up to 150 mph. Both types of wind, commonly lasting 5 to 7 minutes, are hazardous to aviation. These winds reach hurricane force and have the potential to seriously damage port facilities, impact the fishing industry, and cause damage to community infrastructure (especially above ground utility lines) while disrupting vital marine transportation.

Ice Storms (Freezing Rain) describe occasions when excessive ice accumulations are expected during a freezing rain event. They are a particularly hazardous winter weather phenomena and often cause numerous automobile accidents, power outages, and personal injury. Ice storms form from freezing rain it passes through a thin layer of cold air just above the ground, it cools to below freezing. The drops remain in a liquid state until they impact a surface and freezes on contact.

Hail. Thunderstorms produce hail in ball or irregular shapes greater than 0.75 inch in diameter. The size and severity of the storm determine the size of the hailstones. Unlike the hail in mid-western states, Alaskan hail is small (pea-sized) and fairly rare. The extreme atmospheric conditions necessary to generate damaging sized hail (greater than 0.75 inch diameter) are highly unusual in Alaska.

Thunderstorms hazards are lightning, heavy rain, snow, updrafts, downdrafts, severe aircraft turbulence and icing, damaging hail, high winds, and flash flooding. A thunderstorm is

considered severe if winds reach or exceed 58 mph, it produces a tornado, or generates surface hail at least 1 inch in diameter. Thunderstorms affect relatively small areas the average thunderstorm is about 15 miles in diameter and lasts less than 30 minutes in any given location.

Lightning exists in all thunderstorms. It is formed from built-up charged ions within the thundercloud. Lightning is hazardous to humans and frequently start wildfires.

Most thunderstorms in Alaska are usually the single-cell or pulse variety developing from a combination of atmospheric instability and moisture; triggered by surface heating from the sun. The storms generally last only 20-30 minutes and do not usually produce severe weather. Pulse thunderstorms occasionally produce high winds, hail, or weak tornadoes. Multi or super cell thunderstorms and squall line tornadoes are rare events in Alaska.

One of the most common hazard impacts from thunderstorm activity in Alaska is wildland fire in Alaska interior's northern boreal forests. The Bureau of Land Management (BLM) lightning activity sensors positioned across the interior locate an average of 26,000 cloud-to-ground lightning strikes per year. Very active thunderstorm days may feature 8,000 to 12,000 lightning strikes, mainly occurring during the late afternoon hours from the end of June to the beginning of July. Lightning strike wildfires are much less prevalent in the coastal region than in the interior, because the frequency of storms is smaller and the climate is much wetter.

In a typical year, Alaska has fewer than 25 days with thunderstorms and they do not occur uniformly over the state. A majority of the storms occur over a region between the Yukon and Tanana rivers during the warmest summer months. The most active area for lightning strikes is the White Mountains, north of Fairbanks. Other areas experiencing frequent thunderstorms are the Yukon-Tanana uplands and flats, the Nowitna, Tetlin, and Kantishna River Flats, the Ray Mountains, and the Kuskokwim Mountains.

Thunderstorms are also observed along the southern coastal areas, with a higher frequency along the eastern Gulf of Alaska coast between Cordova and Craig. Interestingly, these storms occur during the winter months as well as during summer. Lightning caused injuries and deaths are unusual in Alaska; however, in 1986, one person was killed and three others injured near Tok, when they took shelter under a tree that was struck by lightning.

Tornadoes are rare in Alaska. They most frequently occur in the Yukon-Kuskokwim Delta. Of the five tornado damage potential categories (Fujita Scale 1-5), Alaska tornadoes rarely exceed the lowest level, but have the potential to cause damage or casualties when they touchdown in developed areas. Waterspouts, the spinning upward movement of water through wind action, are more common in Alaska and occur in all southern maritime areas of the state. Damage occasionally results from the vortices' action on property.

Low pressure cyclones develop in the Bering Sea and Gulf of Alaska, where warm moist air from the South Pacific meets cold air from the Arctic. Coastal storms are born in the Aleutians and delivered to the Alaska coast. They are most common from the fall through the spring and are known to cause coastal flooding and erosion (Figure 6-42, page 6-53).

In Tornado Climatology, June 26, 2013, Ms. Kathryn Prociv describes Alaska tornado impacts:

> *Out of all 50 states, Alaska is the state that has the lowest number of recorded tornadoes. There have only been four recorded tornado events since 1950, the last of which*

occurred on August 25th, 2005. All tornadoes have been rated at the F/EF0 level. Referring to the map, the majority of the tornadoes have occurred in the southwestern part of the state, where the terrain is flatter and the climate is moderated and more maritime in nature due to proximity to the Gulf of Alaska…

Basically, Alaska is not a tornado state — it currently experiences one tornado roughly once every 15 years."
Source: U.S. Tornadoes 2013: https://www.ustornadoes.com/2013/06/26/u-s-tornadoes-that-occur-outside-the-u-s-the-continental-u-s-that-is/

Residents in Sand Point on the Alaska Peninsula witnessed a short-lived tornado in 2005. In December, 2007, cold air funnels caused damage north of Juneau when they went over water and became a series of waterspouts.

Waterspouts are similar to tornados that occur over water. Communities along the Bering Sea, Bristol Bay, Cook Inlet, and Koyuk areas, as well as other Alaska locations witness water spouts and are concerned they could disrupt shipping and eventually approach land, threatening their fairly fragile infrastructure.

What is a water spout? A water spout is a whirling column of air and water mist. Water spouts fall into two categories: fair weather waterspouts and tornadic waterspouts.

Tornadic waterspouts are tornadoes that form over water, or move from land to water. They have the same characteristics as a land tornado. They are associated with severe thunderstorms, and are often accompanied by high winds and seas, large hail, and frequent dangerous lightning.

Fair weather waterspouts usually form along the dark flat base of a line of developing cumulus clouds. This type of waterspout is generally not associated with thunderstorms. While tornadic waterspouts develop downward in a thunderstorm, a fair weather waterspout develops on the surface of the water and works its way upward. By the time the funnel is visible, a fair weather waterspout is near maturity. Fair weather waterspouts form in light wind conditions so they normally move very little."

Source NOAA, 2018: https://oceanservice.noaa.gov/facts/waterspout.html?_sm_au_=iVV7VMPsW24tR516

The NWS shared waterspout events along Turnagain Arm near Anchorage, Alaska on July 20, 2014:

Check out these pictures of a Waterspout observed this morning over Turnagain Arm! These pictures were taken from this morning by Anchorage residents along the hillside.

Waterspouts like this, while rare, are not an unheard of sight to see over Alaskan waters. They have been observed in the past over the Bering Sea and Southwest coast, as well as in the Panhandle.

While the pictures may look similar to that of a Tornado or funnel cloud typically seen in areas of the Lower 48, these Waterspout's are created differently. Visit this page made by our friends at the National Ocean Service to learn how fair weather Waterspouts such as this are created, and how they are different from a Tornado.

Source: Photos taken from the Anchorage Hillside toward Turnagain Arm, by Derek Reynolds, https://www.facebook.com/NWSAlaska/posts/708132242573505

Source: Turnagain Arm Funnel Cloud July 20, 2014 by Jon-Michael Graham, https://www.facebook.com/Channel2Weather/photos/a.10152149282076104/10152149282391104/?type=3&theater

Ruben Lipinski, an Anchor Point, Alaska resident described his sighting as reported by Jenny Neyman, Redoubt Reporter:

> *Robin Lipinski is used to the unusual when looking out over Cook Inlet. Endlessly variable vistas are part of why he lives where he does, about three miles north of the Anchor River, in Anchor Point, overlooking the inlet.*
>
> *'You never know what you're gonna see out there, either ship traffic or weather," Lipinski said…*
>
> *A 30-foot-diamater waterspout, whirling to life midinlet and sweeping toward shore, gorging itself on water sucked from the surface, spewing spray 40 to 50 feet in the air. If it had been on land, Lipinski figures it was strong enough to rip tin off a roof.*
>
> *'It was a big white funnel that was hanging off the bottom of the cloud, then you could see it moving toward the east. The water was really just boiling," Lipinski said. "If there were any little minnows on the surface of the water they went for a ride...*
>
> *One side of the inlet was sunny, the other side of the inlet where the funnel was coming from was one of those big cumulonimbus clouds — one of those big thunderhead-looking things. It was actually pretty warm, and I think that's why it formed. I think it was hot meeting cold," Lipinski said. "It's this time of year, I guess, when the weather's changing. It's winter one day, summer the next.'…"*

The article went on to say that,

> *Dave Stricklan, a hydro-meteorological technician at the National Oceanic and Atmospheric Administration forecast office in Anchorage, said waterspouts are unusual, but not unheard of, in Alaska.*
>
> *'It's kind of rare. We don't see a whole lot of them," he said. "It's not anything big, like the tornadoes you get down in the Lower 48. They are pretty small, and waterspouts are more reported out along the (Aleutian) chain, a few near the Bethel area, stuff like that. I would think there's probably more out there that're not reported because of the lack of population.'"*
> *Source: The Redoubt Reporter2011*

Figure 6-83 displays Alaska's annual rainfall map based on Parameter-elevation Regressions on Independent Slopes Model (PRISM) that combines climate data from NOAA and Natural

Resources Conservation Service (NRCS) climate stations with a digital elevation model to generate annual, monthly, and event-based climatic element estimates such as seasonal as well as anomaly precipitation and temperature.

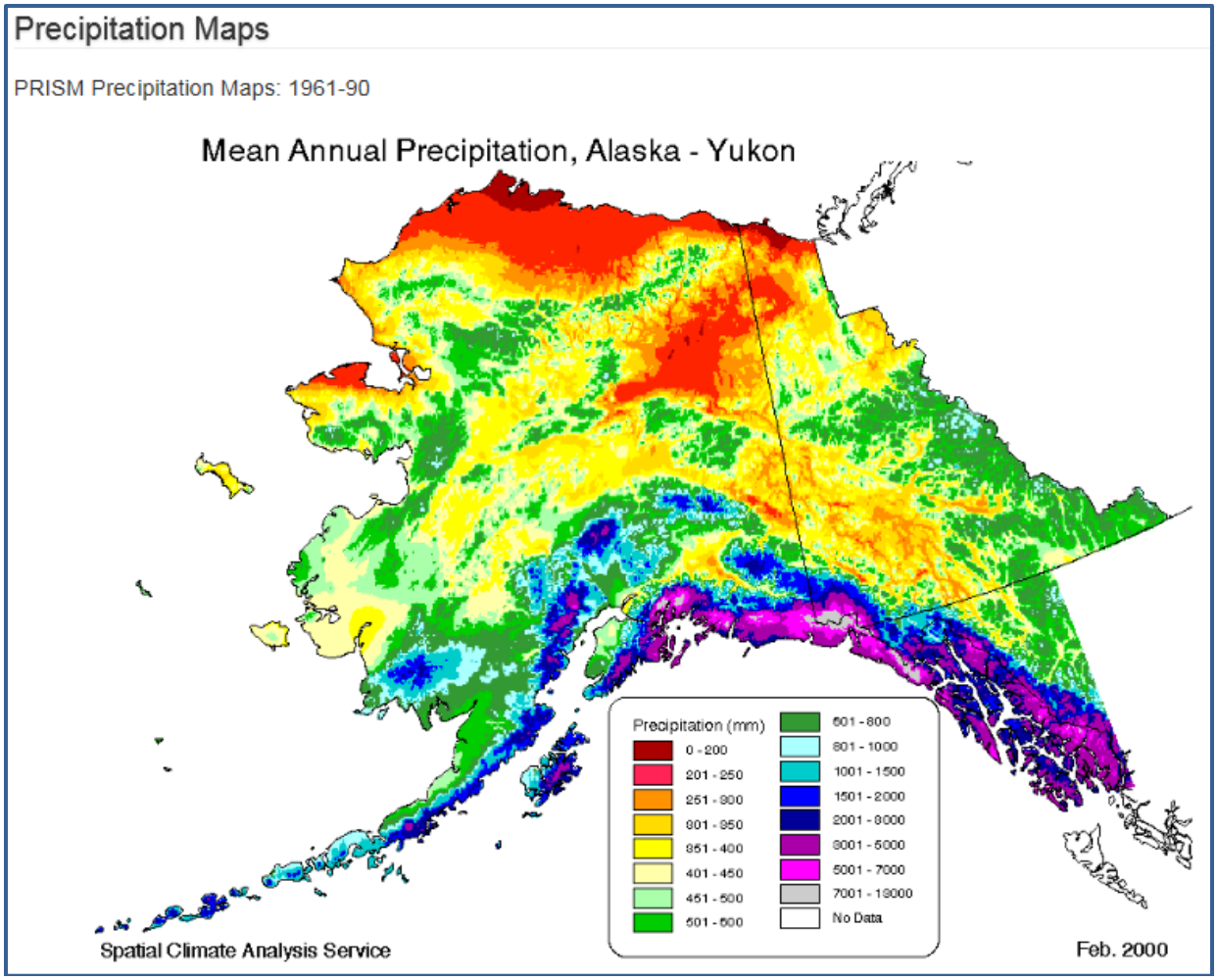


Figure 6-83 Statewide Historical Rainfall Map
Source: Prism, 2018

6.7.2. WEATHER HAZARD HISTORY

Alaska is continually impacted by severe weather events such as hurricane force / straight line wind, excessive rain, sea storms, winter storms, and extreme cold. These severe weather events typically have disastrous results in various locations throughout the state.

The NOAA, Alaska Region's 2018 "Alaska Public Forecast Zone Boundaries" map (Figure 6-84), displays inclusive weather zone boundaries and numbering. Both features will assist communities with locating current, forecast, or historic weather and climate change related events or conditions for diverse locations throughout the state.

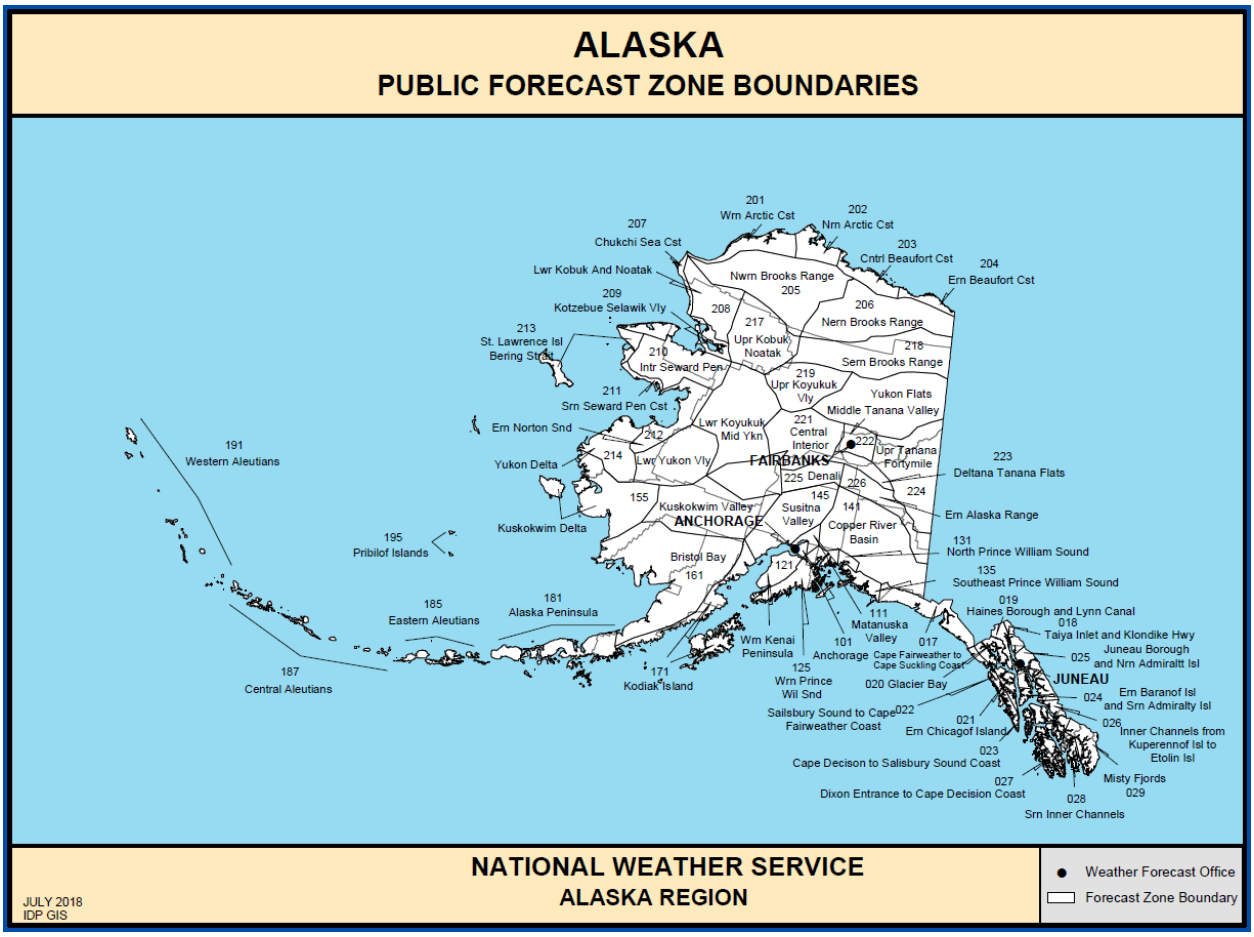


Figure 6-84 AK Public Forecast Zone Boundaries
Source: NOAA, Alaska Region, 2018: https://www.weather.gov/media/pimar/PubZone/ak_zone.pdf

Climate Change. The UAF Arctic Climate Impact Assessment (ACIA) describes recent weather changes and how they impact Alaska:

> *18.3.3.1. Changes in climate*
>
> *Alaska experienced an increase in mean annual temperature of about 2 to 3 ºC between 1954 and 2003…Winter temperatures over the same period increased by up to 3 to 4 ºC in Alaska and the western Canadian Arctic, but Chukotka experienced winter cooling of between 1 and 2 ºC…*
>
> *The entire region, but particularly Alaska and the western Canadian Arctic, has undergone a marked change over the last three decades, including a sharp reduction in snow-cover extent and duration, shorter river- and lake ice seasons, melting of mountain glaciers, sea-ice retreat and thinning, permafrost retreat, and increased active layer depth. These changes have caused major ecological and socio-economic impacts, which are likely to continue or worsen under projected future climate change. Thawing permafrost and northward movement of the permafrost boundary are likely to increase slope instabilities, which will lead to costly road replacement and increased maintenance costs for pipelines and other infrastructure. The projected shift in climate is likely to convert some forested areas into bogs when ice-rich permafrost thaws. Other areas of*

Alaska, such as the North Slope, are expected to continue drying. Reduced sea-ice extent and thickness, rising sea level, and increases in the length of the open-water season in the region will increase the frequency and intensity of storm surges and wave development, which in turn will increase coastal erosion and flooding…

18.3.3.4. Impacts on people's lives

Traditional lifestyles are already being threatened by multiple climate-related factors, including reduced or displaced populations of marine mammals, seabirds, and other wildlife, and reductions in the extent and thickness of sea ice, making hunting more difficult and dangerous. Indigenous communities depend on fish, marine mammals, and other wildlife, through hunting, trapping, fishing, and caribou/reindeer herding. These activities play social and cultural roles that may be far greater than their contribution to monetary incomes. Also, these foods from the land and sea make significant contributions to the daily diet and nutritional status of many indigenous populations and represent important opportunities for physical activity among populations that are increasingly sedentary… Source: ACIA 2015

The University of Alaska Geophysical Institute's Alaska Climate Research Center (ACRC) provided the following 2017 Alaska Statewide mid-winter and mid-summer summaries; there were no 2018 data at the time of this SHMP. The planning team determined that spring and fall weather, although different, can be viewed as transition periods between the winter and summer extremes.
http://akclimate.org/statewide-archive?field_year_list_value=2017&field_month_value=All&sort_by=field_year_value&sort_order=ASC

Note: *These data are 2017 centric and used as historical representations only. Future global climate change conditions will affect future weather patterns and events.*

Note: *Actual community temperatures and depths may vary due to their relative proximity to their respective locations and identified weather zones as depicted in Figure 6-96.*

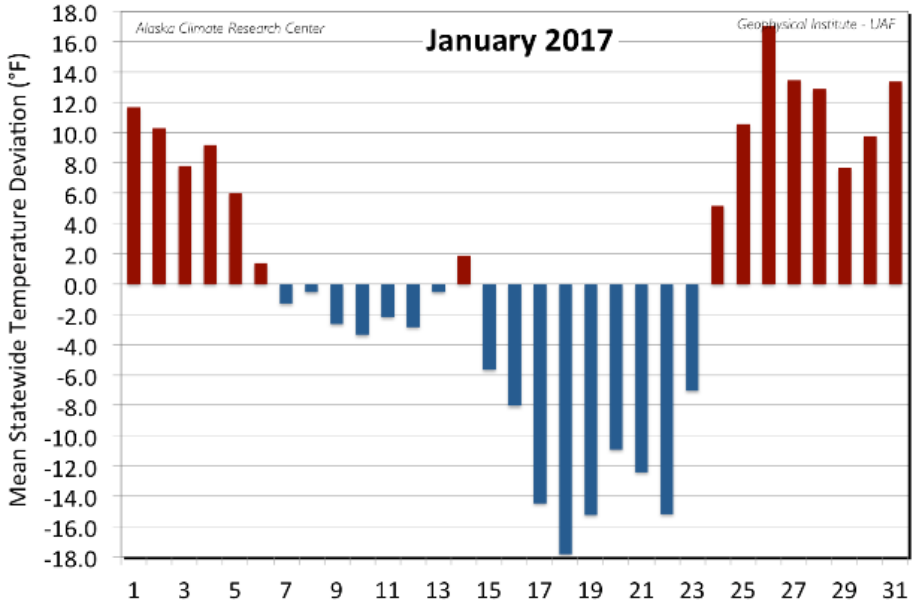
Alaska Statewide Climate Summary
January 2017

Temperature

After fifteen months in a row with mean statewide temperatures above normal, January 2017 hit the mean monthly normal for January. The monthly mean temperature of all First Order Stations was 14.4°F, matching the normal of 14.4°F. This is 7.9°F below the January 2016 mean of 22.3°F. Calculating the mean daily temperatures of the First Order Stations, 15 days of the month were above the 30-year normal, with 16 days below normal. Above normal temperatures started the month, and above normal temperatures the ended of the month, with the transition to colder and mixed temperatures occurring between around 7th and 23rd (see Figure). The peak positive deviation for the month occurred on the 26th at 17.0°F. The greatest negative deviation occurred on the 18th with -17.8°F. Monthly mean temperatures (see table) were above normal for eight of the 19 First Order Stations. As was the case in October, November and December, Barrow held the spot with the greatest positive deviation in January with a significant 13.1°F above its normal of -0.3°F. Kotzebue had the next greatest positive deviation with 4.5°F. The station with the greatest negative deviation was Talkeetna with -6.7°F. Two other

stations had greater than -3.0°F deviations: Anchorage and King Salmon both with -3.5°F.

The highest daily maximum temperature of the First Order Stations for January was 50°F reported at Annette on the 17th. Annette also held the spot for the highest mean temperature for the month at 38.8°F. The lowest temperature of -56°F was observed at Bettles on the 19th and Bettles also reported the lowest January mean monthly temperature with a value of -12.1°F.



Daily mean temperature deviation from the normal temperature for the mean of the First Order Stations for January 2017.

There were only a limited number of new daily temperature record events in January, and all were new highs. Barrow set three new daily temperature records during the first three days of the month.

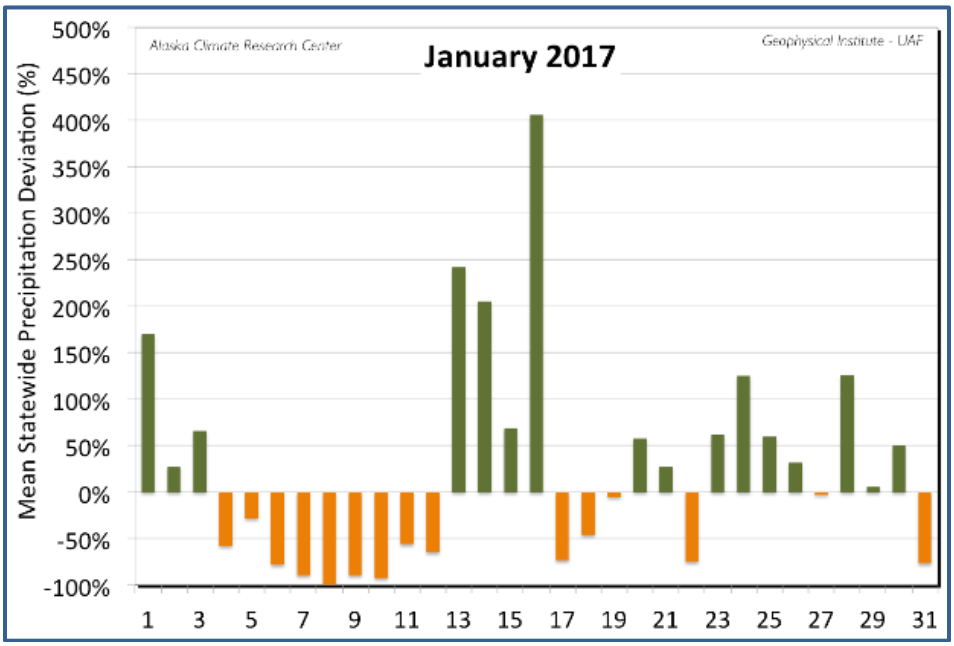
Date	Temperature Records				
	Station	Element	New Record	Old Record	Year of old Record
01/01/17	Barrow	High Temperature	36	30	1928
01/01/17	Kotzebue	High Temperature	38	36	1968
01/02/17	Barrow	High Temperature	34	30	1968
01/03/17	Barrow	High Temperature	30	29	2004
01/26/17	Juneau	High Temperature	46	45	2016

Precipitation

Continuing the trend from December, January's precipitation was significantly above normal, with the overall precipitation calculated as 27% above the average; this calculation was based on the mean of the deviations in percentage of the First Order Stations. Eleven of the First Order Stations and 16 days of the month reported above normal values. This is quite a bit wetter than January 2016, which reported a negative precipitation deviation of 23% below normal. The greatest daily precipitation amount occurred on the 16th. The leading station with a greater than

normal monthly precipitation amount was Barrow with 0.47", or 262% above normal. Anchorage was the station with the next greatest deviation with 134% above normal. The relatively driest station was King Salmon with just 15% of normal.

Station	Precipitation				
	Observed (in)	Normal (in)	Delta (in)	Delta (%)	(%)
Anchorage	1.71	0.73	0.98	134%	234%
Annette	8.24	10.73	-2.49	-23%	77%
Barrow	0.47	0.13	0.34	262%	362%
Bethel	1.21	0.78	0.43	55%	155%
Bettles	0.92	0.81	0.11	14%	114%
Cold Bay	5.13	3.16	1.97	62%	162%
Delta Junction	0.50	0.31	0.19	61%	161%
Fairbanks	0.96	0.58	0.38	66%	166%
Gulkana	0.83	0.46	0.37	80%	180%
Homer	2.67	2.63	0.04	2%	102%
Juneau	6.27	5.35	0.92	17%	117%
King Salmon	0.15	1.02	-0.87	-85%	15%
Kodiak	2.95	8.29	-5.34	-64%	36%
Kotzebue	0.55	0.62	-0.07	-11%	89%
McGrath	0.54	1.09	-0.55	-50%	50%
Nome	0.72	0.94	-0.22	-23%	77%
St. Paul Island	1.51	1.58	-0.07	-4%	96%
Talkeetna	1.68	1.36	0.32	24%	124%
Yakutat	13.39	13.66	-0.27	-2%	98%



Daily mean precipitation deviation from the normal for the First Order Stations for January 2017.

January's highest monthly precipitation total reported for a First Order Station was 13.39" at Yakutat, and Yakutat also reported the highest daily total of 2.53" on the 17th. There were a limited number of precipitation records as noted in the table below.

Date	Precipitation Records				
	Station	Element	New Record	Old Record	Year of old Record
01/01/17	Barrow	Precipitation	0.32	0.16	1924
01/16/17	Delta Junction	Precipitation	0.20	0.19	1952
01/16/17	Juneau	Precipitation	1.49	1.01	2005
01/16/17	Skagway	Precipitation	1.10	0.57	1928
01/30/17	Cold Bay	Precipitation	0.74	0.57	1988

Snowfall

January was the second month this winter with above average snowfall across the State, but like December, just barely. Based on the mean of the deviations from all 15 stations, which measure snowfall, the overall deviation from the normals was 2% above the expected amount. This is considerably greater than the snowfall deviation from January 2016, which had a 60% deficit. Six of the 15 First Order Stations reported above normal snowfalls. Anchorage had the greatest positive deviation at 181% above its expected amount with a total of 31.7". Anchorage also reported the highest one-day snowfall at 10.3" on the 21st, a new daily record, breaking the 1961 record of 3.8". This is the second highest one-day snowfall for Anchorage in January after the 11.2" from January 1st, 2007. The greatest snow depth was 27" and was reported at Anchorage on the 21st. There were a limited number of snowfall records as noted in the table below. Snowpack continued to be low, with around half of normal.

Station	Snowfall				
	Observed (in)	Normal (in)	Delta (in)	Delta (%)	(%)
Anchorage	31.7	11.3	20.4	181%	281%
Annette	1.0	7.6	-6.6	-87%	13%
Barrow	4.7	2.6	2.1	81%	181%
Bethel	9.8	9.6	0.2	2%	102%
Bettles	13.1	13.9	-0.8	-6%	94%
Cold Bay	12.5	14.1	-1.6	-11%	89%
Fairbanks	17.0	10.3	6.7	65%	165%
Juneau	3.7	27.7	-24.0	-87%	13%
King Salmon	3.0	10.2	-7.2	-71%	29%
Kodiak	7.4	13.0	-5.6	-43%	57%
Kotzebue	11.3	9.1	2.2	24%	124%
McGrath	14.7	15.7	-1.0	-6%	94%
Nome	10.4	12.7	-2.3	-18%	82%
St. Paul Island	14.2	12.6	1.6	13%	113%
Yakutat	27.6	31.9	-4.3	-13%	87%

Date	Snowfall Records				
	Station	Element	New Record	Old Record	Year of old Record
01/01/17	Barrow	Snowfall	3.1	1.6	1924
01/13/17	Anchorage	Snowfall	4.0	2.5	1990
01/16/17	Anchorage	Snowfall	5.3	3.7	2008
01/19/17	McGrath	Snowfall	4.8	4.7	1949
01/20/17	Anchorage	Snowfall	2.2	1.9	2011
01/21/17	Anchorage	Snowfall	10.3	3.8	1981

Newsworthy Events

The New Year started off with Yakutat registering a low of 16°F, 20°F colder than Barrow at 36°F for the same day. Avalanche reduction hazard efforts were conducted along the Dalton Highway in the Brooks Range, while the Steese Highway was closed from mile 80 to 114. The Steese Highway was closed in the same area on the 3rd, while a travel advisory was issued for the Dalton Highway on the 5th due to high winds and being impassable along the northern end of the road. The Elliot Highway experienced hazardous driving conditions. Notable wind speeds from the snow storm at the end of the year were: 52 mph at Northway, 62 mph at Sheenjek River in the Southeaster Brooks Range, 66 mph at Inigok Airfield in Northwestern Brooks Range, 70 mph at Jago River in Northeastern Brooks Range, 61 mph at Fort Greely, 75 mph at Camden Bay and 77 mph at Cape Lisburne. In Fairbanks, the road crews were still mopping up on the 6th of January.

The Klondike Highway was closed on the 6th, while Taku winds hit the Juneau area on the 9th with minor damage reported. Winds were reported up to 94 mph at downtown Juneau, 72 mph at Eldred Rock and 61 mph at Point Bishop near Juneau. High winds along the northern Panhandle on the 8th included: 67 mph at Fiver Fingers, 66 mph at Eldred Rock, 55 mph at Skagway and 52 mph at Yakutat. Hazardous driving conditions were reported along the Dalton Highway again on the 11th, and then for the Elliott Highway on the 13th. More snow in the Southcentral area on the 13th included: over 18" at Valdez, over 9" at Eagle River, and 6" to 7" reported at locations from Palmer to Anchorage.

High winds in the Southeast on the same day ranged up to 67 mph at Lincoln Island, 54 mph at Hydaburg, 52 mph at Juneau and 51 mph at Ketchikan. Hazardous driving conditions were reported along the Haines Highway on the 14th due to heavy rain and black ice on the road. Heavy rains reported along the Panhandle included: 3.89" at Shelter Cove, 3.26" at Ketchikan, 2.78" near Haines and 2.72" at Yakutat. The storm continued along the Panhandle the following day with winds up to 70 mph at Sitka, 61 mph at Hydaburg, 59 mph at Annette, 54 mph at Skagway and 43 mph at Yakutat. The rainfall totals for the storms from 11th to 16th were: 11.70" at Pelican, 7.18" at Yakutat, 6.61" at Ketchikan and 5.54" at Sitka. The Klondike Highway was was closed from the 16th to 18th due to heavy rain and black ice.

Snowfall totals for the Southcentral areas on the 16th were 8" at Portage and Hatcher Pass and 8" at Thompson Pass, while parts of Anchorage received 4" to 5". The next day, high winds and drifting snow made for difficult travel along parts of the Parks and Richardson Highways.

Extreme cold began to descend across much of the State on the 17th with a temperature range of 101°F from -51°F at McGrath and Tanana to +50°F at Annette. Anchorage Airport hit -15°F on the 18th, and this was the first time in five years this cold of a temperature had been reported. Barrow reported -30°F, and this ended the longest streak of 387 days, on record, of temperatures staying above this mark. Previous record had been 369 days ending on January 20th, 2006. Temperatures dropped lower on the 18th with -51°F reported at Fairbanks Airport, the first time for that temperature in six years, and it has not been colder than -51°F since the -52°F on New Year's Eve 1999. In the Fairbanks area, -59°F was reported near the Salcha River, -52°F at Eielson and -51°F at Ft Wainwright. Tanana also reported -59°F and Bettles reported -56°F. The next day Tanana and Bettles reported a low of -53°F. In the Southcentral area temperatures were:

-38°F at Talkeetna, -33°F at Wasilla, -20°F at Palmer and -29°F at Kenai. Elliot Highway reported hazardous driving conditions on the 20th. The next day the sun rose at Barrow for the first time in over 2 months.

On the 21st, heavy snowfall impacted the Southcentral areas resulting in avalanche warnings being issued for the south and western Kenai Mountains, and hazardous driving conditions reported along the Seward Highway due to snow and high winds up to 50 mph. Moose Pass reported snowfall totals of over 2 feet. The heavy snowfall prompted the city of Seward to declare a local emergency and request aid from the State as more than 2 ½ feet of snow had fallen in the city. The snowstorm gave Anchorage a winter total of 44.3", more than the previous two winters combined, and resulted in a number of vehicle accidents and the collapse of the dome roof of a sports facility. Two days later avalanche reduction efforts were instituted from miles 19 to 45 along the Seward Highway, and this was repeated for miles 80 to 100 on the 26th. Freezing rain in Anchorage on the 26th generated a number of vehicle accidents and the closure of all after school activities. More avalanche warnings were issued on the 26th for the Kenai Mountains and Turnagain Pass.

As warmer temperatures pushed across the State, Eielson AFB reported a high of +36°F on the 26th, 89°F warmer than the -53°F from the previous week. Denali Park reported 43°F on the 26th, with winds up to 60 mph through the passes of the Alaska Range. The warming created ice roads along the Elliott Highway and drivers were warned to avoid the road.

More high winds along the Panhandle on the 27th resulted in observations of 84 mph at Cape Decision, 77 mph at Hydaburg, 67 mph at Ketchikan, 62 mph at Sitka and Juneau, and 60 mph at Yakutat. The next day winds topped out at 71 mph at Cape Fairweather, 64 mph at Lincoln Island, 58 mph at Annette, 55 mph at Juneau, and 52 mph at Ketchikan and Yakutat. More snow in the Southcentral area on the 38th totaled up to 8" at Wasilla, 7" at Eagle River and up to 6" around Anchorage. Total January snowfall at sea level at Alyeska was over 56". Toward the end of the month, avalanche reduction efforts were conducted along the Dalton Highway in the Brooks Range.

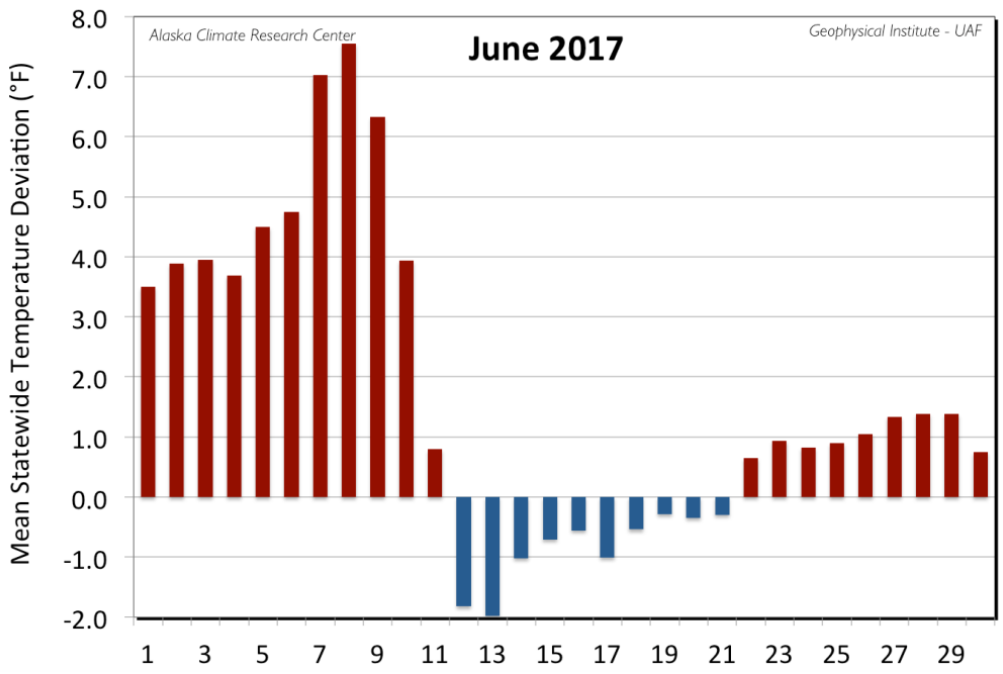
Alaska Statewide Climate Summary
June 2017

Temperature

June 2017 marks 18 months out of the last 20 months with mean statewide temperatures at or above normal. The mean monthly temperature for June 2017 was above normal with the mean temperature of all First Order Stations at 53.5°F, 1.8°F above the normal of 51.7°F. This is 0.6°F below the June 2016 mean of 54.1°F. Calculating the mean daily temperatures of the First Order Stations, the first eleven days of the month were above the 30-year normal, followed by ten days of below normal temperatures, then the month ended with nine more days above normal. The greatest positive deviation occurred on the 8th with 7.5°F above normal, and the greatest negative deviation occurred on the 13th at -2.0°F. (see Figure). Monthly mean temperatures were above normal for 16 of the 19 of the First Order Stations (see table). Kotzebue held the spot with the greatest positive deviation in June with 5.4°F above its normal of 45.7°F. The other stations with deviations greater than or equal to 3°F were Nome (4.9°F), St. Paul Island (3.2°F) and Bethel (3.0°F). Note that all these stations are located in western Alaska. Juneau was the station reporting the greatest below normal mean temperature with 53.3°F, 1.3°F below its June normal of 54.6°F.

Station	Temperature		
	Observed (°F)	Normal (°F)	Delta (°F)
Anchorage	55.3	55.2	0.1
Annette	55.3	55.1	0.2
Barrow	34.7	35.6	-0.9
Bethel	55.5	52.5	3.0
Bettles	59.9	58.5	1.4
Cold Bay	48.0	46.3	1.7
Delta Junction	59.8	57.6	2.2
Fairbanks	62.8	60.4	2.4
Gulkana	56.2	54.4	1.8
Homer	54.4	50.6	3.8
Juneau	53.3	54.6	-1.3
King Salmon	53.7	51.5	2.2
Kodiak	50.8	49.7	1.1
Kotzebue	51.1	45.7	5.4
McGrath	59.4	57.4	2.0
Nome	52.7	47.8	4.9
St. Paul Island	45.6	42.4	3.2
Talkeetna	56.8	57.0	-0.2
Yakutat	52.0	50.8	1.2

The highest daily maximum temperature of the First Order Stations for June was 90°F reported at Fairbanks on the 9th, a new daily record, breaking the 1957 record of 87°F. This was the second earliest 90°F daily high on record, after the 90°F high on May 28, 1947, as well as the first 90°F in Fairbanks since June 2013. Fairbanks also held the spot for the highest mean temperature for the month at 62.8°F. The lowest temperature of 22°F was observed at Barrow on the 5th, and Barrow also reported the lowest June mean monthly temperature with a value of 34.7°F.



Daily mean temperature deviation from the normal temperature for the mean of the First Order Stations for June 2017.

There were a very limited number of new temperature record events this June as delineated in the following table.

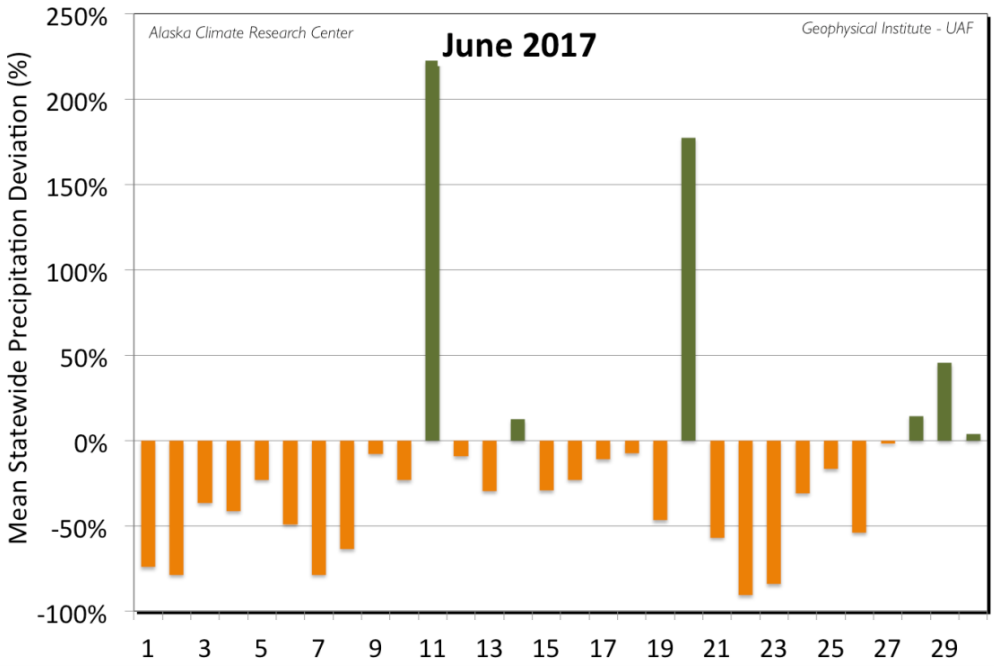
Date	Temperature Records				
	Station	Element	New Record	Old Record	Year of old Record
06/02/17	Bethel	High Temperature	76	75	1993
06/06/17	St. Paul	High Temperature	57	55	2016
06/09/17	Delta Junction	High Temperature	88	83	1957
06/09/17	Fairbanks	High Temperature	90	87	1957
06/09/17	Haines Airport	High Temperature	83	82	1946
06/19/17	King Salmon	Low Temperature	34	35	1997

Precipitation

June's precipitation was notably below normal, with the overall precipitation calculated as 17% below the average; this calculation was based on the mean of the deviations in percentage of the First Order Stations. Thirteen of the First Order Stations and 24 days of the month reported below normal values. This is drier than June 2016, which reported a precipitation surplus of 21%. The greatest daily precipitation amount occurred on the 11th. The station reporting the greatest precipitation deviation was King Salmon at 45% above normal with 2.40", 0.75" above its normal of 1.65". The relatively driest station was Gulkana at just 24% of normal.

Station	Precipitation				
	Observed (in)	Normal (in)	Delta (in)	Delta (%)	(%)
Anchorage	0.87	0.97	-0.10	-10%	90%
Annette	6.33	4.88	1.45	30%	130%
Barrow	0.26	0.32	-0.06	-19%	81%

Station	Precipitation				
	Observed (in)	Normal (in)	Delta (in)	Delta (%)	(%)
Bethel	1.39	1.72	-0.33	-19%	81%
Bettles	0.43	1.40	-0.97	-69%	31%
Cold Bay	1.94	2.72	-0.78	-29%	71%
Delta Junction	2.06	2.31	-0.25	-11%	89%
Fairbanks	1.73	1.37	0.36	26%	126%
Gulkana	0.34	1.40	-1.06	-76%	24%
Homer	0.46	0.82	-0.36	-44%	56%
Juneau	3.86	3.24	0.62	19%	119%
King Salmon	2.40	1.65	0.75	45%	145%
Kodiak	7.98	5.91	2.07	35%	135%
Kotzebue	0.20	0.58	-0.38	-66%	34%
McGrath	1.23	1.52	-0.29	-19%	81%
Nome	1.18	0.98	0.20	20%	120%
St. Paul Island	0.93	1.35	-0.42	-31%	69%
Talkeetna	0.52	1.92	-1.40	-73%	27%
Yakutat	3.81	6.39	-2.58	-40%	60%



Daily mean precipitation deviation from the normal for the First Order Stations for June 2017.

June's highest monthly precipitation total reported for a First Order Station was 7.98" at Kodiak. Kodiak also reported the highest daily total of 2.22" on the 29th, a new daily record, breaking the old record of 1.84" from 1965.

A limited number of daily precipitation records were set this June. Fairbanks on the 11th broke a record set only the previous year with 1.09", topping the 2016 record of 0.95". King Salmon received the same amount, 1.03" on the 14th, more than doubling the 1978 record of 0.49". The rainfall total of 1.24" in Sitka on the 16th broke the previous record of 1.21" also set in 1978.

Newsworthy Events

On June 1st, the North Robertson fire was reported 30 miles northwest of Tok, at mile 1349 of the Alaska Highway. By the next day over 200 firefighters were onsite, and air tankers were dropping water and retardant as the fire approached nearby structures. The fire was 40% contained on the 5th, and 85% by the 11th. It burned a total of 800 acres. Burn suspensions were initiated for central and eastern Interior Alaska on the 2nd.

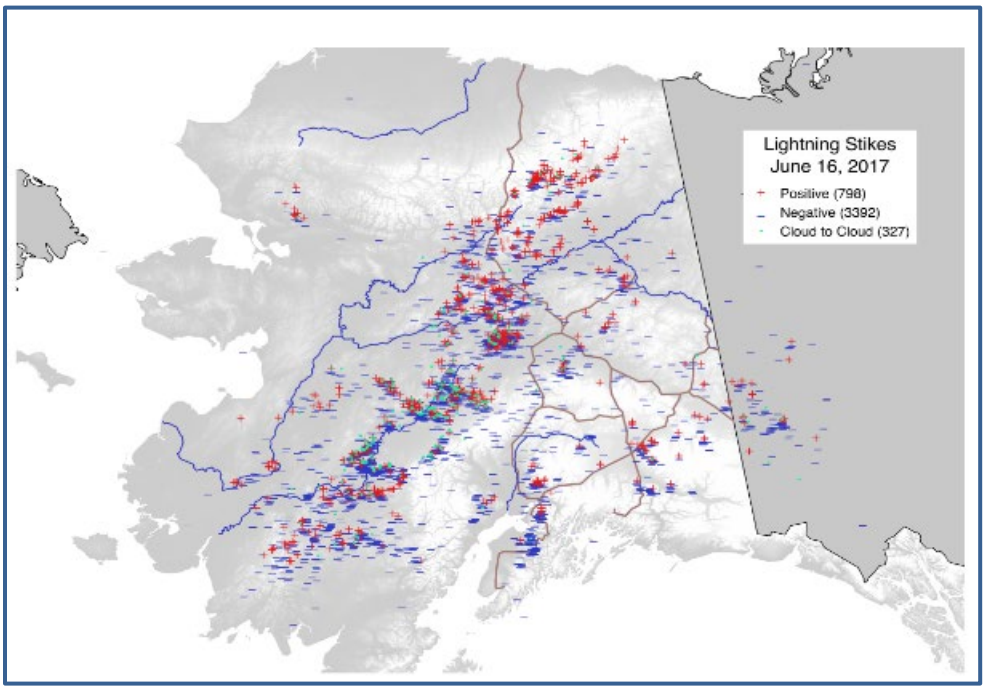
The Bell Creek fire, started by lightning on the 4th, approached the village of Crooked Creek along the Kuskokwim River. Fire crews and takers were dispatched to fight the fire. The fire reached 2,600 acres. The Deadpan's Slough fire also started on the 4th within two miles of the village of Anvik, and was also fought to protect structures.

On the 5th, heavy rainfall was reported across southern portion of the Panhandle with Ketchikan reporting 2.60", 1.64" at Zarembo and 1.27" at Annette. For much of the next week, red flag warnings were issued for the middle and eastern Interior due to continued high temperatures and winds. Heavy lightning strikes in Western Alaska on the 6th started 19 new fires in the Galena zone.

Smoke from the South Fork Salcha, north of the Pogo Mine, reached Fairbanks on the 9th. This fire was not actively fought even though it was within two miles of the road to the Pogo Mine. It ended the month at over 8,000 acres. A small wildfire temporarily closed the Richardson Highway near Fairbanks at mile 308 on the 9th. The fire was fought vigorously with firefighters and multiple aircraft, and listed as out on the 11th at a total of 15 acres. The fire being close to Birth Lake aided in the fighting efforts.

Skagway had a high temperature of 88°F on the 8th, highest temperature in almost eight years. The warm weather increased snowmelt in the mountains, and the Taiya and Chilkat Rivers were running at bankfull levels over the next two days. Needed rainfall moved over the Interior on the 10th and 11th. Some forty-eight hours totals are: 1.73" at Moose Creek Dam near Fairbanks, 1.57" at Little Chena River, 1.41" at Two Rivers, 1.07" at Salcha and 1.04" near Nenana. The high temperatures in the Interior broke on the 13th, with warnings of possible morning frost in low-lying areas on the 13th through the 15th. On the 14th, a low of 28°F was reported at Goldstream Cre[e]k, 26°F at Angel Creek and 23°F at Upper Salcha River.

The East Fork fire was started by lightning late on the 15th about five miles north of Sterling on the Kenai Peninsula. More than 80 personal and a tanker staffed the fire by the next day, while smoke from the fire blew into Anchorage. The fire burned about 1,000 acres before being brought under control over the next few days.



Lightning strikes plotted across Alaska on June 16th, 2017. A total of 4517 were recorded. Data courtesy of the Alaska Interagency Coordination Center.

Heavy rains impacted the northern Southeast area on the 17th with 3.06" reported at Snettisham, 1.50" at Eaglecrest and 1.22" at Auke Bay. Two to three inches of snow was reported in the Chilkat Pass on the British Columbia side of the border also on the 17th. More than 1,400 electrical customers were without power for a time near Fairbanks on the 17th due to high winds from thunderstorms.

A thunderstorm dropped more than an inch of hail on the town of Eagle on the 23rd, while 0.66" of rain was also reported. A red flag warning was also issued for the eastern Interior on the 23rd and 24th, as well as flash flood warnings for Tanacross area with up to 2.20" of rain reported southeast of Fairbanks. A red flag warning was again issued for the eastern Interior on the 29th, while smoke from the South Fork fire blew into the Fairbanks area again.

By the end of June there had been 165 human caused fires that burned about 6,000 acres and 90 lightning caused fires that had burned about 183,600 acres. The largest fire at 16,800 acres was the Pitka Fork a limited suppression area in the Southwest." (Source: UAF/GI 2017)

DHS&EM's DCI records the following severe weather disaster events. Due to Alaska's geographic size, each event would have impacted locations differently than reported within the respective event summaries.

83. Omega Block Disaster, January 28, 1989 & FEMA declared (DR-00826) on May 10, 1989. *The Governor declared a statewide disaster to provide emergency relief to communities suffering adverse effects of a record breaking cold spell, with temperatures as low as -85 degrees. The State conducted a wide variety of emergency actions, which included: emergency repairs to maintain & prevent damage to water, sewer & electrical*

systems, emergency resupply of essential fuels & food, & DOT/PF support in maintaining access to isolated communities.

Note: *The Disaster Cost Index lists numerous additional disasters events that began from severe weather events; too many to list here.*

The Western Region Climate Center (WRCC) provides a brief description of various features, conditions or relationships that affect Alaska's climate. *(**Note**: maps referenced at this data source are not available for public access: http://prism.nacse.org/normals/special_projects.php)*

Topographic Features

Alaska is the westernmost extension of the North American Continent. Its east-west span covers a distance of 2,000 miles, and from north to south a distance of 1,100 miles. The state's coastline, 33,000 miles in length, is 50 percent longer than that of the conterminous United States. In addition to the Aleutian Islands, hundreds of other islands, mostly undeveloped, are found along the northern coast of the Gulf of Alaska, the Alaska Peninsula, and the Bering Sea Coast. Alaska contains 375 million acres of land and many thousands of lakes…

Permafrost is a major factor in the geography of Alaska. It is defined as a layer of soil at variable depths beneath the surface of the earth in which the temperature has been below freezing continuously from a few several thousands of years. It exists where summer heating fails to penetrate to the base of the layer of frozen ground. Permafrost covers most of the northern third of the state. Discontinuous or isolated patches also exist over the central portions in an overall area covering nearly a third of the state. No permafrost exists in the south-central and southern coastal portions including southeastern Alaska, the Alaska Peninsula, and the Aleutian chain.

Climatic Zones

The geographical features … have a significant effect on Alaska's climate, which falls into five major zones... The climate zones are: (1) a maritime Zone which includes southeastern Alaska, the south coast, and southwestern islands; (2) a maritime continental zone which includes the western portions of Bristol Bay and west-central zones. In this zone the summer temperatures are moderated by the open waters of the Bering Sea, but winter temperatures are more continental in nature due to the presence of sea ice during the coldest months of the year; (3) a transition zone between the maritime and continental zones in the southern portion of the Copper River zone, the Cook Inlet zone, and the northern extremes of the south coast zone; (4) a continental zone make up of the remainders of the Copper River and west-central divisions, and the interior basin; and (5) an artic zone, shown on the map as the arctic drainage division.

Precipitation

In the maritime zone a coastal mountain range coupled with plentiful moisture produces annual precipitation amounts up to 200 inches in the southeastern panhandle, and up to 150 inches along the northern coast of the Gulf of Alaska. Amounts decrease to near 60 inches on the southern side of the Alaska Range in the Alaska Peninsula and Aleutian Island sections. Precipitation amounts decrease rapidly to the north, with an average of 12 inches in the continental zone and less than 6 inches in the arctic region.

Snowfall makes up a large portion of the total annual precipitation. For example, Yakutat averages 216 inches of snow annually and has a total annual precipitation (rain plus water equivalent of snow) of about 130 inches. Along the arctic slope, Barrow receives an average of 29 inches of snow annually and a total annual precipitation of slightly

more than 4 inches. Total snow depths on the ground are controlled by the temperature of an area. Fortunately, most of the areas of heavy snow have relatively mild temperatures which prevent total depths from becoming excessive. Present-day snow removal equipment is able to keep highways and airports operational.

Precipitation extremes are of interest. With reference to total amounts (both rain and snow) and based on existing records, the greatest annual precipitation occurred at MacLeod Harbor on Montague Island in the Gulf of Alaska with 332.29 inches in 1976. This station also holds the record for monthly totals with 70.99 inches in November 1976.

The record maximum for 24 hours occurred on December 29, 1955, in the city of Cordova (North Gulf of Alaska coast) with a measured amount of 14.13 inches. Snowfall extremes are all credited to a station at Thompson Pass, which is on the highway north of Valdez. The record measurements are: season (1952-53) 974.5 inches; month (February 1953) 298 inches; and 24-hour (December 1955) 62 inches.

Temperature

Mean annual temperatures in Alaska range from the low 40's under the maritime influence in the south to a chilly 10 degrees along the Arctic Slope north of the Brooks Mountain Range. The greatest seasonal temperature contrast between seasons is found in the central and eastern portion of the continental interior. In this area summer heating produces average maximum temperatures in the upper 70's with extreme readings in the 90's. The highest recorded temperature for the state is 100 degrees at Fort Yukon in June 1915. In winter the lack of sunshine permits radiation to lower temperatures to the minus 50's and occasionally colder for two or three weeks at a time. Average winter minimums in this area are 20 to 30 degrees below zero. The coldest temperature ever recorded in Alaska was minus 80 degrees at Prospect Creek on January 23, 1971.

Elsewhere in the state, temperature contrasts are much more moderate. In the maritime zone the summer to winter range of average temperatures in from near 60 to the 20's. In the transition zone, temperatures range from the low 60's to near zero; in the maritime-continental zones the range is from the low 60's to 10 below zero. The arctic slopes has a range extending form the upper 40's to 20 below zero.

Winter temperatures play a principal role in the flow of most of Alaska's rivers. Usually beginning in late October and extending into May (and sometimes early June for the northernmost steams), thick layers of ice form, permitting passage with all types of heavy equipment. In many areas construction work and oil exploration is done in winter because both the ground and the streams are frozen hard enough from the use of the heaviest of equipment. Several rivers cease to flow completely during the coldest months.

Wind

A normal storm track along the Aleutian Island chain, the Alaska Peninsula, and all of the coastal area of the Gulf of Alaska exposes these parts of the state to a large majority of the storms crossing the North Pacific, resulting in a variety of wind problems. Direct exposure results in the frequent occurrence of winds in excess of 50 mph during all but the summer months. Shemya, on the western end of the Aleutian Islands, has experienced winds on an estimated 139 mph (estimated because the wind recorder pen could only record up to 128 mph). Wind velocities approaching 100 mph are not common but do occur, usually associated with mountainous terrain and narrow passes. For years, strong winds have taken their toll of both merchant and fishing vessels.

An occasional storm will either develop in or move into the Bering Sea then move north or northeastward, creating strong winds along the western coastal area. Because of the

low flat ground in many places along the coast, these winds will cause flooding during the time the winds are blowing onshore. Winter storms moving eastward across the southern Arctic Ocean cause winds of 50 mph or higher along the arctic coast. Except for local strong wind conditions, winds are generally light in the interior sections.

Strong winds, or in fact any wind occurring in the areas of extreme winter cold, create a definite hazard to personnel exposed for even brief periods of time. For example, (using a wind chill chart developed by the U.S. Army) a temperature of a -13°F and an accompanying wind of 15 mph equals conditions that would be experienced with a temperature of -49°F and no wind. If the temperature is a -49°F and the winds 10 mph, the resulting equivalent temperature is -81°F.

Climate and the Economy

Timber

Wooded areas in the state total approximately 100 million acres of both commercial and non-commercial timber. Southeastern Alaska is and always has been the principal production area. Lumber and pulp mills are important contributors to the economy of that portion of the state. In south-central Alaska high, barren mountains and numerous glaciers limit the forests to about 10 to 20 percent of the total area. Some commercial logging has occurred in the Tyonek area on the northwest shore of Cook Inlet and in the Matanuska-Susitna Valley. Some forested land exists in the central interior and southwestern portions along major rivers like the Yukon and the Kuskokwim but, to date, has not been developed commercially. No commercial timber is found north of the Brooks Range or along the western coastal region. Western interior forested areas are limited to small isolated patches without permafrost.

Farming

It is estimated that statewide there are 18 to 20 million acres of land potentially suitable for cropland, but less than 20 thousand acres are actually under or have been under cultivation. The largest acreages are devoted to grass crops for hay, silage, and pasture. Rangelands are widespread in the Alaska mainland. Wild caribou herds foraging on portions of these lands have numbered in the hundreds of thousands and are an important source of protein in many Alaska villages. Cattle and sheep are raised in areas of the Kenai Peninsula, the Alaska Peninsula, and the Aleutian Islands, and small herds of reindeer are raised on the tundra lands of the Seaward Peninsula. Vegetable crops, especially potatoes, are also important, and limited mild production in the Matanuska Valley north of Anchorage and the Tanana Valley near Fairbanks provide fresh dairy products to local residents. Within the agricultural areas the growing season averages 80 to 110 days each year. This is a short growing season, but the daily potential of 16 to 19 hours of sunshine each day produces some of the finest and largest vegetables grown anywhere.

Mineral

Oil is by far the most important mineral product at this time. Current commercial production is at Prudhoe Bay, the Kenai Peninsula, and offshore Cook Inlet. Production from the Prudhoe Bay field is now at 750,000 barrels per day and is projected to reach 1.2 million barrels per day by the end of 1978. The trans-Alaska pipeline, completed in 1977, transports this crude petroleum from the Prudhoe Bay field on the North Slope of Alaska to a refinery at North Pole and to Valdez, a deepwater port in the northern Gulf of Alaska. The petroleum is then moved by oceangoing tankers to refineries in Alaska and the contiguous 48 states. Exploration for additional petroleum is in progress in several

land areas and on the outer continental shelf from the Gulf of Alaska to the Beaufort Sea coast. Commercial gas wells are producing in the Barrow area and the Kenai Peninsula, and a large pipeline is expected to be built in the next 5 to 10 years to transport Prudhoe Bay gas to the lower 48 states.

Coal is mined in the Healy area, and several other large deposits have been located but are not commercially mined. Gold mining has resumed in the vicinity of Nome, bornite is mined in the vicinity of Kobuk, and platinum of the Bering Sea coast. All other types of mining are of a minor nature but are expected to develop as problems of transportation and production costs are solved.

Fishing

The fishing industry, which includes the taking of crab and shrimp, is another leading industry in Alaska. Commercial fishing occurs along the entire Alaska coast but is heaviest in the southeastern Bering Sea, along the Aleutian Islands, and around the coast of the Gulf of Alaska. Salmon have been the main product, but shellfish, particularly ding and tanner crab and shrimp, are becoming more important. A new fishery for bottom fish is emerging with the implementation of the U.S. zone of extended jurisdiction within 200 miles of the coast. Halibut have also long been an important part of the harvest. In recent years, at least one Alaskan port has been listed among the top 10 U.S. ports in terms of both pounds of fisheries products landed and total economic value of the landings.

Tourism

Out-of-state visitors have been increasing in number each year. Because of the airplane, tourism extends into nearly every part of the state. This is particularly true if game hunting is included. Hunting for bear, caribou, moose, and sheep draws hundreds of people to the state each year and contributes many thousands of dollars to the economy" Source: WRCC, 2018 https://wrcc.dri.edu/Climate/narrative_ak.php.

The WRCC also provides specific Alaska community or area centric climate summaries for (Figure 6-85). They can be accessed at: https://wrcc.dri.edu/summary/climsmak.html.

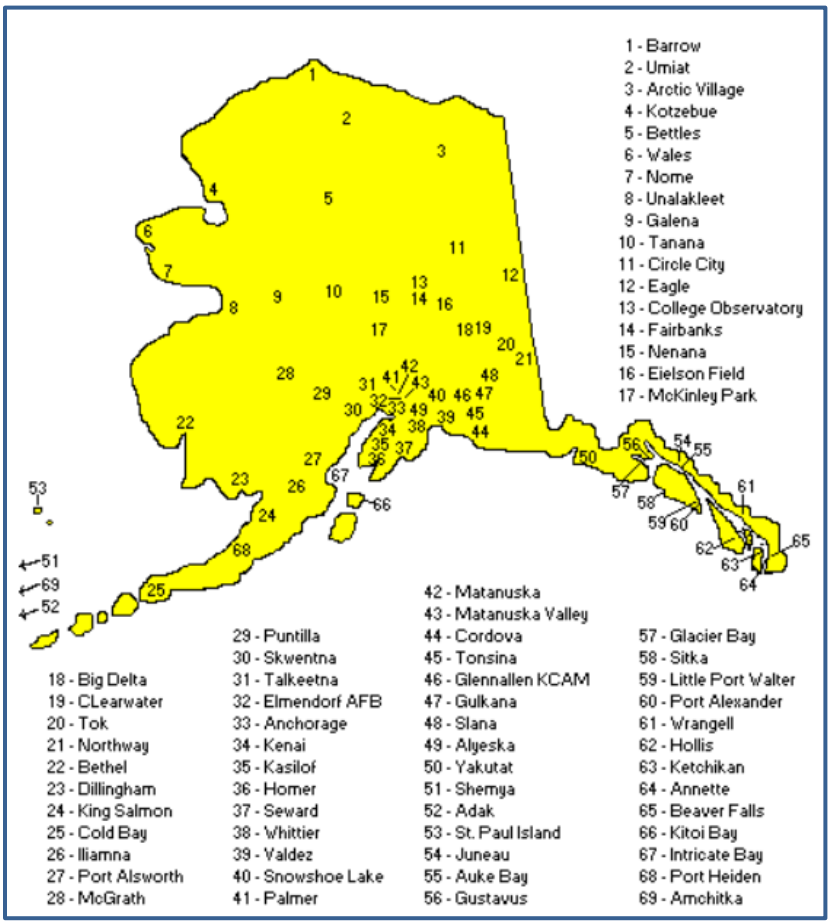


Figure 6-85 WRCC Climate Summaries for Alaska Communities
Source: WRCC 2018

The Alaska Geospatial Data Clearinghouse (AGDC) and the Spatial Climate Analysis Service (ACAS) describe the state's locational severe weather event differences (Figure 6-86).

> *Maximum seasonal differences (mean January-mean July) in surface temperature occur in central Alaska and adjacent areas of Canada, while minimum seasonal differences occur in southeast Alaska, in a narrow coastal region around much of the state, and throughout the Aleutian Islands... For precipitation, positive seasonal differences occur in southeast Alaska... The coasts of south-central Alaska and the Aleutian Islands (especially the outer islands) also have some positive seasonal differences, but these are generally smaller than those in southeast Alaska. Maximum negative differences occur in some northern portions of south-central Alaska, in interior Alaska, and in adjacent areas of Canada. This annual variation is determined by the seasonal cooling and warming of the interior while coastal variability is moderated by the oceans. Again, the black overlay in Figure 6 was applied after the differencing between modeled data sets was performed…*
>
> *Annual (12 month) mean monthly surface temperatures (°C) were computed for the AGDC and the SCAS data sets (Fig. 8a, b). Maxima occur in the coastal regions of southeastern and south-central Alaska, the Alaska Peninsula and along the Aleutian Islands. Minima occur in the mountains (Alaska Range, Chugach Mountains, and*

Wrangell-St. Elias Mountains) of south-central Alaska, northern Alaska (Brooks Range and North Slope), and adjacent areas of Canada. Mean monthly statewide temperatures at each time step (Fig. 8c) show an annual cycle with a high in July and a low in January. Monthly mean temperature differences (AGDC – SCAS) are relatively small compared to the dynamic range of Alaskan surface temperatures (Fig. 8d).

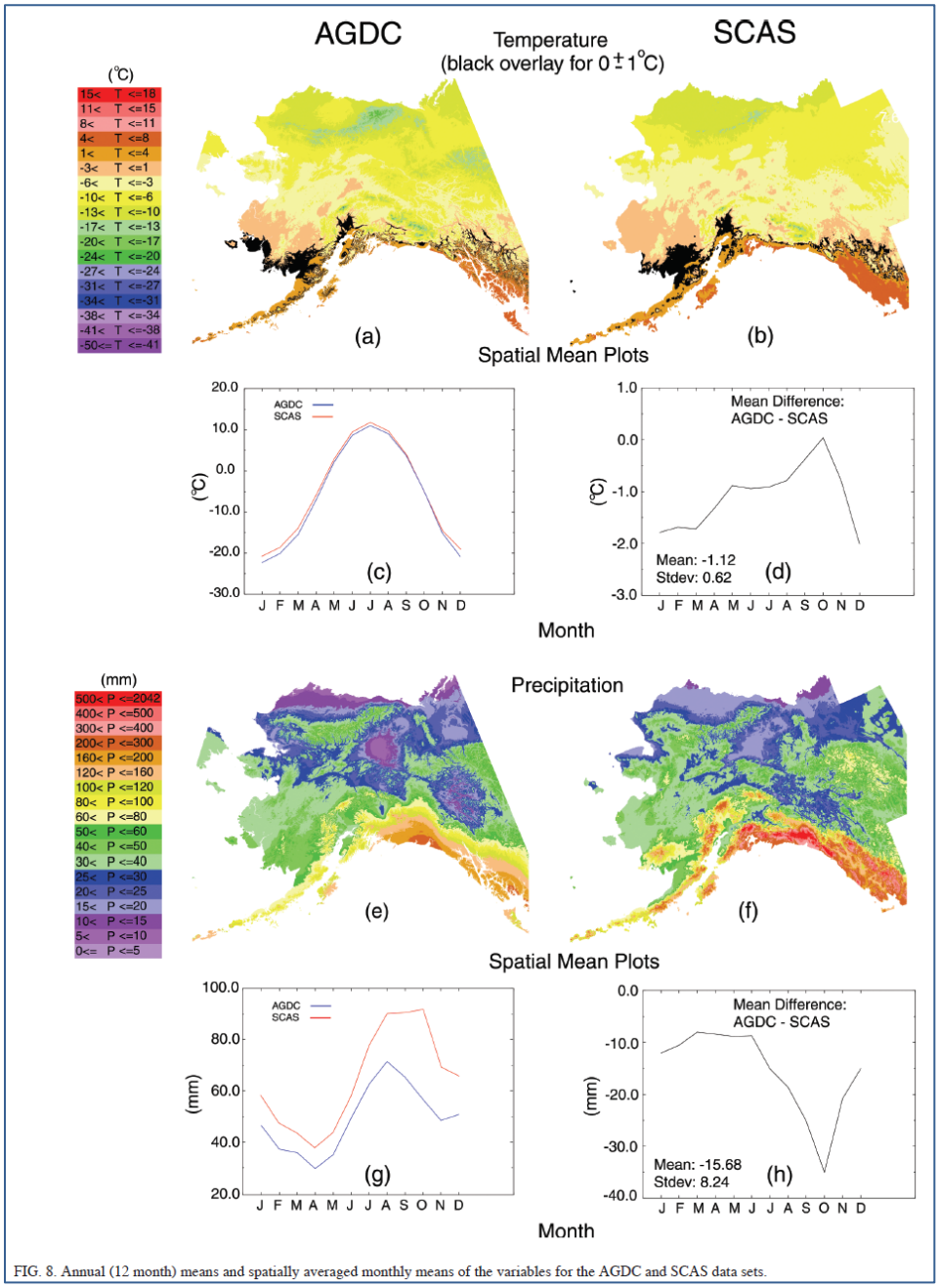


Figure 6-86 Alaska Seasonal Temperature and Precipitation by Location

Source: AGDC and ACAS 2004:
https://www.researchgate.net/publication/228668828_Comparing_Maps_of_Mean_Monthly_Surface_Temperature_and_Precipitation_for_Alaska_and_Adjacent_Areas_of_Canada_Produced_by_Two_Different_Methods?_sg=n1lHQ1Hb2S0-hLanl5_cRbcR7geqGKZ6Sqyu63LVoXYZ0lN_r5Og_5XqiMMRDrsHkG2HRnU29w

6.7.3. LOCATION, EXTENT, IMPACT, AND RECURRENCE PROBABILITY

Location

The state experiences periodic severe weather impacts. The most common are heavy rain, sleet, and icing; along with high winds, extreme cold or heat, drought, and winter storms.

Extent

All of Alaska is vulnerable to the severe weather effects. Each location experiences diverse affects to severe storm conditions, snow depths, wind speeds, and extreme temperature ranges.

Impact

The intensity, location, and topography influence severe weather event impacts. Hurricane force winds, rain, snow, and storm surge can be expected to impact the entire area.

Extreme weather events such as , rain, snow, wind or a combinations of these conditions is transportation become immobilization (e.g., all transportation: air, boat, road; even snow machine, and ATV traffic stops). Impacts can range from unfortunate to catastrophic. Essential supply deliveries, emergency response, medical transport, and critical subsistence activities cannot resume until the weather clears and populations can move about safely.

Heavy snow accumulations can cause roof collapse and knock down trees and power lines. Heavy snow can also damage light aircraft and sink small boats. A quick thaw after a heavy snow can cause substantial flooding. Snow removal, damage repairs, and business disruptions can have severe economic impacts to individuals, villages, and cities.

Weather injuries and deaths usually occur from vehicle and/or snow machine accidents as well as overexertion and hypothermia caused by overexposure to severe weather events.

Aircraft may be grounded due to extreme cold and ice fog conditions, cutting off access and delaying community supply deliveries. Long cold spells can cause rivers to freeze, disrupt shipping, and increase the likelihood of ice jams and associated flooding or overflow threats.

Extreme weather interferes with community infrastructure and its proper functions. It can cause fuel to congeal in storage tanks and supply lines and stop electric power generation, which in-turn causes heaters and furnaces to stop and water and sewer pipes to freeze or rupture. If extreme cold conditions are combined with low or no snow cover, the ground's frost depth can increase, disturbing buried pipes. The greatest danger from extreme cold is the effect on people. Prolonged exposure to the cold and high winds can cause frostbite or hypothermia and become life-threatening; infants and elderly people are most susceptible. Carbon monoxide poisoning is also a possible effect as people will use supplemental heating devices not intended for indoor use during extreme weather events.

While the scope, severity, and pace of future climate change impacts are difficult to predict, it is clear that potential changes could affect our agencies' ability to fulfill their respective missions. The challenges posed by climate change, such as more intense storms, frequent heavy precipitation, heat waves, drought, extreme flooding, and higher sea levels could significantly alter the types and magnitudes of hazards faced by communities and the emergency management

professionals serving them. Some specific areas where climate change could influence response, recovery, and mitigation are:

- Coastal regions, which are becoming increasingly populated and developed. More frequent severe storms may increase the necessity of increased emergency services and associated response and recovery capacity.
- Critical infrastructure resiliency is necessary to ensure operational continuity service delivery is essential and may experience task priority challenges.

Recurrence Probability

Alaska will continue to experience diverse and seasonal severe weather events. The state has a 1 in 1 year (1/1=100 percent) chance for severe weather to occur within any given year.

6.8. WILDLAND FIRE AND COMMUNITY FIRE CONFLAGRATION

While a part of the natural ecosystem, fires in Alaska are a dangerous hazard when they involve local communities. During the five year period spanning 2013 through 2018, over 82 fire-related fatalities were recorded in Alaska. Since 2013, the State has declared over 3,077 fire related emergencies or disasters.

For the purposes of profiling the hazard in Alaska, fires in this section are characterized by their primary fuel source into two categories:

- Wildland fire, which consumes natural vegetation.
- Community fire conflagration, which propagates among structures and infrastructure.

Fire is a natural wildland management force in the Alaskan Interior. It is a key environmental factor in cold-dominated ecosystems. Without fire, organic matter accumulates, the permafrost table rises, and ecosystem productivity declines. Fire rejuvenates an ecosystem by removing decaying matter and returning their nutrients to the soil, preserving vegetative diversity and wildlife habitat unique to Alaska. In the absence of wildland fires, many plant and animal species would no longer thrive.

While fire is critical for maintaining the viability of Alaska's ecosystems, it must be tempered with the need to protect human life and property. This is particularly true of fires burning in "wildland urban interface" areas, where structures and other human development meet or intermingle with undeveloped wildland. Wildland urban interface (WUI) has gained importance throughout Alaska with increased development adjacent to wild lands.

Firefighter and public safety is the primary concern of each local and wildland response agency. In Alaska, thousands of acres burn every year in 300 to 800 fires primarily between the months of March and October. According to the Alaska Interagency Coordination Center (AICC), Alaska lost 7,815,367.8 acres from 2013 through 2017. This figure consisted of the 2,408 wildland fires that started throughout that same time period. This is an average of 3,246 acres per wildland fire.

6.8.1. MANAGEMENT IN ALASKA

Wildland fire management in Alaska is a joint effort among federal, state, local, and tribal governments, native organizations, local fire departments, communities, and landowners. The land management agencies, also known as jurisdictional agencies, have the overall land and resource management responsibilities as provided by federal, state or local law.

The "Alaska Master Cooperative Wildland Fire Management and Stafford Act Response Agreement," Exhibit C, found in the "2018 Alaska Statewide Annual Operating Plan," provides essential agency coordination information. Table 2 within the plan lists statewide fire dispatch centers demonstrating their commitment to effective firefighting resource allocation and coordination (Figure 6-87) throughout the state.

Table 2: Alaska Dispatch Centers

Dispatch Center	*Location*	*Managing Agency*
Alaska Interagency Coordination Center	Fort Wainwright	BLM/AFS
State Logistics Center	Fairbanks	DNR
Anchorage Interagency Dispatch Center*	Anchorage	BLM
Upper Yukon / Tanana / Military Zone Dispatch Center	Fort Wainwright	BLM/AFS
Galena Zone Dispatch	Galena	BLM/AFS
Delta Area Dispatch	Delta Junction	DNR
Fairbanks Area Dispatch	Fairbanks	DNR
Kenai Interagency Dispatch Center	Soldotna	DNR
Mat-Su Area Dispatch	Palmer	DNR
Southwest (McGrath) Dispatch	McGrath	DNR
Tok Area Dispatch	Tok	DNR
Valdez-Copper River Area Dispatch	Glennallen	DNR
Chugach National Forest Dispatch	Anchorage	USFS
Tongass National Forest Dispatch	Ketchikan	USFS

Figure 6-87 Alaska Fire Dispatch Centers
Source: 2018 Alaska Statewide Annual Operating Plan, Exhibit C

Fire Management Options in Alaska

Prior to the planning efforts in the 1980s, decisions regarding wildland fire management were based upon available resources. In 1988, interagency planners established four fire management options (Critical, Full, Modified and Limited) and defined response priorities for each wildland fire option. Standard responses ranged from aggressive suppression to surveillance. In 1998, the 1988 management option definitions were incorporated into the Alaska Interagency Wildland Fire Management Plan update; the plan guides wildland fire response within Alaska.

Alaska wildland fire suppression agencies have developed and implemented the 2018 Alaska Interagency Wildland Fire Management Plan (http://fire.ak.blm.gov/administration/awfcg.php). The plan establishes response options and priorities. The range of responses provides an opportunity for agencies to achieve both protection and natural resource management goals and objectives, as well as essential fuels and vegetation management resources.

BLM in coordination with the AICC, provides the BLM Alaska Fire Management Plan Interactive Web Maps to support their fire mitigation initiatives. The following maps and associated tools depict Alaska Fire Management Plan components available to guide mitigation planning efforts and initiatives.

Figure 6-88 displays Alaska's wildland fire management options: Critical, Full, Modified, Limited and Unplanned.

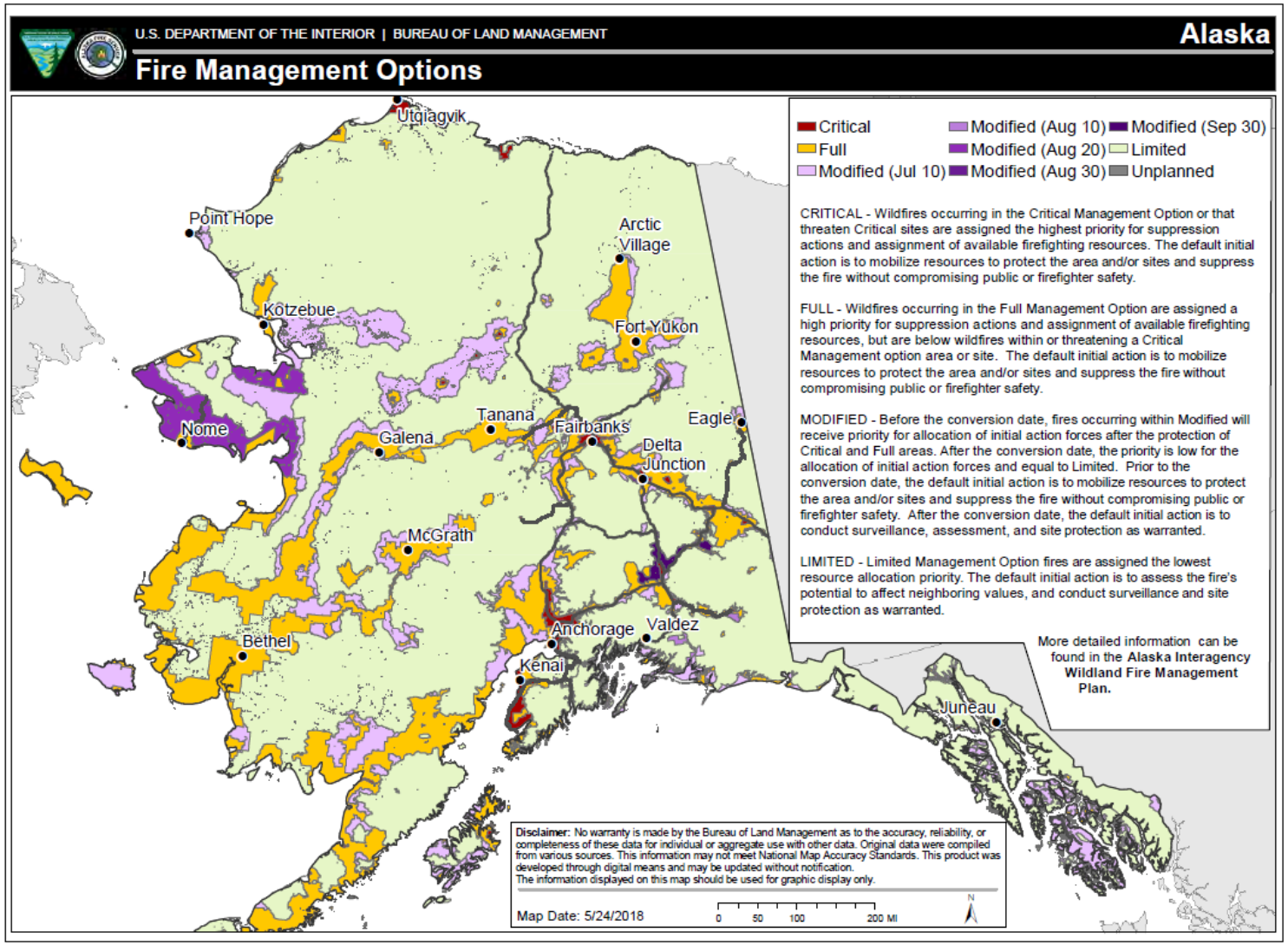


Figure 6-88 Alaska Fire Management Options
Source: AICC, 2018

Figure 6-89 depicts Alaska's 2018 fire management options and responsible jurisdictions.

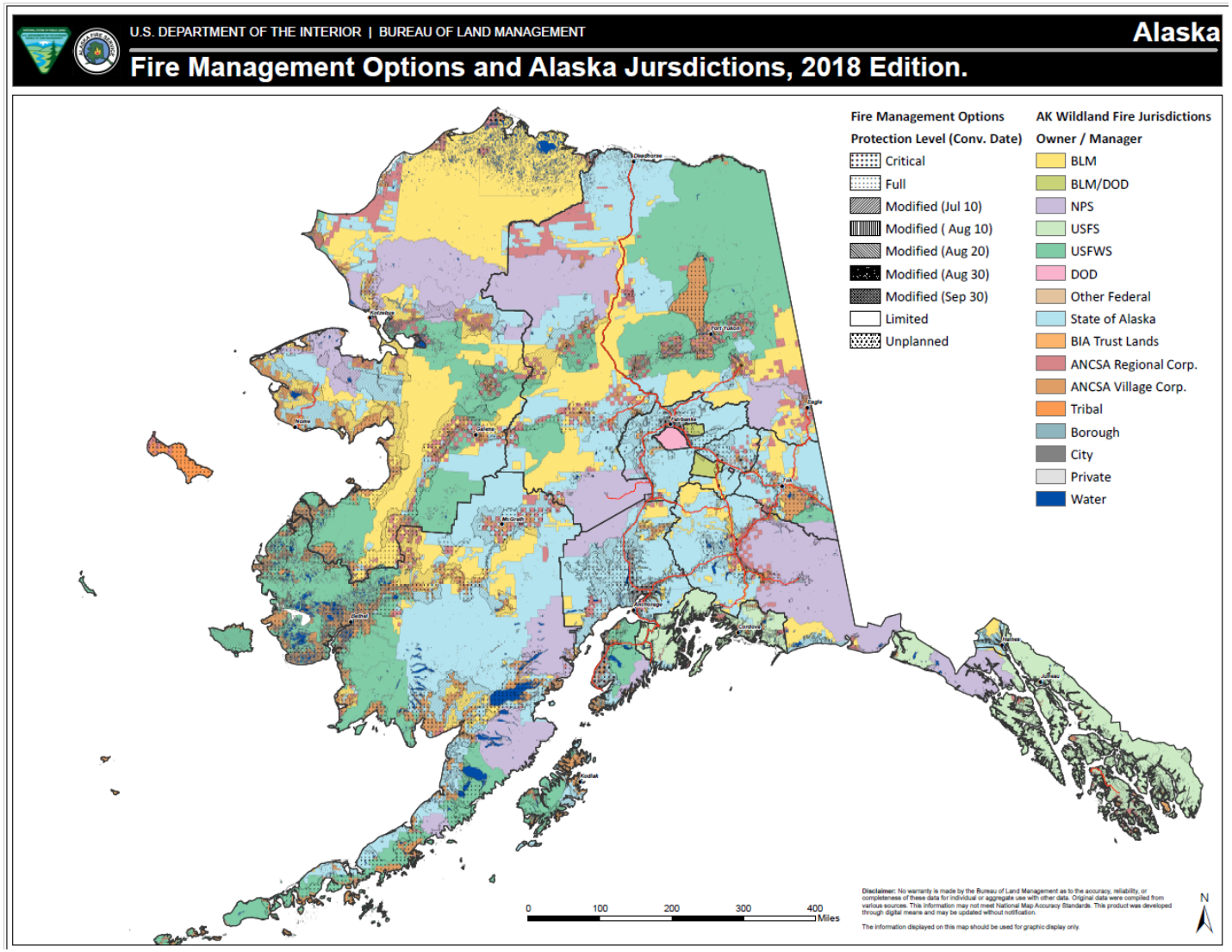


Figure 6-89 Alaska Fire Management Options with Jurisdictional Responsibilities
Source: AICC, 2018

Alaska is divided into three protection areas supported by diverse agencies as specified in the *Alaska Statewide Master Agreement:* (http://fire.ak.blm.gov/administration/asma.php). (Figure 6-90)

- US Department of Agriculture, Forest Service, and National Forest System
- Alaska Department of Natural Resources, Division of Forestry
- U.S. Department of Interior, Bureau of Land Management, and Alaska Fire Service

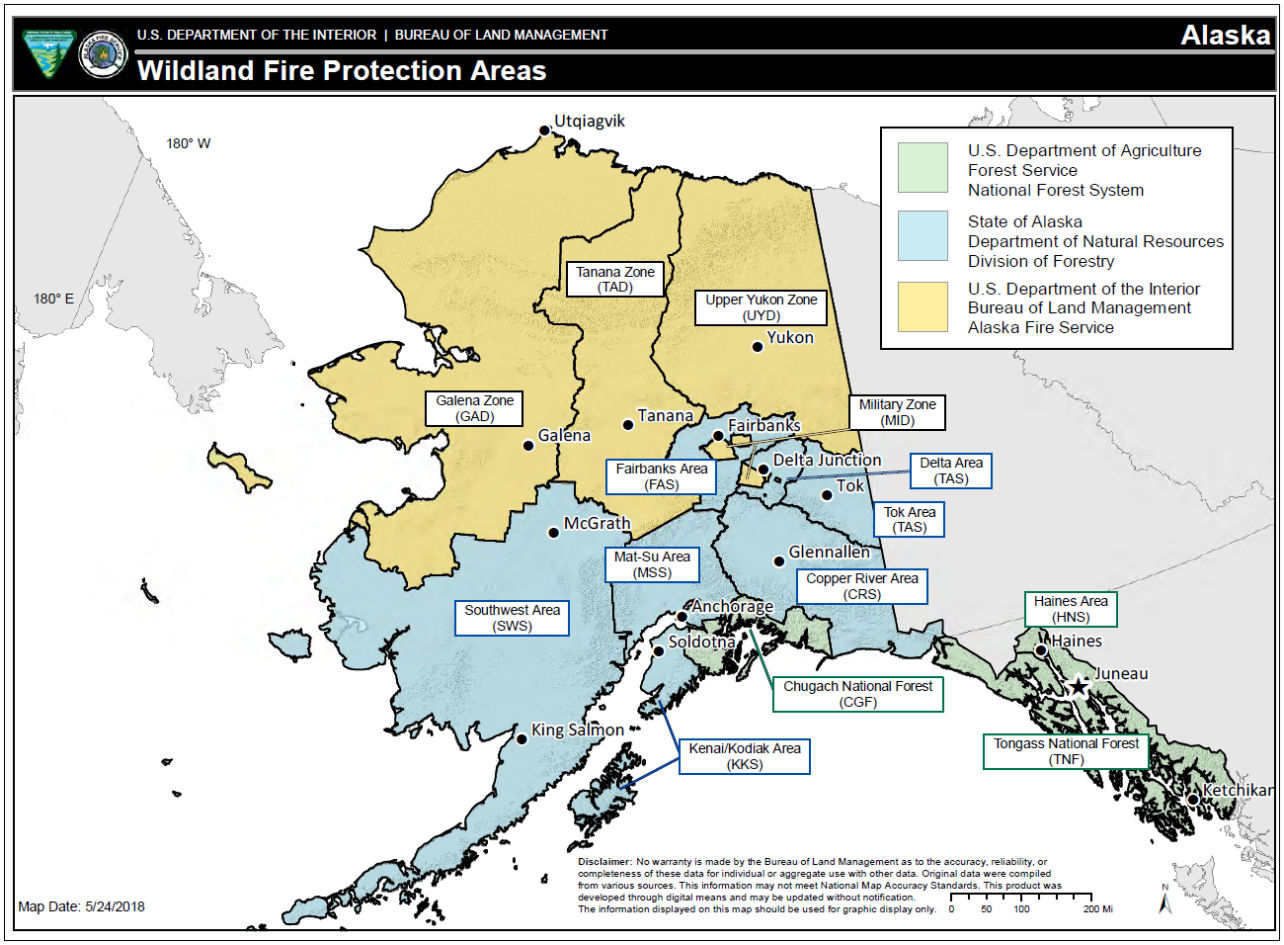


Figure 6-90 Alaska Fire Protection Areas
Source: AICC, 2018

6.8.2. WILDLAND FIRE HAZARD CHARACTERISTICS

A wildland spreads through vegetation consumption. It often begins unnoticed, spreads quickly, and is usually signaled by dense smoke that may be visible from miles around. Wildland fires can be caused by human activities (e.g., such as unattended burns or campfires) or by natural events such as lightning. Wildland fires often occur in forests or other areas with ample vegetation. In addition to wildland fires, wildfires can be classified as tundra fires, urban fires, interface or intermix fires, and prescribed burns.

The following three factors contribute significantly to wildland fire behavior and can be used to identify wildland fire hazard areas.

Topography describes slope increases, which influences the rate of wildland fire spread increases. South-facing slopes are also subject to more solar radiation, making them drier and thereby intensifying wildland fire behavior. However, ridge tops may mark the end of wildland fire spread since fire spreads more slowly or may even be unable to spread downhill.

Fuel is the type and condition of vegetation plays a significant role in the occurrence and spread of wildland fires. Certain types of plants are more susceptible to burning or will burn with greater intensity. Dense or overgrown vegetation increases the amount of combustible material available to fuel the fire (referred to as the “fuel load”). The ratio of living to dead plant matter is also important. Climate change is deemed to increase wildfire risk significantly during periods of prolonged drought as the moisture content of both living and dead plant matter decreases. The fuel load continuity, both horizontally and vertically, is also an important factor.

Weather is the most variable factor affecting wildland fire behavior is weather. Temperature, humidity, wind, and lightning can affect chances for ignition and spread of fire. Extreme weather, (e.g., high temperatures and low humidity) can lead to extreme wildland fire activity. Climate change increases the susceptibility of vegetation to fire due to longer dry seasons. By contrast, cooling and higher humidity often signal reduced wildland fire occurrence and easier containment.

The frequency and severity of wildland fires is also dependent on other hazards, such as lightning, drought, and infestations (e.g., the damage caused by spruce-bark beetle infestations). If not promptly controlled, wildland fires can grow into an emergency or disaster. Even small fires can threaten lives and resources and destroy improved properties; they can also impact transportation corridors and/or infrastructure. In addition to affecting people, wildland fires may severely affect livestock and pets. Such events may require emergency water/food, evacuation, and shelter.

The indirect effects of wildland fires can be catastrophic. In addition to stripping the land of vegetation and destroying forest resources, large, intense fires can harm the soil, waterways, and the land itself. Soil exposed to intense heat may lose its capability to absorb moisture and support life. Exposed soils erode quickly and enhance river and stream siltation, thereby enhancing flood potential, harming aquatic life, and degrading water quality. Lands stripped of vegetation are also subject to increased debris flow hazards.

Climate Factors: According to the Global Climate Change Impacts in the U.S., published in 2009 by the U.S. Global Change Research Program, "Under changing climate conditions, the average area burned per year in Alaska is projected to double by the middle of this century. By

the end of this century, area burned by fire is projected to triple under a moderate greenhouse gas emissions scenario and to quadruple under a higher emissions scenario." Climate Central's most recent assessment of large wildfires in Alaska appears to support that projection (Figure 6-91).

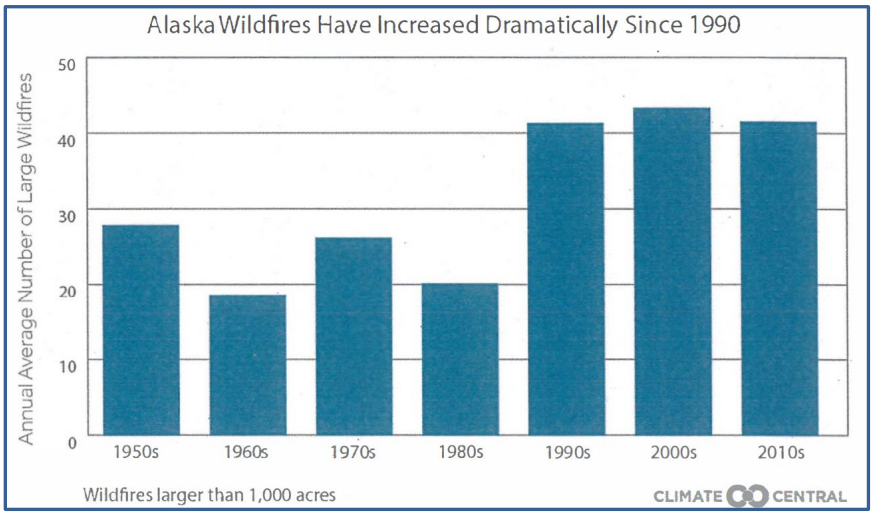


Figure 6-91 Alaska Wildfires Have Increased Dramatically Since 1990
Source: "Age of Alaskan Wildfires", Climate Central, 2015

Since 1990, Alaska has experienced nearly twice the number of wildfires per decade compared to periods 1950 through 1980. Additionally, the sparsely populated Arctic region experienced only three wildfires over 1,000 acres from 1950 to 1970. Since 2000, there have been over 33 large wildfires.

The average duration of the wildfire season in the Arctic region runs May through July. Other regions south of the Arctic, such as southcentral may run late April through mid-September, depending upon weather-related factors. Average annual precipitation in Alaska has increased since 1950, but not quite as much as the average annual temperature (Figures 6-92 and 6-93).

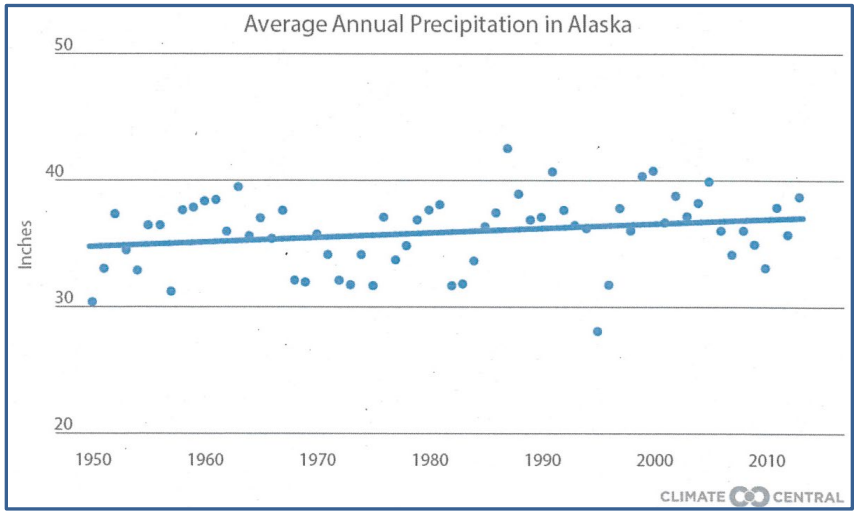


Figure 6-92 Average Summer Precipitation in Arctic Alaska
Source: "Age of Alaskan Wildfires", Climate Central, 2015

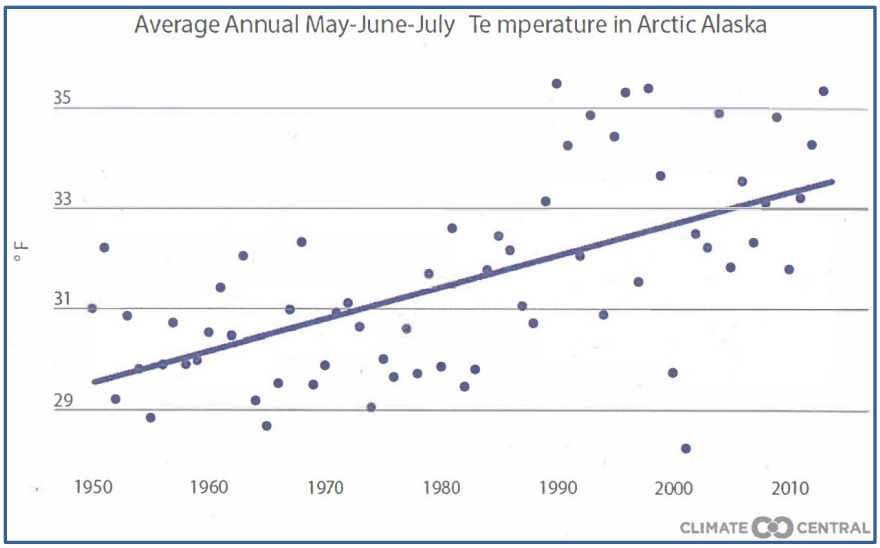


Figure 6-93 Average Summer Temperatures in Arctic Alaska
(Source: "Age of Alaskan Wildfires", Climate Central, 2015)

6.8.3. WILDLAND FIRE HAZARD HISTORY

The Alaska Division of Forestry and the Alaska Fire Service (State Agency Collectively) identified the following human-caused "High Profile Fires." These included the McHugh Creek, Sockeye, Funny River, Hasting, Caribou, and Parks Highway fires (Table 6-8).

Table 6-8 High Profile State Agency Managed Wildfires

Fire Name	Fire Number	Year	Area Burned (Acres)	Location	Forestry Office	Estimated Cost	Residences Destroyed	Outbuildings Destroyed	Buildings Damaged
McHugh Creek	601541	2016	780	MOA	Matanuska Susitna Area (MSA)	6,261,621	--	--	--
Sockeye	501282	2015	7,220	Willow	MSA	7,347,213	55	--	44
Funny River	403140	2014	195,858	KPB	Kenai Kodiak Area (KKA)	14,319,380	--	--	--
Hasting	111271	2011	54,000	FNSB	Fairbanks Area (FAS)	18,476,249	1	1	--
Caribou	703278	2007	56,000	KPB	KKA	7,124,524	88	109	--
Parks Highway	611163	2006	130,000	Nenana	FSA	9,654,725	2	14	--

DHS&EM tracks State and federal disaster declarations within their Disaster Cost Index (DCI). The DCI listed the following fire events that lists affected communities and agencies as applicable within each event (spanning 2013 through present).

AK-15-247 2015 Alatna Washeteria Fire declared by Governor Walker on April 25, 2015: *On the morning of 15 April, 2015, the Multi-Purpose Building in Alatna caught fire in the boiler room. The building houses the water treatment facility, Washeteria, and clinic. The fire was extinguished, but not before it caused substantial damage to the water treatment facility and heating components, rendering both inoperable. The Washeteria and*

clinic sustained substantial smoke damage. Extensive damage to the electrical wiring in the Multi-Purpose Building has been reported and the entire building is without power. Damage to the water treatment facility has cut off the supply of potable water to the village. The cause of the fire is unknown at this time. Currently, village residents are able to drive across the Koyukuk River to Allakaket, five miles away on the other bank, and access potable water and the clinic; however, this option will not be viable for long as break-up is imminent.

AK-15-249 2015 Sockeye Wildfire declared by Governor Walker on June 15, 2015: *Beginning on June 14, 2015 and continuing, a large urban interface wildfire exacerbated by record high temperatures caused widespread damage to the community of Willow and surrounding areas of the Matanuska Susitna Borough. The response to the wildfire is hampered by red flag warnings for record warm temperatures, strong winds, low humidity, and dry thunderstorms this month that affects the entire central portion of the state, including the Matanuska Susitna Borough. The wildfire has damaged or destroyed at least 50 private homes and/or secondary structures and damaged several more, and resulted in 175 residents seeking refuge in temporary shelters, although these numbers are expected to rise. The following conditions exist as a result of this disaster: a robust emergency response and management operation requiring substantial additional labor, equipment, and support costs to combat the fire; activation of the emergency operations center; damage or destruction of at least 50 homes and other structures; evacuation and sheltering of 175 residents and hundreds of pets/work animals to date; severe damage to personal and real property; disruption of power, natural gas, communications, and other utility infrastructure requiring temporary and permanent repairs. A federal Fire Management Grant (FMAG) has been authorized to assist in the cost of suppression.*

AK-15-250 2015 Kenai Wildfire declared by Governor Walker on June 19, 2015: *Beginning on June 15, 2015 a series of wildfires have occurred in the Kenai Peninsula Borough as a result of prolonged hot, dry weather and human error. The most significant of these is the Card Street Wildfire which began on June 15 and damaged 11 buildings in Sterling, including 3 primary residences. The fire moved away from residences into the Kenai Wildlife Refuge... The Alaska Division of Forestry, local firefighters, and national wildland firefighter teams are currently working to gain control of the Card Street fire and numerous other fires within the Borough. A federal Fire Management Grant (FMAG) has been authorized to assist in the cost of suppression. The SEOC has been fully activated to support firefighting efforts. In addition, the AK National Guard and DOD are providing fire suppression support with troop and resource deployments as well as supporting SEOC operations.*

AK-15-251 2015 Summer Alaska Wildfires *Beginning on June 14, 2015 and continuing, wildland fires have impacted multiple communities throughout the state requiring emergency response, evacuations, and sheltering. Due to ongoing fire growth and new fire starts, the number of communities that will be impacted or threatened and the extent of community fire damage is unknown. Current and forecasted weather including warm temperatures, strong winds, low humidity, and dry thunderstorms indicate a continued wildland fire threat to the state. The following conditions exist as a result of this disaster: a robust emergency response and management operation requiring substantial additional labor, equipment, and support costs to combat the fire; activation of the emergency operations center; evacuation and sheltering of over 200 residents from five different communities.*

AK-16-259 2016 Kotlik Fire Disaster declared by Governor Walker on October 4, 2016: *On August 18, 2016, a structural fire destroyed the old school facility and several nearby buildings in the Lower Yukon River community of Kotlik. Since construction of a new school in Kotlik in 2003, the old school was boarded up and utilities shut off to preserve it for future use. The fire also destroyed: a small city building used by the Native Village of Hamilton as their tribal office; a 100-foot section of boardwalk; and the teacher housing, a generator building, and two storage buildings owned by the Lower Yukon School District (LYSD).*

The City of Kotlik Local Government submitted a local Disaster Declaration with Request for State Assistance, dated September 9, 2016 which was received by the DHS&EM on September 12, 2016. In their declaration, the City of Kotlik specifically requested disaster relief for debris removal/clean up, technical assistance and funding to reconstruct the City gymnasium, public disaster assistance for emergency protective measures, temporary and permanent repairs to school water and sewer pipe lines and electrical systems. (DHSEM)

The State Division of Forestry provided the following details for the Kodiak Twin Creek Fire that started on August 27, 2015 (Figure 6-94):

The Twin Creeks Fire, also known locally as the Chiniak Fire, started near the Kodiak Island community of Chiniak on Thursday evening, August 27. overnight and the next day strong winds quickly spread this fire through 5,000 acres of grass, timber and logging slash on Leisnoi, Incorporated lands. The Chiniak Library, at last one homne, and a cabin was destroyed by the fire.

Figure 6-94 Twin Creek Fire
Source: DOF, Kodiak, AK 2015

The Twin Creek Fire involved a large portion of the island, threatening the entire Chiniak Community as depicted in Figure 6-95.

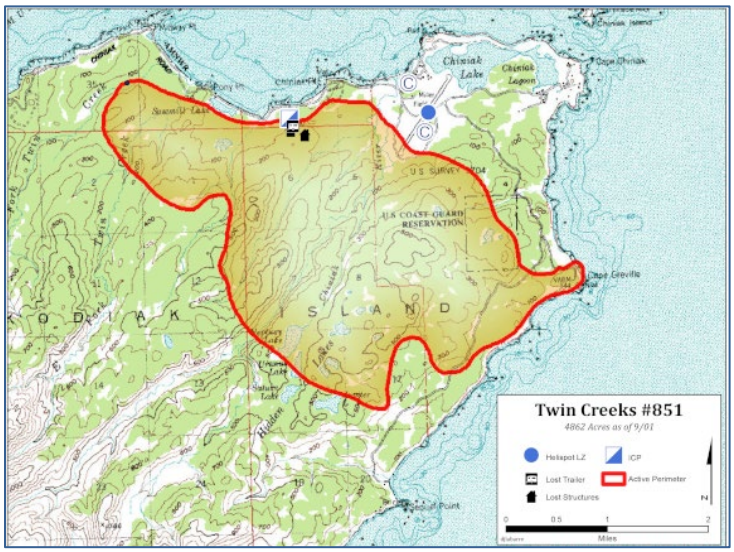


Figure 6-95 Twin Creek Fire Perimeter Map
Source: DOF 2015

The Alaska Interagency Coordination Center (AICC) identified wildland fires that occurred throughout Alaska since 1939 are displayed in Figure 6-96. The dataset is comprehensive the exact number and not pertinent to the SHMP update.

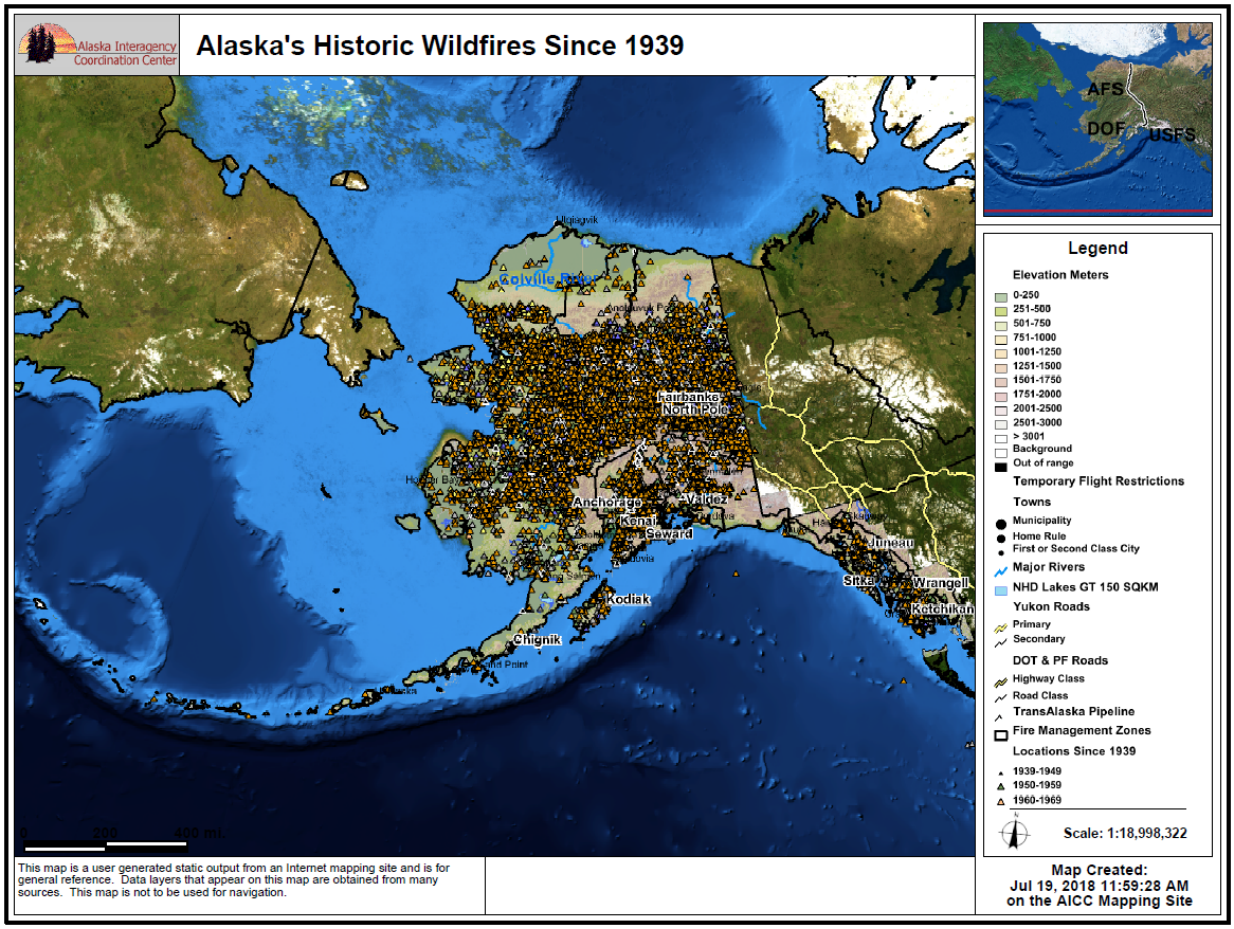


Figure 6-96 Alaska's Historic Wildfire Locations
Source: AICC, 2018

The Alaska Interagency Coordination Center (AICC) identified 3,077 wildland fires with 82 associated deaths (most deaths occurred in structure fires, with a few from wildfires) that have occurred throughout Alaska since the legacy 2013 SHMP was implemented. Table 6-9 lists the number of fires that occurred annually, acres burned, and the approximate total costs.

Table 6-9 Alaska's Annual Wildfire Count Since 2013

Fire Year	Total	Acres Burned	Total Cost ($)
2018 (Jan-July)	354	433,925	
2017	362	653,148	$20,969,348.78
2016	579	496,603	$29,245,707.86
2015	771	5,146,541	$134,652,246.69
2014	392	233,530	$31,359,448.89
2013	619	1,320,978	$77,124,691.41
Total	**3,077**	**8,284,724**	**$293,351,443.64**

Source: AICC 2018

Table 6-10 lists the costs from the Feds vs State perspective.

Table 6-10 Actual Federal / State Cost Sharing from Table 6-12

Federal Costs	State Costs
$158,137,761	$135,213,682

Source: DOF 2018

The Alaska Department of Forestry (DOF) and the Alaska Forest Service (AFS) identified 3,077 wildland fires that occurred throughout Alaska spanning 2013 through 2017. DOF, AFS, and the USFS protect land for a variety of owners. Table 6-11 data identifies number of fires by landowner and their approximate costs, but it does not provide acres burned, or their respective causes.

Table 6-11 Wildfires not Identified by AICC Due to Land Ownership

Owner	Number (#) Fires	Approximate Fire # Percentage (%)	Fire Cost/ Agency ($)	Fire Percentage/ Agency (%)
ANCSA	381	12%	$84,786,034	29%
BIA	18	1%	$7,179,039	2%
BLM	229	7%	$16,333,027	6%
BOROUGH	81	3%	$4,412,717	2%
CITY	56	2%	$116,030	0%
DOD	200	6%	$40,300,334	14%
NPS	99	3%	$3,105,843	1%
PRIVATE	895	29%	$17,708,827	6%
STATE	788	26%	$87,292,119	30%
USFS	60	2%	$1,897,513	1%
USFWS	270	9%	$30,219,960	10%
Totals	**3077**	**100%**	**$293,351,444**	**100%**

6.8.4. LOCATION, EXTENT, IMPACT, AND RECURRENCE PROBABILITY

Location

Wildland fires may occur anywhere in Alaska when weather, fuel availability, topography, and ignition sources combine to form the most favorable wildland fire conditions. All of Alaska is considered to be vulnerable to wildland fire which includes various vegetation such as grasses and tundra. Since 2013, 3,077 wildland fire events (Table 6-11) have occurred within Alaska.

Figure 6-97 displays Alaska wildland fire locations since the legacy 2013 SHMP was implemented.

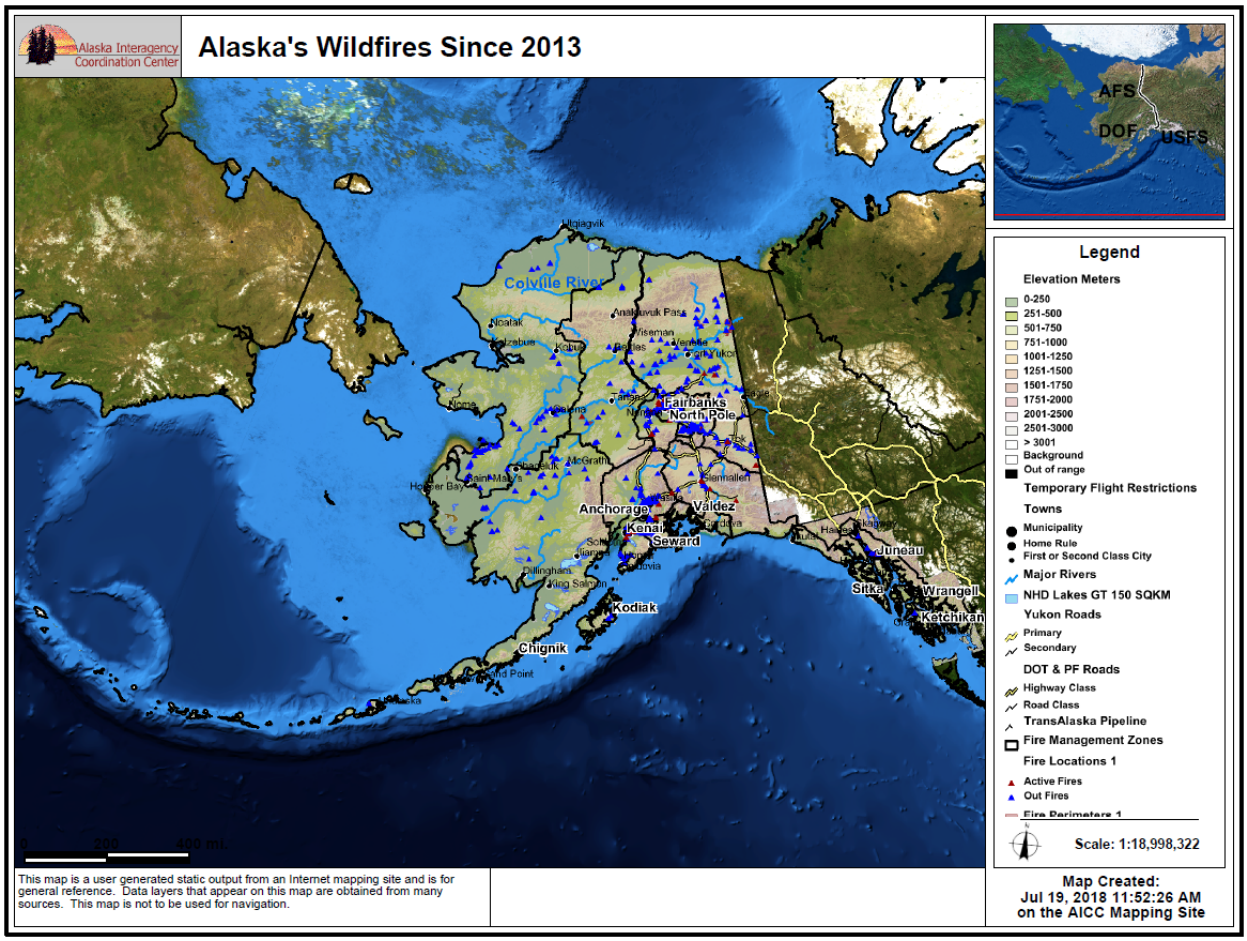
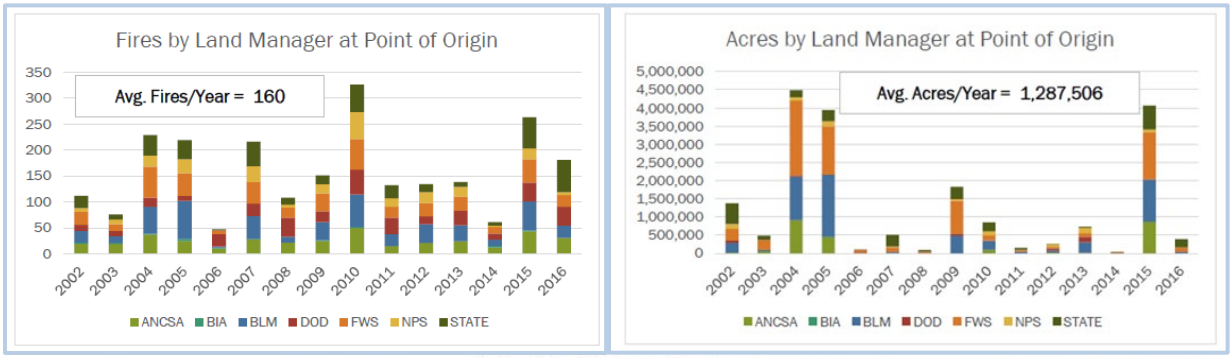


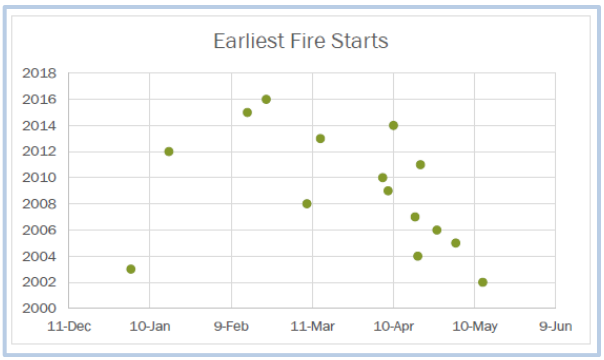
Figure 6-97 Alaska's Historic Wildfire Locations Since 2013
Source: AICC 2018

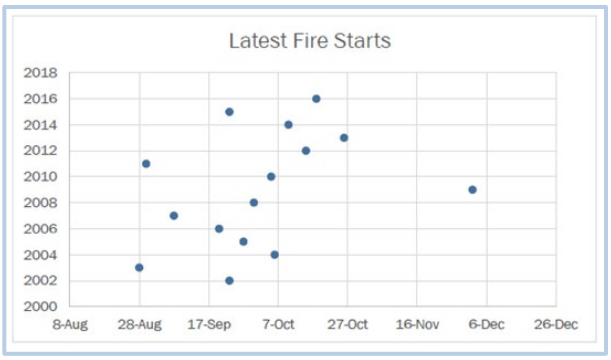
Figures 6-98 (includes the following 12 charts) displays the AFS's seasonal wildland fire threat statistics.

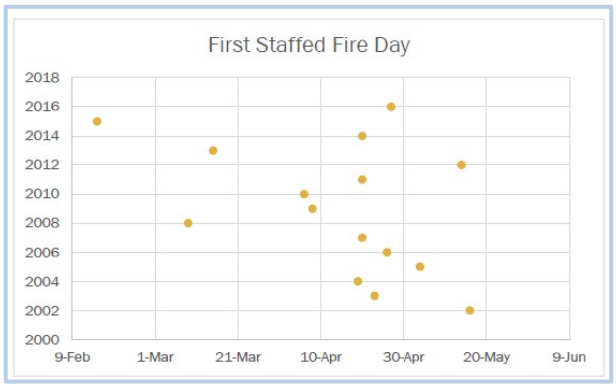


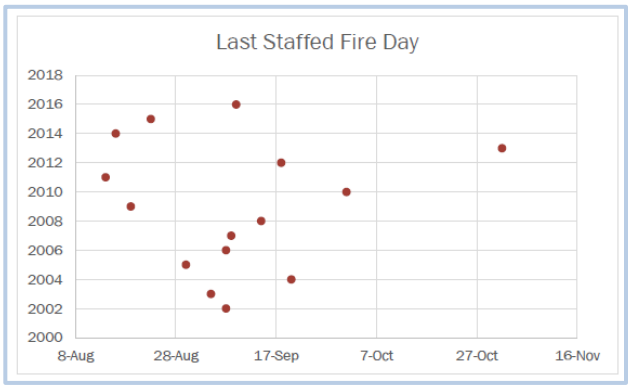
Acres Protected by Land Manager

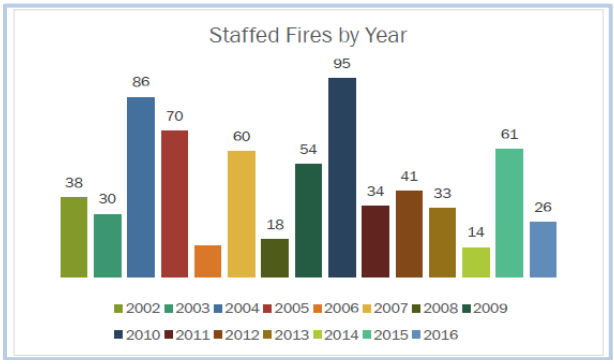
ANCSA	23,577,576	12%	BIA	514,727	0%	BLM	58,409,573	31%	DOD	1,606,865	1%
NPS	26,163,254	14%	OTHER FED	827	0%	PRIVATE	55,485	0%	STATE	34,617,104	18%
USFWS	46,139,307	24%									

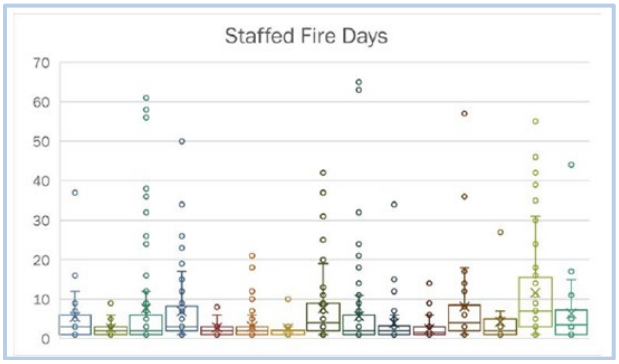

Earliest Fire Starts
2018
2016
2014
2012
2010
2008
2006
2004
2002
2000
11-Dec
10-Jan
9-Feb
11-Mar
10-Apr
10-May
9-Jun

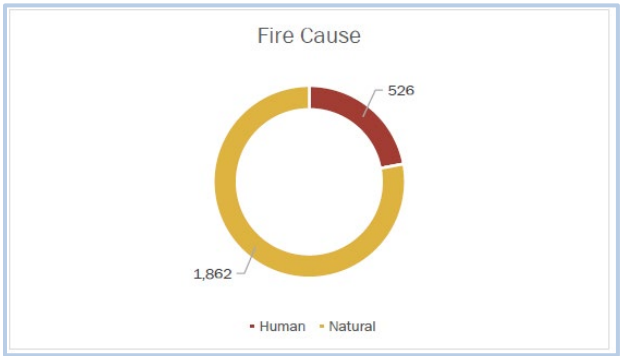

Latest Fire Starts
2018
2016
2014
2012
2010
2008
2006
2004
2002
2000
8-Aug
28-Aug
17-Sep
7-Oct
27-Oct
16-Nov
6-Dec
26-Dec

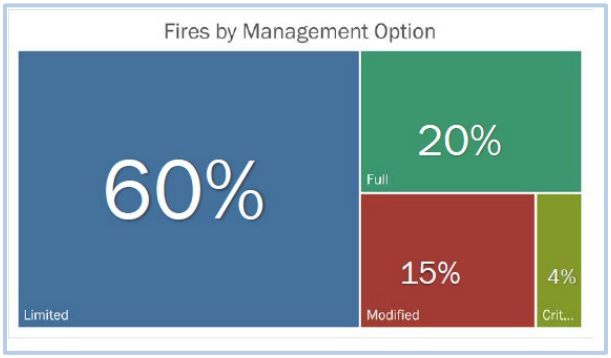

First Staffed Fire Day
2018
2016
2014
2012
2010
2008
2006
2004
2002
2000
9-Feb
1-Mar
21-Mar
10-Apr
30-Apr
20-May
9-Jun

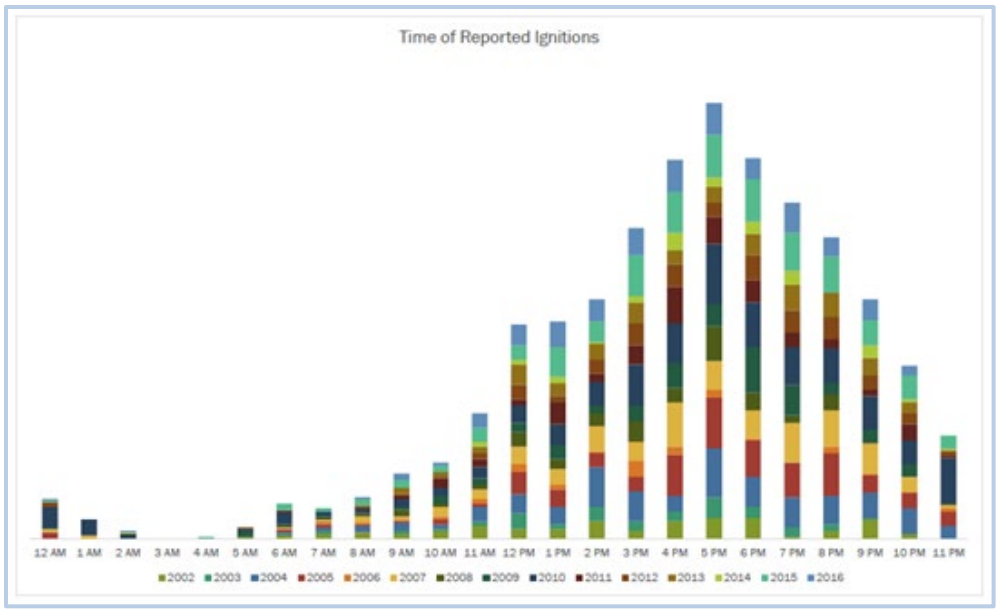

Last Staffed Fire Day
2018
2016
2014
2012
2010
2008
2006
2004
2002
2000
8-Aug
28-Aug
17-Sep
7-Oct
27-Oct
16-Nov

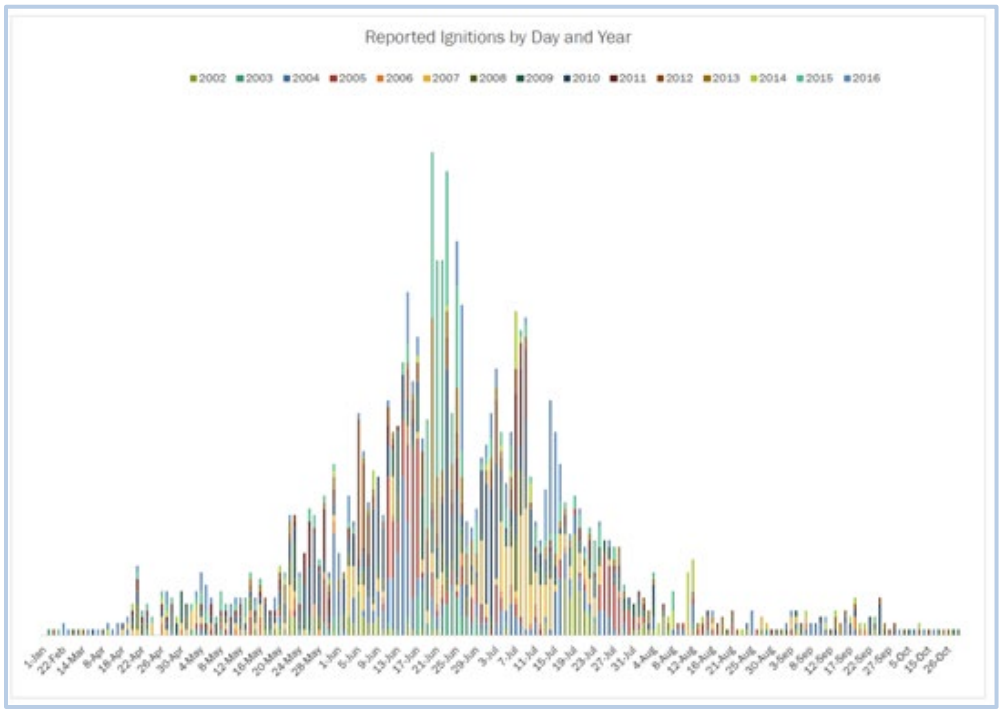

Staffed Fires by Year
38
30
86
70
60
18
54
95
34
41
33
14
61
26
2002 2003 2004 2005 2006 2007 2008 2009
2010 2011 2012 2013 2014 2015 2016


Staffed Fire Days
70
60
50
40
30
20
10
0


Fire Cause
526
1,862
Human
Natural


Fires by Management Option
60%
Limited
20%
Full
15%
Modified
4%
Crit...

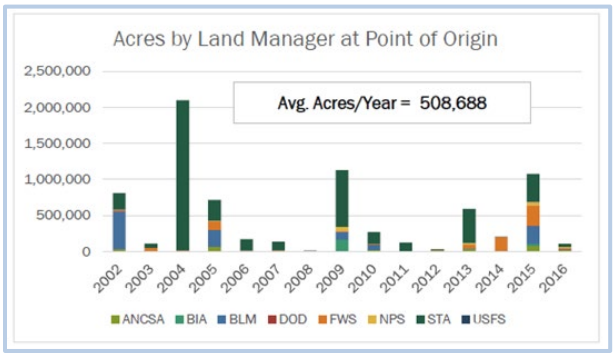


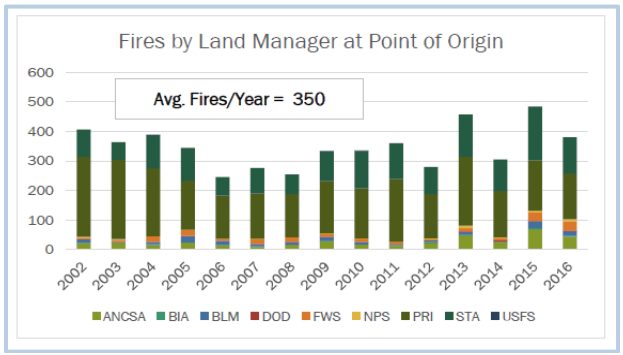


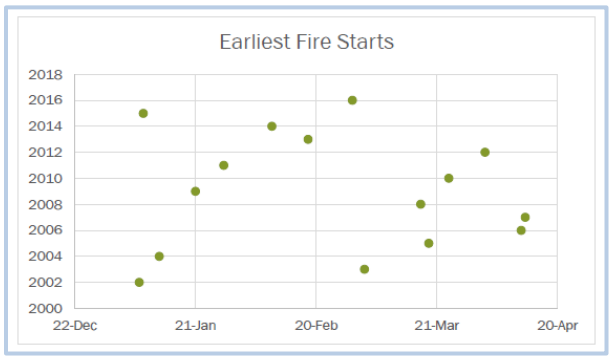
Figures 6-98 2002-2016 AFS Fires Statistics

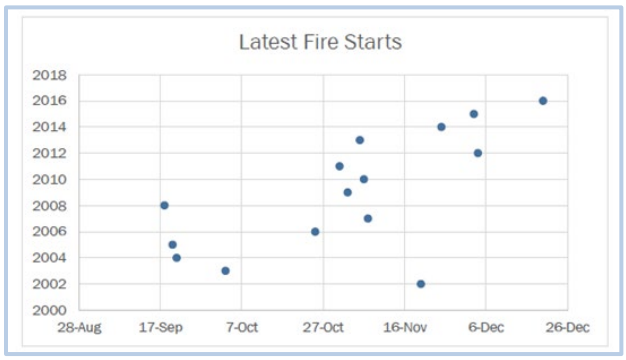
Source: AFS 2018

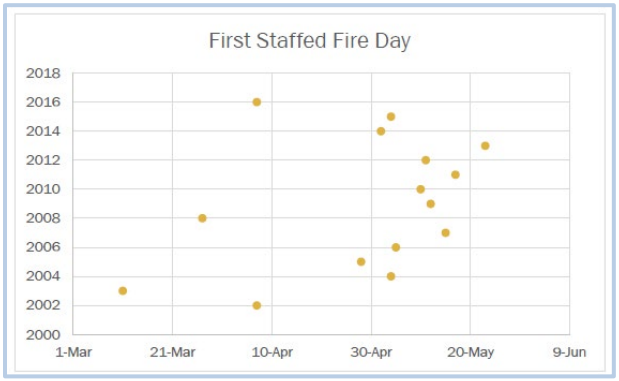
Figures 6-99 (includes the following 12 charts) displays the DOF's seasonal wildland fire threat statistics.

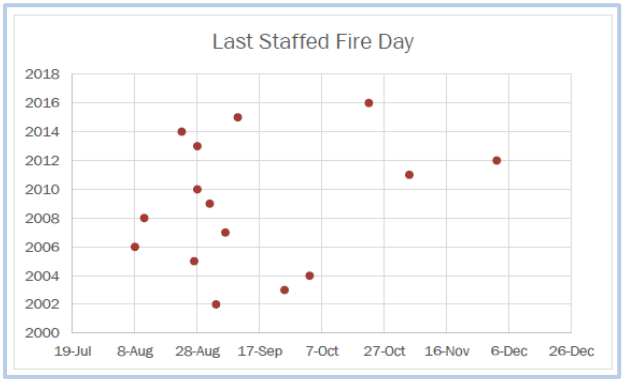


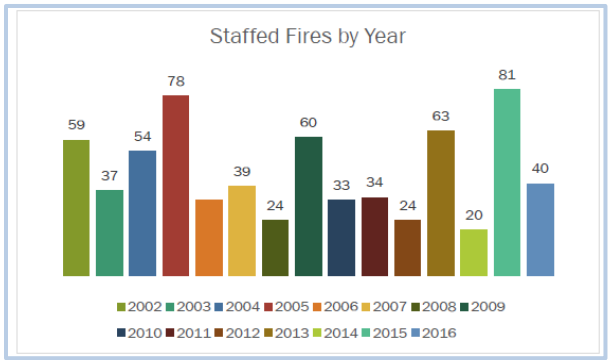


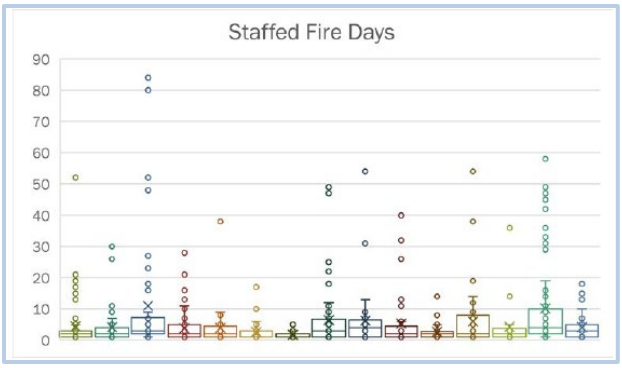


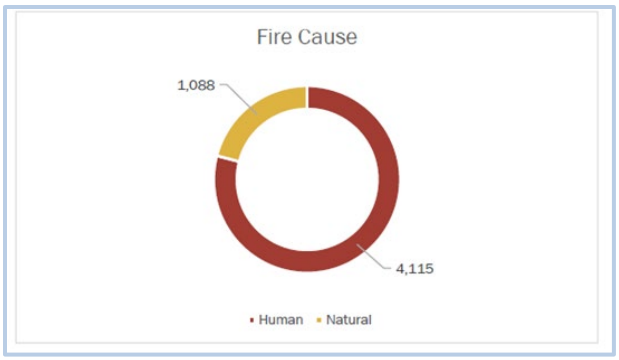


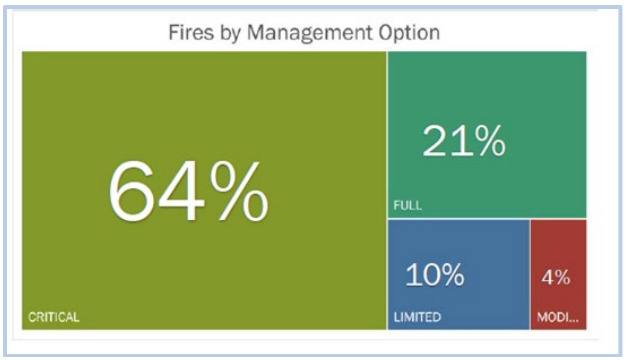


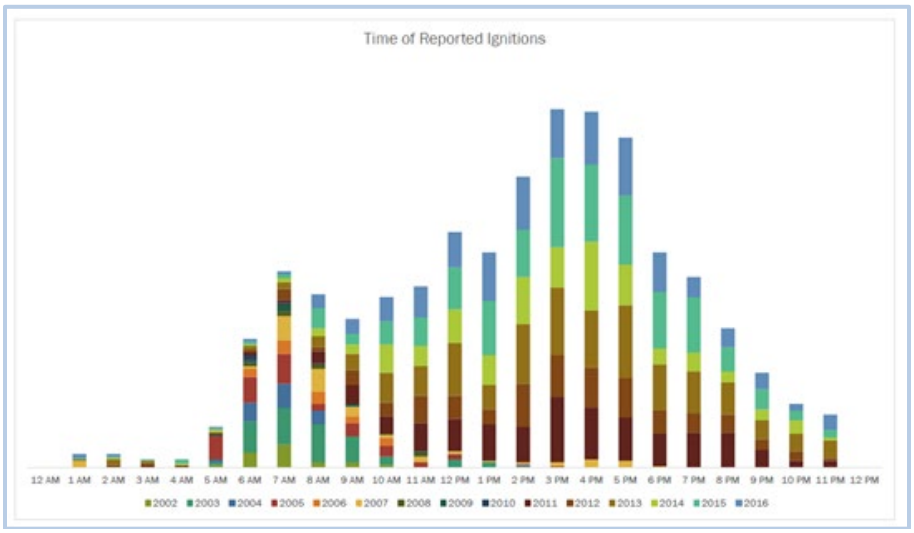


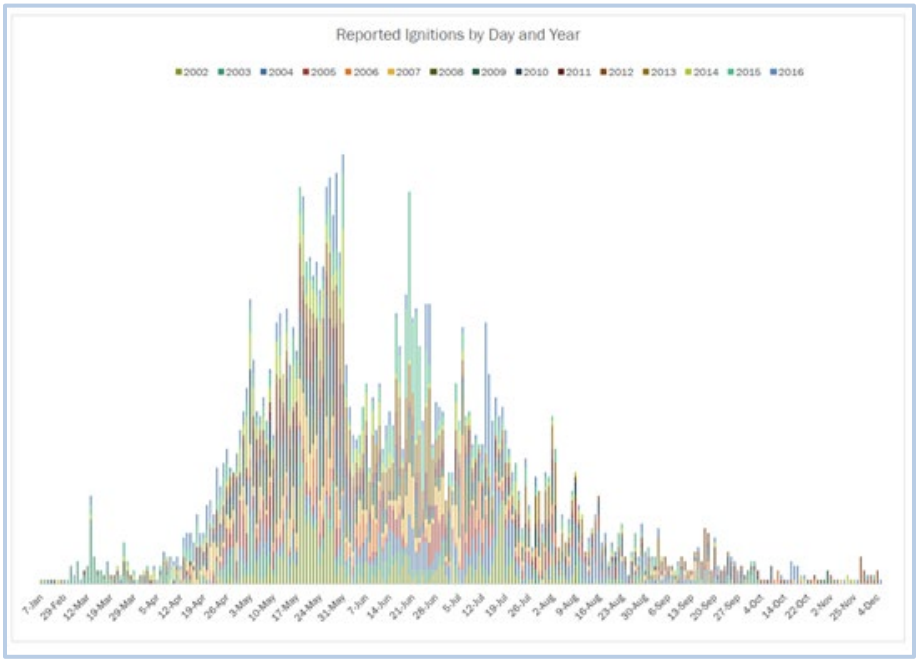












Figures 6-99 2002-2016 DOF Fires Statistics

Source: DOF 2018

6.8.5. CONFLAGRATION FIRE

Urban conflagration is a large destructive fire that is widespread throughout an urban area or community involving one or more developed areas in the community. In contrast to the commonly destructive individual property fire, conflagration involves a larger portion of the community's built environment. In small communities, conflagrations frequently overwhelm resources and damage infrastructure. In rural Alaskan communities, the loss of a critical building, such as a school, may warrant a local disaster declaration.

6.8.6. CONFLAGRATION HAZARD CHARACTERISTICS

Conflagration fires are very difficult to control. Complicating factors are wind, temperature, slope, proximity of structures, and community firefighting capability, as well as building construction and contents. Additional factors facing response efforts are hazardous substance releases, structural collapse, water service interruptions, unorganized evacuations, and loss of emergency shelters. Historical national conflagration examples include the Chicago City Fire of 1871 and the San Francisco City fire following the 1906 earthquake.

Structural Fire vs. Wildland Fire

Many wildland firefighters are neither equipped nor trained for structure fires. Structural fire suppression within defined service areas is the responsibility of volunteer, city, or borough fire departments. When wildland firefighters encounter structure, vehicle, dump or other non-vegetative fires during the performance of their wildland fire suppression duties, firefighting efforts are often limited to wildland areas.

6.8.7. CONFLAGRATION HAZARD HISTORY

DHS&EM tracks State and federal disaster declarations within their Disaster Cost Index (DCI). The DCI listed the numerous remote locational wildland fire events, many of which burned residential properties and could be called urban interface fire events (Section 6.8.3).

Substantial community infrastructure can be damaged or destroyed from a single fire event. These fires can cripple remote communities when they lose basic utilities (e.g., power, water, stores, clinics) and structure uses by any hazard event. Structure fires are more likely to threaten human life. AFS and DOF state that 82 lives were lost in structure and wildland fires from 2013 to 2017.

Alaska community fires listed in the Disaster Cost Index (Table 6-12) include:

Table 6-12 Historical Community Fires

Location	Date	Impacts
Kotlik Structure Fire	08/16/2016	A structural fire destroyed the old school facility and several nearby buildings
Kenai Wildfire	06/05/2015	Card Street Wildfire which began on June 15 and damaged 11 buildings in Sterling, including 3 primary residences.
Sockeye Fire	06/15/2015	A large urban interface wildfire exacerbated by record high temperatures caused widespread damage to the community of Willow and surrounding areas of the Matanuska Susitna Borough.

Table 6-12 Historical Community Fires

Location	Date	Impacts
Alatna Multi-Purpose Building Fire	04/15/2015	The Multi-Purpose Building in Alatna caught fire in the boiler room. The building houses the water treatment facility, Washeteria, and clinic.
Stuart Creek Fire	06/14/2013	The fire started during an Army artillery training exercise, burned more than 87,000 acres required evacuating of 1,200 residents and ,many sled dog teams from the area. It was one of the largest wildfires in the U.S. in 2013. This fire cost $21 million to fight the fire.
Dot Lake Fire	08/28/2011	The village utility building provided water and heat for several home homes in the community through an underground utilidor and is utilized as a watering point for other residents in the area.
Birch Creek Fire	05/26/2011	The tribal office building fire spread and destroyed the community's power plant, tribal office, potable watering point, and telephone building.
Hooper Bay Fire	08/03/2006	The fire continued through the next day and resulted in the destruction of the community's elementary school, high school, school support facilities, community store, and 14 homes – nearly 10% of the entire community.
Sleetmute	12/20/2001	A fire destroyed the community building in Sleetmute. The building housed the clinic, Council Office, Village Public Safety Officer (VPSO) office, washeteria, and the TV equipment for the Alaska Rural Communication Service (ARCS) satellite station.

Figure 6-100 provides an aerial view of the July 2013 Stuart Creek Fire, Pleasant Valley, AK.

Figure 6-100 July 2013 Stuart Creek Wildland Urban Interface Fire
Source: Photo Courtesy InciWeb; Pleasant Valley Area 2013

Sleetmute experienced a community fire in 2001 (Figure 6-101) that destroyed its tribal office, Village Public Safety Office, washeteria, and TV equipment for the ARCS satellite station.

Figure 6-101 2001 Sleetmute Conflagration Fire
Source: DHS&EM, 2001

6.8.8. LOCATION, EXTENT, IMPACT, AND RECURRENCE PROBABILITY

Location

Under certain conditions wildland fires may occur anywhere in Alaska when weather, fuel availability, topography, and ignition sources combine to form the most favorable wildland fire conditions. Most of Alaska's urban centers could potentially experience a wildland/urban interface fire because of the state's extensive spruce bark beetle infestation, and excessive dry fuels surrounding residential neighborhoods.

The Municipality of Anchorage's (MOA) Anchorage 2004 "Wildfire, Dare to Prepare" Program Report, describes their efforts to reduce conflagration threats to the community.

> ***Managing for fire and forest health***
>
> *[Anchorage Fire Department] AFD uses science to make management decisions for fuel treatment projects. AFD Foresters work cooperatively with State Forestry fire behavior experts to assign prescriptions to forested areas. In addition, mitigation strategies focus on the home ignition zone for residential areas. This 100-200 foot radius around a structure has been proven time and again to be the most influential zone determining a home's ignition potential. Case studies from across America, Canada, and Australia show repeated accounts of homes burning to the ground while trees and surrounding vegetation remain green. Furthermore, documented research conducted by Jack Cohen of the Missoula Fire Sciences Laboratory substantiates efforts to reduce home ignitions through extending vegetation treatment and landscape management to the 100 foot radius. Source:* https://www.muni.org/Departments/Fire/Wildfire/Documents/ANCHORAGE_WILDFIRE_May_2004_Program_Report.pdf*)*

See Figure 6-96, page 6-143, Historical Wildfire Locations image depicts wildland fire prevalence as it could indicate urban interface fire potential that if not properly planned for could prove catastrophic.

Extent

Urban interface fires generally follow similar patterns as a wildland fire; however, the fire engages with close proximity to infrastructure, utilities, and residential properties.

Fire susceptible fuels (e.g., slash, dry undergrowth, flammable vegetation) in close proximity to residences and infrastructure, coupled with weather and topography, influence fire behavior, potential threat, and community impact extent.

Impact

Urban interface fires threaten Alaska's population centers if not properly controlled. A small fire can threaten lives and resources and destroy property. In addition to impacting people, these fires may severely threaten livestock and pets. Such events may require owners to consider evacuation and emergency shelter or determine how they will be able to provide emergency watering and feeding if their structures are destroyed or substantially damaged.

Recurrence Probability

Increased community development, fire fuel accumulation, and weather pattern uncertainties indicate that seasonal wildfires will continue into the future. Communities and individuals need to develop plans to address this ever increasing threat.

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7. Other Hazards

7.1. Dam Failure (Moved To Attachment 12.2.1)

7.2. Public Health (Moved to Attachment 12.2.2)

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8. Risk Analysis

This section outlines the vulnerability process for determining potential losses for Alaska from various hazard impacts.

8.1. Overview

This section's risk analysis includes a vulnerability assessment that predicts the exposure extent that may result from a given hazard event and its impact intensity, within regional areas. This qualitative analysis provides data to identify and prioritize potential mitigation measures by allowing state agencies and communities to focus attention on areas with the greatest risk. A risk analysis is divided into the following five focus areas:

1. Asset inventory
2. Infrastructure risk, vulnerability, and losses from identified hazards
3. Development changes and trends
4. Data limitations
5. Future development considerations

DMA 2000 requirements and implementing state governance regulations for developing risk and vulnerability assessment initiatives:

DMA 2000 Multi-Jurisdictional Requirements
STANDARD STATE. Hazard Risk Assessment
S5. Does the risk assessment address the vulnerability of state assets located in hazard areas and estimate the potential dollar losses to these assets? [44 CFR §§201.4(c)(2)(ii) and 201.4(c)(2)(iii)]
S6. Does the risk assessment include an overview and analysis of the vulnerability of jurisdictions to the identified hazards and the potential losses to vulnerable structures? [44 CFR §§201.4(c)(2)(ii) and 201.4(c)(2)(iii)]
S7. Was the risk assessment revised to reflect changes in development? [44 CFR §201.4(d)]
Source: FEMA, March 2015

8.2. Current Asset Exposure Analysis

8.2.1. CRITICAL ASSET INFRASTRUCTURE

Assets that may be affected by hazard events include population (for community-wide hazards), residential buildings (where data is available), and critical facilities and infrastructure.

Assets are grouped into two structure types:

- Critical infrastructure
- Residential properties

8.2.1.1. ALASKA'S CRITICAL INFRASTRUCTURE

The following critical infrastructure information is used during DHS&EM's infrastructure protection planning and program development, and in applying state risk mitigation analysis in the most effective manner.

Critical infrastructure is defined as a facility that provides essential products and services to the general public, such as preserving quality of life while fulfilling important public safety, emergency response, and disaster recovery functions. Due to many of Alaska's communities' remote rural location (i.e., communities that are a long distance from their nearest neighboring

community) most all facilities are deemed "critical" to a community or agency's survival. Critical facilities and infrastructure profiled in this plan include the following facilities (see also Table 8-1):

- Government: state, city, and tribal administrative offices, departments, and agencies
- Emergency Response: including police department and firefighting equipment
- Educational: including K-12, universities, colleges, and charter schools
- Health Care: medical clinics, congregate living, health, residential, and continuing care and retirement facilities
- Community Gathering Places: community, tribal, and youth centers, and culturally significant and ceremonial sites
- Utilities: electric and alternative power generation, communications, water and waste water treatment, sewage lagoons, and landfills

*(**Note:** Table 8-1 has no particular order except that the left column starts with 1st responders and progresses right to relatively less critical facilities - the order is very subjective.)*

Table 8-1 Alaska's Critical Infrastructure

• Hospitals, Clinics, & Assisted Living Facilities	• Satellite Facilities	• Power Generation Facilities	• Oil & Gas Pipeline Structures & Facilities	• Schools
• Fire Stations	• Radio Transmission Facilities	• Potable Water Treatment Facilities	• Service Maintenance Facilities	• Community Washeterias
• Police Stations	• Highways and Roads	• Reservoirs & Water Supply Lines	• Community Halls & Civic Centers	• National Guard Facilities
• Emergency Operations Centers	• Critical Bridges	• Waste Water Treatment Facilities	• Community Stores	• Landfills & Incinerators
• Any Designated Emergency Shelter	• Airports	• Fuel Storage Facilities	• Community Freezer Facilities	• Community Cemeteries
• Telecommunications Structures & Facilities	• Harbors / Docks / Ports			

The 2018 SHMP's State facilities, Department of Transportation, Alaska Railroad, public schools, and the state's university system data were incorporated into Section 8.6.2 risk analysis and resultant vulnerability assessment.

***Note:** State asset managers explained that state assets and associated values were detailed in 2013 with few substantive changes identified for this 2018 SHMP update. Therefore the following sections were brought forward into this plan.*

8.2.1.2. ALASKA DEPARTMENT OF TRANSPORTATION

The Departments of Transportation and Public Facilities (DOT/PF) and Administration (DOA), Division of Risk Management provided location and replacement values for State-owned facilities and roads (including those found in State parks and forests). Information regarding State facilities and roads is provided as follows.

Note: *DOT/PF estimates road construction cost equals approximately $5M dollars per paved road mile and $1.5M per unpaved road miles*

AK DOT&PF *(Road Miles)*	Central Region			Northern Region			Paved	Southcoast Region			State Total
	Paved	Unpaved	Total	Paved	Unpaved	Total		Unpaved	Unknown	Total	
Interstate - TOTAL	**387.657**		**387.657**	**692.576**		**692.576**					**1080.233**
Interstate - Rural	333.525		333.525	667.982		667.982					1001.507
Interstate - Urban	54.132		54.132	24.594		24.594					78.726
Principal Arterial - TOTAL	**221.158**		**221.158**	**364.636**	**262.687**	**627.323**	**71.925**			**71.925**	**920.406**
Principal Arterials - Rural	135.713		135.713	342.366	262.687	605.053	58.486			58.486	799.252
Principal Arterials - Urban	85.445		85.445	22.270		22.270	13.439			13.439	121.154
Minor Arterial - TOTAL	**103.266**		**103.266**	**313.478**	**87.744**	**401.222**	**75.450**			**75.450**	**579.938**
Minor Arterials - Rural	37.768		37.768	278.111	87.744	365.855	24.243			24.243	427.866
Minor Arterials - Urban	65.498		65.498	35.367		35.367	51.207			51.207	152.072
Major Collector - TOTAL	**282.221**	**0.781**	**283.002**	**337.021**	**532.247**	**869.268**	**237.807**	**5.941**	**0.185**	**243.933**	**1396.203**
Major Collectors - Rural	202.898	0.781	203.679	278.013	532.246	810.259	210.329	5.570	0.185	216.084	1230.022
Major Collectors - Urban	79.323		79.323	59.008	0.001	59.009	27.478	0.371		27.849	166.181
Minor Collector - TOTAL	**241.241**	**138.053**	**379.294**	**125.369**	**264.156**	**389.525**	**123.616**	**65.054**	**0.000**	**188.670**	**957.489**
Minor Collectors - Rural	205.815	138.053	343.868	87.303	263.441	350.744	99.916	64.370		164.286	858.898
Minor Collectors - Urban	35.426		35.426	38.066	0.715	38.781	23.700	0.684		24.384	98.591
Local - TOTAL	**64.970**	**114.489**	**179.459**	**81.039**	**301.063**	**382.102**	**45.463**	**87.934**		**133.397**	**694.958**
Local - Rural	48.379	113.307	161.686	63.494	298.975	362.469	24.943	75.635		100.578	624.733
Local - Urban	16.591	1.182	17.773	17.545	2.088	19.633	20.520	12.299		32.819	70.225
Totals	**1300.513**	**253.323**	**1553.836**	**1914.119**	**1447.897**	**3362.016**	**554.261**	**158.929**	**0.185**	**713.375**	**5629.227**
Rural	964.098	252.141	1216.239	1717.269	1445.093	3162.362	417.917	145.575	0.185	563.677	4942.278
Urban	336.415	1.182	337.597	196.850	2.804	199.654	136.344	13.354		149.698	686.949

AK DNR (Road Miles)	Central Region Paved	Central Region Unpaved	Central Region Total	Northern Region Paved	Northern Region Unpaved	Northern Region Total	Southcoast Region Paved	Southcoast Region Unpaved	Southcoast Region Total	State Total
Forestry		**21.100**	**21.100**		**361.652**	**361.652**		**74.910**	**74.910**	**457.662**
Local - Rural		21.100	21.100		361.652	361.652		74.910	74.910	457.662
Local - Urban										
Parks	**23.575**	**21.125**	**44.700**	**2.200**	**23.075**	**25.275**	**0.900**	**7.296**	**8.196**	**78.171**
Local - Rural	23.575	21.125	44.700	1.500	23.075	24.575	0.900	7.296	8.196	77.471
Local - Urban				0.700		0.700				0.700
Minor Collector								**0.204**	**0.204**	**0.204**
Minor Collectors - Rural								0.204	0.204	0.204
Minor Collectors - Urban										
Totals	**23.575**	**42.225**	**65.800**	**2.200**	**384.727**	**386.927**	**0.900**	**82.206**	**83.106**	**536.037**
Rural	23.575	42.225	65.800	1.500	384.727	386.227	0.900	82.410	83.310	535.133
Urban				0.700		0.700				0.700

BOROUGH (Road Miles)	Central Region Paved	Central Region Unpaved	Central Region Total	Northern Region Paved	Northern Region Unpaved	Northern Region Total	Southcoast Region Paved	Southcoast Region Unpaved	Southcoast Region Total	State Total
Principal Arterial - TOTAL	**18.616**		**18.616**							**18.616**
Principal Arterials - Rural										
Principal Arterials - Urban	18.616		18.616							18.616
Minor Arterial - TOTAL	**35.902**		**35.902**		**1.922**	**1.922**	**2.042**	**0.000**	**2.042**	**39.866**
Minor Arterials - Rural	0.871		0.871		1.922	1.922				2.793
Minor Arterials - Urban	35.031		35.031				2.042		2.042	37.073
Major Collector - TOTAL	**69.845**	**1.966**	**71.811**	**8.230**	**5.603**	**13.833**	**12.732**	**0.087**	**12.819**	**98.463**
Major Collectors - Rural	24.697	0.372	25.069	5.096	5.323	10.419	2.927	0.087	3.014	38.502
Major Collectors - Urban	45.148	1.594	46.742	3.134	0.280	3.414	9.805		9.805	59.961
Minor Collector - TOTAL	**145.197**	**56.184**	**201.381**	**15.449**	**28.790**	**44.239**	**22.092**	**19.791**	**41.883**	**287.503**
Minor Collectors - Rural	57.221	51.453	108.674	12.848	28.017	40.865	11.443	19.095	30.538	180.077
Minor Collectors - Urban	87.976	4.731	92.707	2.601	0.773	3.374	10.649	0.696	11.345	107.426
Local - TOTAL	**1084.000**	**1543.000**	**2627.000**	**33.000**	**657.000**	**690.000**	**123.000**	**170.000**	**293.000**	**3610.000**
Local - Rural	191.000	1289.000	1480.000	5.000	460.000	465.000	29.000	126.000	155.000	2100.000
Local - Urban	893.000	254.000	1147.000	28.000	197.000	225.000	94.000	44.000	138.000	1510.000
Totals	**1353.560**	**1601.150**	**2954.710**	**56.679**	**693.315**	**749.994**	**159.866**	**189.878**	**349.744**	**4054.448**
Rural	273.789	1340.825	1614.614	22.944	495.262	518.206	43.370	145.182	188.552	2321.372
Urban	1079.771	260.325	1340.096	33.735	198.053	231.788	116.496	44.696	161.192	1733.076

MUNICIPAL (Road Miles)	Central Region Paved	Central Region Unpaved	Central Region Total	Northern Region Paved	Northern Region Unpaved	Northern Region Total	Southcoast Region Paved	Southcoast Region Unpaved	Southcoast Region Total	State Total
Minor Arterial - TOTAL	**2.244**		**2.244**	**5.927**		**5.927**	**2.908**		**2.908**	**11.079**
Minor Arterials - Rural										
Minor Arterials - Urban	2.244		2.244	5.927		5.927	2.908		2.908	11.079
Major Collector - TOTAL	**15.158**	**0.642**	**15.800**	**14.316**	**23.202**	**37.518**	**14.015**	**18.664**	**32.679**	**85.997**
Major Collectors - Rural	4.582	0.596	5.178	5.925	23.202	29.127	8.474	18.664	27.138	61.443
Major Collectors - Urban	10.576	0.046	10.622	8.391		8.391	5.541		5.541	24.554
Minor Collector - TOTAL	**31.327**	**90.402**	**121.729**	**19.355**	**111.865**	**131.220**	**23.344**	**73.122**	**96.466**	**349.415**
Minor Collectors - Rural	18.733	90.264	108.997	10.193	111.588	121.781	18.717	73.122	91.839	322.617
Minor Collectors - Urban	12.594	0.138	12.732	9.162	0.277	9.439	4.627		4.627	26.798
Local - TOTAL	**156.000**	**336.000**	**492.000**	**127.000**	**334.000**	**461.000**	**92.000**	**334.000**	**426.000**	**1379.000**
Local - Rural	79.000	298.000	377.000	22.000	331.000	353.000	59.000	324.000	383.000	1113.000
Local - Urban	77.000	38.000	115.000	105.000	3.000	108.000	33.000	10.000	43.000	266.000
Totals	**204.729**	**427.044**	**631.773**	**166.598**	**469.067**	**635.665**	**132.267**	**425.786**	**558.053**	**1825.491**
Rural	102.315	388.860	491.175	38.118	465.790	503.908	86.191	415.786	501.977	1497.060
Urban	102.414	38.184	140.598	128.480	3.277	131.757	46.076	10.000	56.076	328.431

OTHER STATE AGENCIES (Road Miles)	Central Region Paved	Central Region Total	Northern Region Paved	Northern Region Unpaved	Northern Region Total	Southcoast Region Paved	Southcoast Region Unpaved	Southcoast Region Total	State Total
Major Collector - TOTAL						**4.424**		**4.424**	**4.424**
Major Collectors - Rural						4.424		4.424	4.424
Major Collectors - Urban									
Minor Collector - TOTAL	**0.474**	**0.474**							**0.474**
Minor Collectors - Rural	0.381	0.381							0.381
Minor Collectors - Urban	0.093	0.093							0.093
Local - TOTAL			**0.189**	**1.402**	**1.591**	**1.382**	**12.000**	**13.382**	**14.973**
Local - Rural			0.189	1.374	1.563	1.074	12.000	13.074	14.637
Local - Urban				0.028	0.028	0.308		0.308	0.336
Totals	**0.474**	**0.474**	**0.189**	**1.402**	**1.591**	**5.806**	**12.000**	**17.806**	**19.871**
Rural	0.381	0.381	0.189	1.374	1.563	5.498	12.000	17.498	19.442
Urban	0.093	0.093		0.028	0.028	0.308		0.308	0.429

OTHER LOCAL AGENCIES (Road Miles)	Central Region Unpaved	Total	Northern Region Paved	Unpaved	Total	Southcoast Region Unknown -	Total	State Total
Major Collector - TOTAL			**0.711**	**0.654**	**1.365**			**1.365**
Major Collectors - Rural			0.711	0.654	1.365			1.365
Major Collectors - Urban								
Minor Collector - TOTAL	**0.341**	**0.341**	**0.470**	**9.771**	**10.241**			**10.582**
Minor Collectors - Rural	0.341	0.341	0.470	9.771	10.241			10.582
Minor Collectors - Urban								
Local - TOTAL			**1.514**	**51.950**	**53.464**			**53.464**
Local - Rural			1.514	51.950	53.464			53.464
Local - Urban								
Totals	**0.341**	**0.341**	**2.695**	**62.375**	**65.070**			**65.411**
Rural	0.341	0.341	2.695	62.375	65.070			65.411
Urban								

BIA (Road Miles)	Central Region Unpaved	Total	Northern Region Unpaved	Total	Southcoast Region Paved	Unpaved	Total	State Total
Major Collector - TOTAL					**15.474**		**15.474**	**15.474**
Major Collectors - Rural					15.474		15.474	15.474
Major Collectors - Urban								
Minor Collector - TOTAL	**1.298**	**1.298**			**4.137**	**1.850**	**5.987**	**7.285**
Minor Collectors - Rural	1.298	1.298			4.137	1.850	5.987	7.285
Minor Collectors - Urban								
Local - TOTAL	**68.802**	**68.802**	**4.200**	**4.200**		**392.639**	**392.639**	**465.641**
Local - Rural	68.802	68.802	4.200	4.200		392.639	392.639	465.641
Local - Urban								
Totals	**70.100**	**70.100**	**4.200**	**4.200**	**19.611**	**394.489**	**414.100**	**488.400**
Rural	70.100	70.100	4.200	4.200	19.611	394.489	414.100	488.400
Urban								

INDIAN NATIONS (Road Miles)	Central Region Paved	Unpaved	Total	Northern Region Paved	Unpaved	Total	Southcoast Region Paved	Unpaved	Total	State Total
Minor Collector - TOTAL		**1.083**	**1.083**		**1.116**	**1.116**		**3.814**	**3.814**	**6.013**
Minor Collectors - Rural		1.083	1.083		1.116	1.116		3.814	3.814	6.013
Minor Collectors - Urban										
Local - TOTAL	**3.900**	**733.617**	**737.517**	**6.500**	**721.280**	**727.780**	**1.500**	**169.490**	**170.990**	**1636.287**
Local - Rural	3.900	733.617	737.517	6.500	721.280	727.780	1.400	168.690	170.090	1635.387
Local - Urban							0.100	0.800	0.900	0.900
Totals	**3.900**	**734.700**	**738.600**	**6.500**	**722.396**	**728.896**	**1.500**	**173.304**	**174.804**	**1642.300**
Rural	3.900	734.700	738.600	6.500	722.396	728.896	1.400	172.504	173.904	1641.400
Urban							0.100	0.800	0.900	0.900

U.S. FOREST SERVICE *(Road Miles)*	Central Region Paved	Central Region Unpaved	Central Region Total	Northern Region Paved	Northern Region Unpaved	Northern Region Total	Southcoast Region Paved	Southcoast Region Unpaved	Southcoast Region Total	State Total
Minor Collector - TOTAL	**0.408**		**0.408**				**0.280**	**31.273**	**31.553**	**31.961**
Minor Collectors - Rural	0.408		0.408				0.280	31.273	31.553	31.961
Minor Collectors - Urban										
Local - TOTAL	**8.419**	**31.473**	**39.892**	**2.125**	**12.513**	**14.638**	**5.292**	**497.748**	**503.040**	**557.570**
Local - Rural	8.419	31.473	39.892	2.125	12.513	14.638	1.565	488.194	489.759	544.289
Local - Urban							3.727	9.554	13.281	13.281
Totals	**8.827**	**31.473**	**40.300**	**2.125**	**12.513**	**14.638**	**5.572**	**529.021**	**534.593**	**589.531**
Rural	8.827	31.473	40.300	2.125	12.513	14.638	1.845	519.467	521.312	576.250
Urban							3.727	9.554	13.281	13.281

NATIONAL PARKS SERVICE *(Road Miles)*	Central Region Paved	Central Region Unpaved	Central Region Total	Northern Region Paved	Northern Region Unpaved	Northern Region Total	Southcoast Region Paved	Southcoast Region Unpaved	Southcoast Region Total	State Total
Major Collector - TOTAL				**14.742**		**14.742**	**4.513**		**4.513**	**19.255**
Major Collectors - Rural				14.742		14.742	4.513		4.513	19.255
Major Collectors - Urban										
Local - TOTAL	**1.740**	**0.090**	**1.830**	**3.671**	**110.740**	**114.411**		**36.454**	**36.454**	**152.695**
Local - Rural	1.740	0.090	1.830	3.671	110.740	114.411		36.454	36.454	152.695
Local - Urban			0.000							
Totals	**1.740**	**0.090**	**1.830**	**18.413**	**110.740**	**129.153**	**4.513**	**36.454**	**40.967**	**171.950**
Rural	1.740	0.090	1.830	18.413	110.740	129.153	4.513	36.454	40.967	171.950
Urban										

U.S. ARMY CORPS OF ENGINEERS *(Road Miles)*	Northern Region Paved	Northern Region Unpaved	Northern Region Total	State Total
Totals	**12.400**	**7.500**	**19.900**	**19.900**
Local - Rural	12.400	7.500	19.900	19.900
Local - Urban				

U.S. NAVY *(Road Miles)*	Northern Region Paved	Northern Region Unpaved	Northern Region Total	Southcoast Region Paved	Southcoast Region Unpaved	Southcoast Region Total	State Total
Totals		**8.020**	**8.020**	**5.800**	**154.990**	**160.790**	**168.810**
Local - Rural		8.020	8.020	5.800	154.990	160.790	168.810
Local - Urban							

U.S. ARMY *(Road Miles)*	Northern Region Paved	Northern Region Unpaved	Northern Region Total	State Total
Totals	**46.110**	**52.000**	**98.110**	**98.110**
Local - Rural	31.900		31.900	31.900
Local - Urban	14.210	52.000	66.210	66.210

U.S. AIR FORCE (Road Miles)	Central Region Paved	Central Region Total	Northern Region Paved	Northern Region Total	State Total
Totals	**0.291**	**0.291**	**0.444**	**0.444**	**0.735**
Minor Arterial - Urban	0.291	0.291			0.291
Major Collector - Rural			0.444	0.444	0.444

U.S. COAST GUARD (Road Miles)	Southcoast Region Paved	Southcoast Region Unpaved	Southcoast Region Total	State Total
Totals	**4.179**	**0.046**	**4.225**	**4.225**
Local - Rural				
Local - Urban	4.179	0.046	4.225	4.225

OTHER PUBLIC INSTRUMENTALITY (Road Miles)	Northern Region Paved	Northern Region Unpaved	Northern Region Total	State Total
Major Collector - TOTAL	**0.390**		**0.390**	**0.390**
Major Collector - Rural	0.390		0.390	0.390
Major Collector - Urban				
Minor Collector - TOTAL	**2.319**		**2.319**	**2.319**
Minor Collectors - Rural				
Minor Collectors - Urban	2.319		2.319	2.319
Local - TOTAL	**3.528**	**5.695**	**9.223**	**9.223**
Local - Rural	3.528		3.528	3.528
Local - Urban		5.695	5.695	5.695
Totals	**2.709**		**2.709**	**11.932**
Rural	0.390		0.390	0.390
Urban	2.319		2.319	2.319

U.S. FISH & WILDLIFE SERVICE (Road Miles)	Central Region Unpaved	Central Region Total	Northern Region Unpaved	Northern Region Total	Southcoast Region Unpaved	Southcoast Region Total	State Total
Totals	**42.940**	**42.940**	**4.600**	**4.600**	**42.700**	**42.700**	**90.240**
Local - Rural	42.940	42.940	4.600	4.600	42.700	42.700	90.240
Local - Urban							

BUREAU OF LAND MANAGEMENT (Road Miles)	Central Region Paved	Central Region Total	Northern Region Paved	Northern Region Unpaved	Northern Region Total	State Total
Minor Collector - TOTAL				**12.309**	**12.309**	**12.309**
Minor Collectors - Rural				12.309	12.309	12.309
Minor Collectors - Urban						
Local - TOTAL	**1.190**	**1.190**	**0.100**	**10.971**	**11.071**	**12.261**
Local - Rural	1.190	1.190		10.971	10.971	12.161
Local - Urban			0.100		0.100	0.100
Totals	**1.190**	**1.190**	**0.100**	**23.280**	**23.380**	**24.570**
Rural	1.190	1.190		23.280	23.280	24.470
Urban			0.100		0.100	0.100

PRIVATE AGENCY (Road Miles)	Central Region Paved	Central Region Unpaved	Central Region Total	Northern Region Paved	Northern Region Unpaved	Northern Region Total	Southcoast Region Paved	Southcoast Region Unpaved	Southcoast Region Total	State Total
Major Collector - TOTAL		**0.101**	**0.101**	**0.090**	**0.154**	**0.244**				**0.345**
Major Collectors - Rural		0.101	0.101	0.090	0.154	0.244				0.345
Major Collectors - Urban										
Minor Collector - TOTAL					**0.118**	**0.118**	**0.413**		**0.413**	**0.531**
Minor Collectors - Rural					0.118	0.118	0.413		0.413	0.531
Minor Collectors - Urban										
Local - TOTAL	**0.036**	**1.515**	**1.551**	**0.851**	**58.657**	**59.508**	**1.386**	**13.739**	**15.125**	**76.184**
Local - Rural	0.036	1.515	1.551	0.065	58.657	58.722		11.565	11.565	71.838
Local - Urban				0.786		0.786	1.386	2.174	3.560	4.346
Totals	**0.036**	**1.616**	**1.652**	**0.941**	**58.929**	**59.870**	**1.799**	**13.739**	**15.538**	**77.060**
Rural	0.036	1.616	1.652	0.155	58.929	59.084	0.413	11.565	11.978	72.714
Urban				0.786		0.786	1.386	2.174	3.560	4.346

RAILROAD (Road Miles)	Paved	Northern Region Unpaved	Northern Region Unknown	Total	Total	State Total
Local - Rural						
Local - Urban		0.415		0.415		0.415
Totals		**0.415**		**0.415**	**0.000**	**0.415**

OTHER (Road Miles)	Central Region Paved	Central Region Unpaved	Central Region Total	Northern Region Paved	Northern Region Unpaved	Northern Region Total	Southcoast Region Paved	Southcoast Region Unpaved	Southcoast Region Total	State Total
Local - Rural		0.050	0.050	0.879		0.879				0.929
Local - Urban					6.447	6.447	0.452	8.509	8.961	15.408
Totals		**0.050**	**0.050**	**0.879**	**6.447**	**7.326**	**0.452**	**8.509**	**8.961**	**16.337**

Table 8-2 Statewide Total Road Miles

	Central Region			Northern Region			Southcoast Region				State Total
	Paved	Unpaved	Total	Paved	Unpaved	Total	Paved	Unpaved	Unknown	Total	
Interstate - TOTAL	**387.657**		**387.657**	**692.576**		**692.576**					**1080.233**
Interstate - Rural	333.525		333.525	667.982		667.982					1001.507
Interstate - Urban	54.132		54.132	24.594		24.594					78.726
Principal Arterial - TOTAL	**239.774**		**239.774**	**364.636**	**262.687**	**627.323**	**71.925**			**71.925**	**939.022**
Principal Arterials - Rural	135.713		135.713	342.366	262.687	605.053	58.486			58.486	799.252
Principal Arterials - Urban	104.061		104.061	22.270		22.270	13.439			13.439	139.770
Minor Arterial - TOTAL	**141.703**		**141.703**	**319.405**	**89.666**	**409.071**	**80.400**			**80.400**	**631.174**
Minor Arterials - Rural	38.639		38.639	278.111	89.666	367.777	24.243			24.243	430.659
Minor Arterials - Urban	103.064		103.064	41.294		41.294	56.157			56.157	200.515
Major Collector - TOTAL	**367.224**	**3.490**	**370.714**	**375.944**	**561.860**	**937.804**	**288.965**	**24.692**	**0.185**	**313.842**	**1622.360**
Major Collectors - Rural	232.177	1.850	234.027	305.411	561.579	866.990	246.141	24.321	0.185	270.647	1371.664
Major Collectors - Urban	135.047	1.640	136.687	70.533	0.281	70.814	42.824	0.371		43.195	250.696
Minor Collector - TOTAL	**418.647**	**287.361**	**706.008**	**162.962**	**428.125**	**591.087**	**173.882**	**195.108**		**368.990**	**1666.085**
Minor Collectors - Rural	282.558	282.492	565.050	110.814	426.360	537.174	134.906	193.728		328.634	1430.858
Minor Collectors - Urban	136.089	4.869	140.958	52.148	1.765	53.913	38.976	1.380		40.356	235.227
Local - TOTAL	**1343.830**	**2914.201**	**4258.031**	**321.106**	**2733.180**	**3054.286**	**281.354**	**2002.455**		**2283.809**	**9596.126**
Local - Rural	357.239	2621.019	2978.258	154.765	2466.507	2621.272	123.682	1915.073		2038.755	7638.285
Local - Urban	986.591	293.182	1279.773	166.341	266.673	433.014	157.672	87.382		245.054	1957.841
DOT Regional Totals	**2898.835**	**3205.052**	**6103.887**	**2236.629**	**4075.518**	**6312.147**	**896.526**	**2222.255**	**0.185**	**3118.966**	**15535.000**
Rural	1379.851	2905.361	4285.212	1859.449	3806.799	5666.248	587.458	2133.122	0.185	2720.765	12672.225
Urban	1518.984	299.691	1818.675	377.180	268.719	645.899	309.068	89.133	0.000	398.201	2862.775

Source: ADOT/PF, Division of Program Development, http://www.dot.alaska.gov/stwdplng/transdata/pub/2017cprmFinal.pdf

8.2.1.3. ALASKA SCHOOLS AND UNIVERSITIES

Schools in Alaska fall under several varying jurisdictions. Total insured value and staff numbers organized by borough/Rural Educational Attendance Area (REAA) are displayed in Table 8-3. The State owns Mt. Edgecumbe High School, a boarding school in Sitka, Alaska. The value of that facility is incorporated into appropriate hazard and vulnerability assessments (HVAs). In many Alaska communities, the school facilities serve as the primary emergency shelter and are considered critical infrastructure.

Table 8-3 School Systems Insured Value and Full Time Equivalent Staff

Borough/REAA	Total Valued Insured	FTE
Alaska Gateway REAA	$48,293,056	32
Aleutians East Borough	unavailable	35
Aleutian Region REAA	$59,074,028	33
Annette Island REAA	$28,060,350	32
Bristol Bay Borough	$33,479,006	14
Bering Strait REAA	$353,051,455	47
City and Borough of Juneau	$22,904,112	377
City and Borough of Sitka	$189,611,658	107
City and Borough of Wrangell	$44,983,384	25
City and Borough of Yakutat	$15,783,018	12
Chatham REAA	$32,654,437	10
Chugach REAA	$15,716,499	109
Copper Rover REAA	$68,344,164	39
Denali Borough REAA	$29,873,593	23
Delta-Greely REAA	$46,151,188	62
Fairbanks North Star Borough	$698,460,000	1,650
Haines Borough	$39,710,747	23
Iditarod Area	$48,787,598	25
Kashunamiut REAA	unavailable	25
Ketchikan Gateway Borough	unavailable	173
Kenai Peninsula Borough	$549,017,951	645
Kuspuk REAA	$116,960,300	36
Lower Kuskokwim REAA	$375,670,805	300
Lake & Peninsula Borough	$86,777,907	52
Lower Yukon REAA	$302,088,625	12
Matanuska-Susitna Borough	unavailable	1,145
Municipality of Anchorage	1,217,581,907	3,207
Northwest Arctic Borough	$312,429,495	158
North Slope Borough	unavailable	190
Pribilof Islands REAA	$63,908,126	11
Southeast Island REAA	$182,414,559	130
Southwest Region	$164,187,193	72
Yukon Flats REAA	$75,153,220	28
Yukon-Koyukuk REAA	$156,188,082	142
Yupiit REAA	$67,360,000	48
TOTAL	**$3,431,295,521**	**7,379**

Source: Alaska Department of Education & Early Development, Mt. Edgecumbe High School, and the Association of Alaska School Boards (2013). Kodiak Island Borough information is unavailable.

The University of Alaska provided facility values for university properties throughout the state, displayed within Table 8-4.

Table 8-4 University of Alaska Facility and Property Values

Name	Location	Area Sq. Ft.	Adjusted Building Value
University of Alaska Anchorage (UAA) System			
Anchorage	Anchorage	2,255,395	$592,072,878
Kenai Peninsula	Soldotna	89,432	$26,288,801
Kachemak Bay	Homer	18,360	$6,590,566
Kodiak	Kodiak	44,981	$13,799,752
Matanuska-Susitna College	Palmer	105,316	$34,885,851
Prince William Sound Community College	Valdez	61,709	$16,174,362
Sub Total	***--***	***2,575,193***	***$689,812,210***
University of Alaska Fairbanks (UAF) System			
Fairbanks	Fairbanks	2,903,104	$89,162,127
Fairbanks Agricultural & Forestry Experiment Station	Fairbanks	48,868	$3,676,394
State Virology Laboratory	Fairbanks	30,362	$33,053,288
Matanuska Agricultural & Forestry Experiment Station	Matanuska Borough	89,888	$11,572,250
Agricultural & Forestry Experiment Station Palmer Research Center	Palmer	--	--
Poker Flat Research Range	Fairbanks	35,760	$12,064,679
Seward Marine Center	Seward	37,338	$9,450,054
Bristol Bay	Dillingham	10,523	$6,594,432
Chukchi	Kotzebue	8,948	$4,871,069
Interior-Aleutians	various	25,415	$11,308,307
Kuskokwim	Bethel	51,680	$20,558,633
Northwest	Nome	20,760	$4,883,426
Tanana Valley Campus	Fairbanks	193,229	$9,803,798
Sub Total	***--***	***3,455,875***	***$216,998,457***
University of Alaska Sitka (UAS) System			
Juneau	Juneau	441,648	$115,107,322
Ketchikan	Ketchikan	47,850	$17,589,192
Sitka	Sitka	68,058	$12,543,719
Sub Total	***--***	***557,556***	***$145,240,233***
Statewide Programs and Services (SPS)			
Statewide Office of Land Management	State	3,745	$180,443
Statewide Services	State	108,670	$43,601,128
Sub Total	***--***	***112,415***	***$43,781,571***
UAA SYSTEM TOTALS		***6,701,039***	***$1,095,832,471***

Source: University of Alaska 2013 Facilities Inventory, Statewide Planning and Budget, 2013

The State of Alaska Risk Manager uses the Marshall & Swift Valuation Service Classification Class list for determining and maintaining a list of State-owned, insured buildings. Risk management does not use this list for any construction cost determination. Classification categories include:

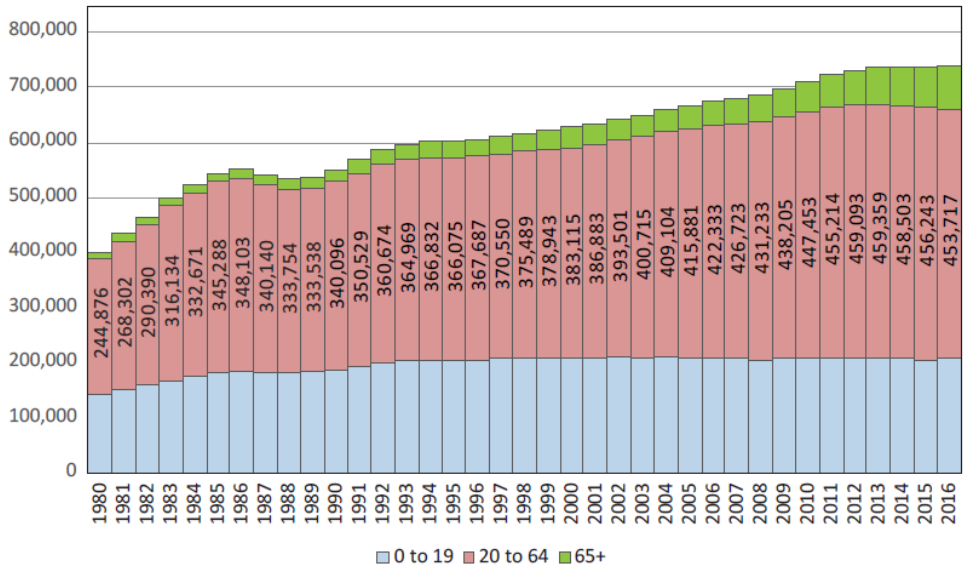
- *Class "A," buildings have fireproofed structural steel frames with reinforced concrete or masonry floors and roofs,*
- *Class "B," buildings have reinforced concrete frames with concrete or masonry floors and roofs,*
- *Class "C," buildings have masonry or concrete exterior walls with wood or steel roofs and floors, except for concrete slab on grade.*
- *Class "D," buildings generally have a wood frame, floor, and roof structure. They may have a concrete floor on grade and other substitute materials, but are considered combustible construction. This class includes engineered pole frame buildings.*
- *Class "S," buildings of Alaska and for the purpose of the evaluation of State structures will not be used until future updates of the plan when the State Risk Manager incorporates this class into the classification of structures.*
- *Class "E," buildings are statewide leased.*
- *Class "F," building refers to uninsured properties*

Alaska Risk Management uses the 2002 "Marshall Valuation Service Classification of Construction Statement" to determine the State's valuation methodology and statement.

8.2.1.4. POPULATION

The following comes from the Alaska Department of Labor and Workforce Development, Research and Analysis Department's (RAD) June 2017, "Our Changing Age Structure" article 3.

…Alaska's Population by Age Group 1980 to 2016



Alaska's population has continued to grow in recent years, although growth has slowed and the state's age structure has shifted. The state grew from 735,859 people in 2013 to 739,828 in 2016, but the only age group to increase was 65-plus.

This doesn't mean more senior citizens are moving to Alaska; rather, it's the result of the large cohort of baby boomers, those born between 1946 and 1964, entering retirement age and the resulting subtraction from the 20-to-64 age group.

The increase in Alaskans over 65 has been steady and rapid for several years. The group grew by more than 4,000 people between 2015 and 2016 alone, reaching 78,980, and Alaska's senior population will likely pass the 80,000 mark in 2017 and top 100,000 in the coming years.

The 20-to-64 population, the typical working-age range, declined to 453,717 by 2016 after peaking at 459,359 in 2013. The under-20 population remained essentially unchanged over that period, as it has for more than two decades, hovering between 205,000 and 210,000 since 1994."
Source: DOL: 2017

The DLW/RAD states that Alaska's statewide population increased by 26,847 people from 2010 to 2017. The growth as a whole is primarily through natural increase (births), listed at just over 20,000.

Many of Alaska's boroughs and census areas slowly grew between 2012 and 2017. Of the 29 boroughs and census areas, 18 experienced population declines during that time. The largest population decreases occurred in the Fairbanks North Star Borough (FNSB) and the Kodiak Island Borough (KIB).

However, population growth in the Matanuska-Susitna Borough (Mat-Su or MSB) accounted for roughly 50 percent of the total growth statewide. The MSB is the fastest growing area in Alaska. These data are listed in Table 8-5 Population Growth and 8.6 Residential Property Values.

There is no comprehensive or published list that correlates population growth and its connected facility and infrastructure growth.

This SHMP has provided new hazard maps (Section xx, page s-s) for each hazard type that depict various risk analysis from Tables 8-14 through 8-21 using colored shading The darker the hazard color the higher the risk. Alaska's communities with populations over 400 are shown on each map to assist readers with community locational proximity. Readers can therefore assume the relative risk for each community location.

These new hazard maps are based on the most current hazard information available. They therefore become the baseline to facilitate future risk analyses and vulnerability assessments.

Note: more refined hazard risk analysis and vulnerabilities is required to better determine single location risk factors. The larger communities with established land and parcel maps can better define locational hazard risks as these communities generally overlay pertinent GIS data layers to identify known high hazard locations.

Table 8-5 Alaska Population Growth, 2010-2017

	2010 Census	2017 Census Estimates	Natural Increase *Births-Deaths*	Net Migration	Population Change	Average Annual Growth Rate *(%)*
	April 2010	*July 2017*	*2010-2017*	*2010-2017*	*2012-2017*	*2016-2017*
Alaska	**710,231**	**737,080**	**20,149**	**-25,100**	**6,038**	**-0.36**
Anchorage / Mat-Su Region	**380,821**	**401,649**	**11,089**	**-7,368**	**9,663**	**0.04**
Municipality of Anchorage	291,826	297,483	8,376	-16,307	-851	-0.49
Matanuska-Susitna Borough	88,995	104,166	2,713	8,939	10,514	1.56
Gulf Coast Region	**78,628**	**80,750**	**3,878**	**-1,811**	**122**	**-0.51**
Kenai Peninsula Borough	55,721	58,024	2,245	379	1,391	-0.04
Kodiak Island Borough	13,664	13,287	1,144	-1,449	-706	-2.03
Valdez-Cordova Census Area	9,696	9,387	489	-741	-563	-1.19
Interior Region	**112,600**	**111,911**	**9,624**	**-9,734**	**-3,486**	**-1.15**
Denali Borough	1,831	1,849	82	-59	-7	-1.82
Fairbanks North Star Borough	98,106	97,738	8,868	-8,711	-2,926	-1.24
Southeast Fairbanks Census Area	7,029	6,973	472	-525	-227	0.75
Yukon Koyukuk Census Area	5,612	5,351	202	-439	-326	-1.72
Northern Region	**26,586**	**27,705**	**3,046**	**-1,786**	**431**	**-0.37**
Nome Census Area	9,555	10,006	1,157	-643	154	-0.64
North Slope Borough	9,475	9,849	879	-460	139	0.49
Northwest Arctic Borough	7,556	7,850	1,010	-683	138	-1.10
Southeast Region	**72,156**	**72,915**	**2,788**	**-1,537**	**-1,253**	**-1.24**
Haines Borough	2,532	2,459	7	-56	-148	-0.28
Hoonah-Angoon Census Area	2,153	2,122	53	-80	-78	-3.06
City and Borough of Juneau	31,534	32,269	1,495	-501	-420	-1.40
Ketchikan Gateway Borough	13,538	13,754	554	-277	-124	0.04
Petersburg Census Area	3,226	3,147	134	-190	-104	-0.95
Prince of Wales-Hyder Census Area	6,238	6,390	215	3	-66	-1.57
City and Borough of Sitka	8,926	8,748	228	-361	-317	-1.88

Table 8-5 Alaska Population Growth, 2010-2017

	2010 Census	2017 Census Estimates	Natural Increase *Births-Deaths*	Net Migration	Population Change	Average Annual Growth Rate *(%)*
	April 2010	***July 2017***	***2010-2017***	***2010-2017***	***2012-2017***	***2016-2017***
Municipality of Skagway	969	1,087	51	68	130	1.67
City and Borough of Wrangell	2,381	2,387	13	5	-57	-2.85
City and Borough of Yakutat	659	552	38	-148	-69	-7.33
Southwest Region	**40,875**	**42,202**	**4,417**	**-2,864**	**561**	**-0.17**
Aleutians East Borough	3,147	2,977	55	-219	-169	-0.74
Aleutians West Census Area	5,572	5,357	136	-340	-265	-2.29
Bethel Census Area	17,122	18,127	2,336	-1,222	567	0.03
Bristol Bay Borough	1,004	887	24	-134	-97	1.25
Dillingham Census Area	4,872	4,925	492	-414	-49	-0.59
Lake and Peninsula Borough	1,643	1,721	132	-42	41	0.10
Wade Hampton Census Area	7,515	8,208	1,242	-493	533	4.70

** 2017. All numbers are based on 2010 Census geography.*
Sources: Alaska Department of Labor and Workforce Development, Research and Analysis Section; and U.S. Census Bureau

8.2.1.5. RESIDENTIAL PROPERTIES

The State of Alaska Department of Labor and Workforce provided residential property values from municipalities or jurisdictions levying a property tax (Table 8-6). Jurisdictions not levying property taxes were excluded.

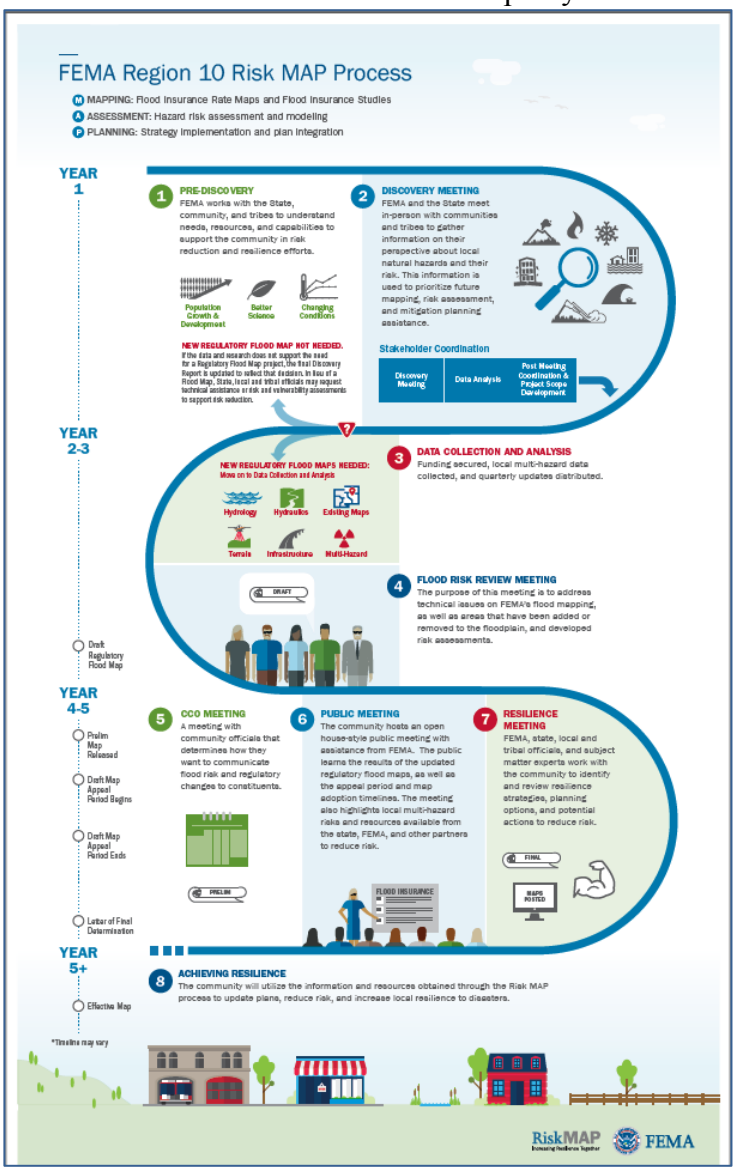
Table 8-6 2018 Residential Property Values by Boroughs

Boroughs & Unified Municipalities	Locally Assessed Real Property	Locally Assessed Personal Property	Approximate Total Assessed Values
Municipality of Anchorage*	$32,876,827,762	$2,744,298,672	$35,621,126,434
Bristol Bay Borough	$195,240,574	$185,216,693	$380,457,267
Fairbanks North Star Borough	$8,038,878,283	$0	$8,038,878,283
Haines Borough	$347,097,000	$0	$347,097,000
Juneau City & Borough	$4,498,119,846	$356,741,060	$4,854,860,906
Kenai Peninsula Borough	$6,338,989,400	$362,535,660	$6,701,525,060
Ketchikan Gateway Borough	$4,410,790,300	$90,300,960	$4,501,091,260
Kodiak Island Borough	$1,205,698,799	$137,125,100	$1,342,823,899
Matanuska-Susitna Borough	$8,970,380,541	$55,474,108	$9,025,854,649
North Slope Borough	$808,535,066	$260,488,374	$1,069,023,440
Petersburg Borough	$317,225,474	$0	$317,225,474
Sitka City & Borough	$1,016,704,300	$57,307,441	$1,074,011,741
Municipality of Skagway	$338,576,381	$0	$338,576,381
Wrangell City & Borough	$147,125,567	$0	$147,125,567
Yakutat City & Borough	$46,393,389	$0	$46,393,389
(Approximate) TOTALs	**$66,556,582,582**	**$4,249,488,068**	**$73,806,070,750**

**Assessed Values from Municipality Property Taxes, 2017.*
Source: DCCED

8.3. ALASKA RISK MAP

FEMA's Risk Mapping, Assessment, and Planning (Risk MAP) Program, integrates mapping, assessment, and planning. Alaska's DCRA staff manages the Risk MAP Program's Mapping Business Plan (MBP) via a Cooperating Technical Partnership (CTP) Agreement with FEMA. The MBP outlines the strategy that FEMA and the State intend to use during future map update efforts. For example, FEMA's additional work in the municipality of Anchorage and the city of Seward's alluvial fan study.



The program provides communities with flood and other hazard information, risk assessment tools, and outreach support to increase local understanding of risk, inform community decisions regarding, and ultimately lead to local actions that will reduce risk. The goal is to increase community resilience to natural hazards.

Risk MAP is a continuing, collaborative partnership to help federal, state, tribal, and local community officials, business owners, private citizens, and stakeholders make sound floodplain management decisions focused on taking action to reduce flood and other hazard's risks.

Risk MAP integrates and aligns with other FEMA mitigation and risk analysis programs, such as the Multi-Hazard Mitigation Planning and National Flood Insurance Program (NFIP) to create an effective, community-based strategy.

The graphic illustrates the Risk MAP Process from discovery through resilience. For more information on each step of the Risk MAP process, please visit the Risk MAP Process story map webpage (https://www.commerce.alaska.gov/web/Portals/4/pub/R10_Risk_MAP_Process_Graphic.pdf).

8.3.1. ALASKA'S RISK MAP STRATEGY

The Alaska Mapping Business Plan: Integrating Mapping, Assessment, and Mitigation Planning comprehensively evaluates the status of Alaska's flood maps, setting priorities for future

mapping and risk assessment, and outlining a collaborative relationship with FEMA to fully execute the Risk MAP strategy for the benefit of Alaska's communities, local governments, tribal entities, and residents. The purpose of the Alaska Mapping Business Plan is to provide FEMA with Alaska's strategy for local government participation in the Risk MAP Program.

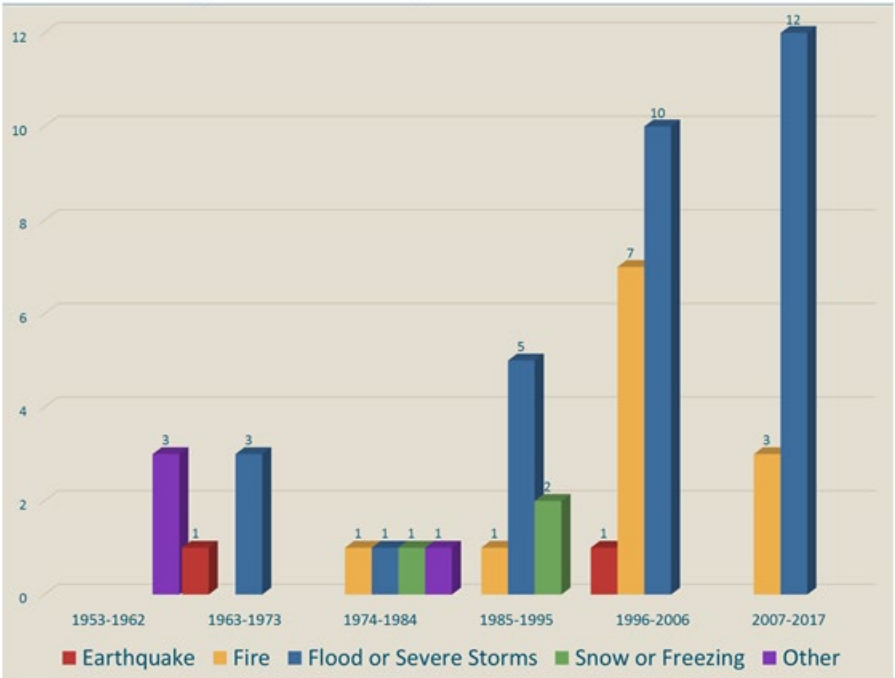
Imminently-Threatened Alaska Native Communities

In 2017, a new focus of Alaska's Risk MAP Program was developed to provide assistance to Alaska Native villages threatened by flooding, erosion, and permafrost degradation. This effort will initially focus on the 31 communities identified as imminently threatened in the 2009 U.S. Government Accountability Report, Alaska Native Villages: Limited Progress Has Been Made on Relocating Villages Threatened by Flooding and Erosion (GAO-09-551, June 3, 2009). DCRA will continue to work with other state and federal agencies, private sector organizations, non-profit entities, tribes and local governments to develop a strategy that will bring Risk MAP resources and tools of to the communities who most need this assistance.

The DCRA provides the following information pertaining to this new effort:

> *Over the last several decades, the number of presidentially-declared disasters in Alaska has increased dramatically, as illustrated in Figure 1, below. The majority of these disasters are caused by flooding associated with severe storms.*

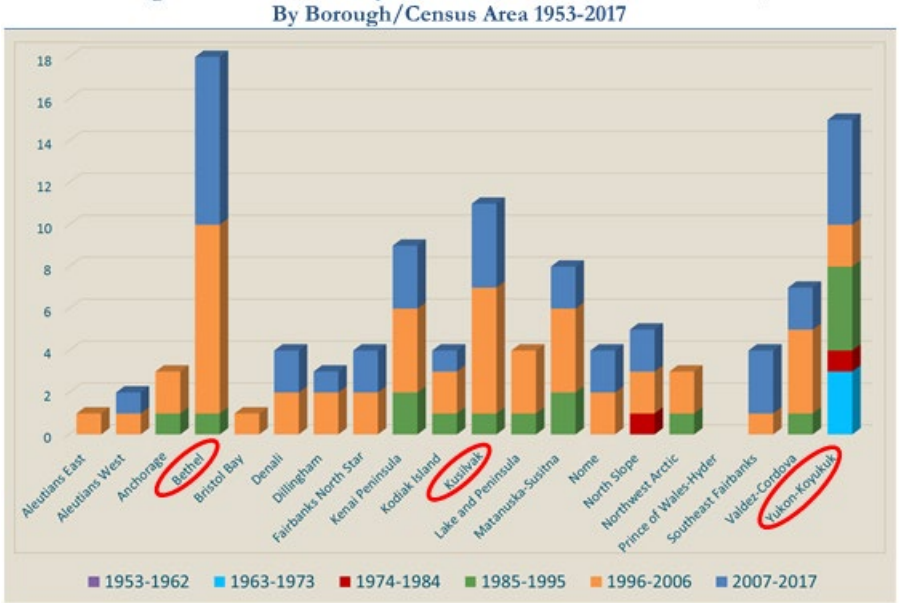
Figure 1: Alaska Federally Declared Disasters, 1953-2017



> *Most of these events have occurred in the Bethel, Kusilvac and Yukon-Koyukuk census areas (see Figure 2 [below]). These census areas are comprised of small, remote, predominantly Alaska Native communities. The communities are especially vulnerable because all three census areas are part of Alaska's vast unorganized borough where there is no borough form of government to provide services and other resources to address disaster events. Only 9 of the 87 Alaska Native villages within these two census areas participate in the National Flood Insurance Program (NFIP). Nearly half of the villages within these census areas are ineligible to participate in the NFIP because they are not incorporated municipalities. Storm events are increasingly putting these*

communities at risk to loss of life and property. Recent studies indicate that the frequency and intensity of these storms is likely to increase, especially in western Alaska.

Figure 2: Alaska Federally-Declared Disasters, Floods or Storms, By Borough/Census Area 1953-2017



State and Federal agencies have been concerned about the impact of flooding and other natural hazards on the safety and viability of Alaska Native communities for some time. Several key observations and needs have been identified through these efforts:

- *Assistance to imperiled communities should be based on a fair and defensible methodology which prioritizes communities by level of threat and need*
- *The community must be a key player in the decision-making process*
- *Imperiled communities (and the agencies assisting them) need quantifiable data from which to make informed decisions*
- *A coordinated, interdisciplinary approach to address community threats is essential to increasing community resilience*

A briefing paper prepared by the State of Alaska Risk MAP Coordinator, "Risk Mapping, Assessment and Planning: Assisting Alaska Native Villages," summarizes these efforts and looks at ways in which the tools, resources, and technical assistance offered through FEMA's Risk Mapping, Assessment, and Planning (Risk MAP) Program could enhance local understanding of risk in Alaska Native villages and inform local decisions to take action to increase disaster resilience in these communities.

> *"Understanding risk and having reliable data from which to make informed decisions to take action to reduce or mitigate risk is crucial to community-driven efforts to increase disaster resilience.*

Developing a Risk MAP Strategy to Assist Imminently-Threatened Alaska Native Villages

A community does not have to participate in the National Flood Insurance Program (NFIP) to be involved in the Risk MAP Program. Although the regulatory products of the Risk MAP Program, Flood Insurance Studies and Flood Insurance Rate Maps apply to NFIP-participating communities, many of Risk MAP's non-regulatory tools and products can be of great benefit to non-NFIP communities who are dealing with the impacts of natural hazards and environmental change. Below is a summary of what the Risk MAP process might look like for these communities:

Pre-Discovery

FEMA and the State will work with the Alaska Native village to understand the needs, resources, and capabilities to support the community in risk reduction and resilience efforts. Ideally, the Risk MAP process would be tied with the Hazard Mitigation Planning update process. The Data Collection and Analysis Phase will begin prior to the Discovery Meeting and continue afterwards once the needs of the village are identified (see Post-Discovery Data Collection and Analysis, below).

Discovery Interview

A telephone interview will be conducted with various stakeholders (regional, state, federal) to share current information, current and past projects, historical knowledge, and to identify who the best people are to attend the in-person Discovery meeting.

Discovery Meeting

The State Risk MAP Coordinator and a few key stakeholders will conduct an in-person Discovery meeting in the village. The purpose of the Discovery Meeting is to gather information on the community's perspective about local natural hazards and their risk. This information will be used to prioritize risk and vulnerability assessment and mitigation planning assistance.

Considerations for the meeting include:

- *Need for interpreter in villages where English is the second language*
- *Number of stakeholders attending (We don't want to outnumber attendees)*
- *Culturally-appropriate ways to present information*
    - *Community gathering/potluck*

*(*see Discovery Report suggestion under Risk MAP Products and Tools, below)*

Post-Discovery Coordination and Project Scope Development

This will be a collaborative effort to identify how we can meet the community's resilience needs and how we can align FEMA's effort with other ongoing efforts.

Post-Discovery Data Collection and Analysis

During this phase of the project, funding will be secured, local multi-hazard data will be collected, and risk and vulnerability assessments will be conducted to evaluate the nature, immediacy, probability, and severity of each hazard.

Data Collection and Analysis will be a collaborative effort between a number of stakeholders in order to meet the community's resilience needs. The discussion should include:

- *Ways to incorporate local/traditional knowledge with science*
- *How to incorporate local observation as part of the process. Both the Alaska Native Tribal Health Consortium and the Alaska Division of Geological and Geophysical Surveys have local observer efforts and there is real value in training local observers to document change throughout the study process.*

Risk MAP Products and Tools

Discovery Report: a supplement to the report would be more helpful for many communities. DCRA has found that providing a map-sized document which can be hung in a public space, allowing community residents to gather and discuss is often more useful than a multipage report. The traditional Discovery Report could still be prepared to meet the needs of agencies. An example of a translated document can be found here: https://silverjacketsteam.nfrmp.us/LinkClick.aspx?fileticket=6b_0S-nFCso%3d&portalid=0

Resilience Meeting

The Resilience Meeting provides the community with the opportunity to meet with subject matter experts to discuss how the information, tools, and products of the Risk MAP process can be used to inform future planning efforts, reduce risk, and increase local resistance to disaster. A decision on next-steps to implement resilience actions is key to this meeting.

As with the Discovery Meeting, it may be necessary to have an interpreter and to hold the meeting in a community gathering/potluck format. Use of visuals outlining next steps (that can be left in the community) are helpful.

Please visit the Imminently-Threatened Alaska Native Village story map webpage for more information: (https://www.commerce.alaska.gov/web/dcra/PlanningLandManagement/RiskMAP/Imminently-ThreatenedAlaskaNativeVillages.aspx)." Source: DCRA, 2018

Mapping Studies in Alaska

Ten municipalities (cities and boroughs) have ongoing Risk MAP studies. Five municipal Risk MAP studies have resulted in Preliminary Flood Insurance Rate Maps (FIRMs), one study is in the resilience phase, one is in the draft work map phase, five projects are in the discovery phase, and two have been completed. Current Risk MAP Study locations in Alaska include (Table 8-7):

Table 8-7 Alaska Risk Map Program – Jurisdictional Status

Jurisdiction	Status
Municipality of Anchorage	Resilience Phase; In-Progress
Fairbanks North Star Borough	Draft Work Map Phase;
City and Borough of Juneau	Preliminary Map Phase
Kenai Peninsula Borough	Complete
Ketchikan Gateway Borough	Preliminary Map Phase
City of Cordova	Complete
City of Aniak	Discovery Phase
City of Bethel	Discovery Phase
City of Emmonak	Discovery Phase
City of Kotzebue	Discovery Phase
City of Kwethluk	Discovery Phase
Matanuska-Susitna Borough	Preliminary Map Phase
City and Borough of Sitka	Preliminary Map Phase
City of Valdez	Preliminary Map Phase

Source: DCCED/DCR 2018

8.4. NATIONAL FLOOD INSURANCE PROGRAM PARTICIPATION

This section estimates the number and type of structures at risk to repetitive flooding: properties that have experienced repetitive loss (RL), the flood depth extent, and damage potential.

Alaska's NFIP activities include:

- National Flood Insurance Program Participation
  - Repetitive Loss Properties
  - Community Rating System (CRS)

DMA 2000 requirements and implementing state governance regulations for addressing repetitive loss RL and Severe Repetitive Loss (SRL) properties include:

DMA 2000 Requirements
STANDARD STATE. Repetitive Loss (RL) Strategy
RL1. Did Element S6 (risk assessment) address RL and SRL properties? [44 CFR §§201.4(c)(2)(ii), 201.4(c)(2)(iii), and 201.4(c)(3)(v)]
RL2. Did Element S8 (mitigation goals) address RL and SRL properties? [44 CFR §§201.4(c)(3)(i) and 201.4(c)(3)(v)]
RL3. Did Element S9 (mitigation actions) address RL and SRL properties? [44 CFR §§201.4(c)(3)(iii) and 201.4(c)(3)(v)]
RL4. Did Element S10 (funding sources) address RL and SRL properties? [44 CFR §§201.4(c)(3)(iv) and 201.4(c)(3)(v)]
RL5. Did Element S13 (local and tribal, as applicable, capabilities) address RL and SRL properties? [44 CFR §§201.4(c)(3)(ii) and 201.4(c)(3)(v)]
RL6. Did Element S15 (prioritizing funding) address RL and SRL properties? [44 CFR §§201.4(c)(4)(iii) and 201.4(c)(3)(v)]
Source: FEMA, March 2015.

There are nine boroughs with 33 NFIP participating communities as listed in Table 8-8, NF Jurisdictions

Table 8-8 NFIP Participating Jurisdictions

Alaska Boroughs	Participating Communities
Municipality of Anchorage (MOA):	Includes: Municipality of Anchorage, Chugiak, Eagle River, Girdwood, Eklutna, and Vicinity
Fairbanks North Star Borough (FNSB)	Includes: City of Fairbanks and Vicinity & North Pole
City and Borough of Juneau (CBJ)	Includes City of Douglas
Kenai Peninsula Borough (KPB)	Includes: Kachemak, Seldovia, Seward, and SBCFSA
Ketchikan Gateway Borough (KGB)	Includes: City of Ketchikan and Saxman
Lake & Peninsula Borough (LPB)	Includes: Chignik, Egegik, Nondalton, Pilot Point, Port Heiden
Matanuska-Susitna Borough (MSB)	Includes the incorporated areas of the cities of Houston, Palmer and Wasilla and Talkeetna
Northwest Arctic Borough (NWAB)	Includes: Ambler, Buckland, Deering, Kiana, Kobuk, Noorvik, Selawik, and Shungnak) and Cities of Kivalina and Kotzebue
City and Borough of Sitka	Includes: City and Borough of Sitka

FEMA's National Flood Insurance Program's Community Status Book Report lists Alaska's NFIP participating communities and their respective programmatic participation details (Figures 8-1, 8-2, and 8-3)

Federal Emergency Management Agency
Community Status Book Report
ALASKA
Communities Participating in the National Flood Program

CID	Community Name	County	Init FHBM Identified	Init FIRM Identified	Curr Eff Map Date	Reg-Emer Date	Tribal
020005#	ANCHORAGE, MUNICIPALITY OF INCLUDES CHUGIAK, EAGLE RIVER, GIRDWOOD, EKLUTNA AND THE HISTORIC CITY & BOROUGH OF ANCHORAGE.	ANCHORAGE MUNICIPALITY	06/09/70	09/05/79	09/25/09	09/05/79	No
020033#	ANIAK, CITY OF	BETHEL CENSUS AREA	09/05/78	04/02/90	09/29/06	04/02/90	No
020104#	BETHEL, CITY OF	BETHEL CENSUS AREA	06/28/74	03/16/76	09/25/09	03/16/76	No
020037A	CORDOVA, CITY OF	VALDEZ-CORDOVA CENSUS AREA	05/24/77	04/02/79	12/16/15	04/02/79	No
020041#	DILLINGHAM, CITY OF	DILLINGHAM CENSUS AREA	05/31/74	09/30/82	09/30/82	09/30/82	No
020125#	EMMONAK, CITY OF	WADE HAMPTON CENSUS AREA		09/21/98	09/25/09	09/21/98	No
025009#	FAIRBANKS NORTH STAR BOROUGH INCLUDES CITY OF FAIRBANKS & VICINITY & NORTH POLE	FAIRBANKS NORTH STAR BOROUGH		06/25/69	03/17/14	05/15/70	No
020045#	FORT YUKON, CITY OF	YUKON-KOYUKUK CENSUS AREA		02/03/10	02/03/10	02/03/10	No
020124#	GALENA, CITY OF	YUKON-KOYUKUK CENSUS AREA	10/12/82	03/01/84	03/01/84	03/01/84	No
020007	HAINES BOROUGH NOW INCLUDES THE DEFUNCT COMMUNITY OF HAINES CITY OF AS OF 10/17/2002. ON 9/1/2004 THE BOROUGH ADOPTED FHBM OF AUGUST 22, 1975 INITIALLY DEVELOPED FOR THE CITY OF HAINES WHICH WAS SUBSEQUENTLY CONVERTED TO A FIRM BY LETTER.	HAINES BOROUGH	05/31/74	05/01/87	05/01/87(L)	02/02/05	No
020107B	HOMER, CITY OF	KENAI PENINSULA BOROUGH	05/19/81	06/16/99	10/20/16	06/02/03	No
020049#	HOONAH, CITY OF	SKAGWAY-HOONAH-ANGOON CENSUS A	06/07/74	04/02/79	06/04/10	04/02/79	No
020009#	JUNEAU, CITY AND BOROUGH OF INCLUDES THE CITY OF DOUGLAS.	JUNEAU CITY AND BOROUGH	05/20/77	02/04/81	08/19/13	02/04/81	No
020012B	KENAI PENINSULA BOROUGH INCLUDES THE CITIES OF SELDOVIA AND KACHEMAK.	KENAI PENINSULA BOROUGH		05/19/81	10/20/16	11/20/86	No
020003#	KETCHIKAN GATEWAY BOROUGH INCLUDES THE CITIES OF KETCHIKAN AND SAXMAN	KETCHIKAN GATEWAY BOROUGH	05/09/78	04/16/90	04/16/90	04/16/90	No
020059#	KOTZEBUE, CITY OF	NORTHWEST ARCTIC BOROUGH	06/21/74	07/18/83	07/18/83	07/18/83	No
020127	KOYUKUK, CITY OF	YUKON-KOYUKUK CENSUS AREA				01/15/02(E)	No
020130	KWETHLUK, CITY OF	BETHEL CENSUS AREA				10/26/99(E)	No
025063#	LAKE AND PENINSULA BOROUGH	LAKE AND PENINSULA BOROUGH		02/03/10	02/03/10	02/03/10	No
020021#	MATANUSKA-SUSITNA, BOROUGH OF INCLUDES THE INCORPORATED AREAS OF THE CITIES OF HOUSTON, PALMER AND WASILA.	MATANUSKA-SUSITNA BOROUGH	02/28/78	05/01/85	03/17/11	05/01/85	No
020128#	MCGRATH, CITY OF	YUKON-KOYUKUK CENSUS AREA		10/04/11	10/04/11	10/04/11	No
025010#	NENANA, CITY OF	YUKON-KOYUKUK CENSUS AREA		06/09/72	04/07/99	06/09/72	No
020069#	NOME, CITY OF	NOME CENSUS AREA	06/28/74	09/01/83	05/03/10	09/01/83	No
020121	NORTHWEST ARCTIC BOROUGH	NORTHWEST ARCTIC BOROUGH				05/17/05(E)	No
020074#	PETERSBURG, CITY OF	WRANGELL-PETERSBURG CENSUS ARE	06/14/74	06/01/82	06/01/82	06/01/82	No

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Figure 8-1 Alaska NFIP Participation Status as of April 2018 *Source: NFIP 2018*

Federal Emergency Management Agency
Community Status Book Report
ALASKA
Communities Participating in the National Flood Program

CID	Community Name	County	Init FHBM Identified	Init FIRM Identified	Curr Eff Map Date	Reg-Emer Date	Tribal
020113B	SEWARD, CITY OF	KENAI PENINSULA BOROUGH		05/19/81	10/20/16	11/20/86	No
	THE CITY OF SEWARD HAS ADOPTED THE KENAI PENINSULA BOROUGH (020012) FIRM.						
020084#	SHISHMAREF, CITY OF	NOME CENSUS AREA		05/03/10	05/03/10	08/23/01	No
020006#	SITKA, CITY AND BOROUGH OF	SITKA CITY AND BOROUGH	06/28/74	06/01/82	09/29/10	06/01/82	No
025011	SKAGWAY, CITY OF	SKAGWAY-HOONAH-ANGOON CENSUS A	09/09/70	03/01/77	03/01/77	03/01/77	No
020090#	TOGIAK, CITY OF	DILLINGHAM CENSUS AREA	05/10/77	02/03/10	02/03/10	05/21/09	No
020094#	VALDEZ, CITY OF	VALDEZ-CORDOVA CENSUS AREA	11/01/74	09/03/80	12/01/83	09/03/80	No

Summary:

Total In Flood Program	31
Total In Emergency Program	3
Total In the Regular Program	28
Total In Regular Program with No Special Flood Hazard	0

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Figure 8-2 **Alaska NFIP Participation Status as of April 2018** *Source: NFIP 2018*

Federal Emergency Management Agency
Community Status Book Report
ALASKA
Communities Not in the National Flood Program

CID	Community Name	County	Init FHBM Identified	Init FIRM Identified	Curr Eff Map Date	Sanction Date	Tribal
020040#	DELTA JUNCTION, CITY OF	SOUTHEAST FAIRBANKS CENSUS ARE	10/25/77	09/16/82	09/16/82	02/01/16(W)	No
020114B	KENAI, CITY OF	KENAI PENINSULA BOROUGH	06/14/74	05/19/81	10/20/16	06/14/75	No
	FORMERLY PARTICIPATED UNDER THE BOROUGH OF KENAI PENINSULA'S APPLICATION. CURRENTLY NOT PARTICIPATING IN THE NFIP. FAILED TO ADOPT REQUIRED MEASURES.						
020014#	SOLDOTNA, CITY OF	KENAI PENINSULA BOROUGH	06/14/74	12/06/99	12/06/99	06/14/75	No
020098#	WRANGELL, CITY AND BOROUGH OF	WRANGELL-PETERSBURG CENSUS ARE	06/28/74	06/15/82	06/15/82	06/15/82(S)	No

Summary:

Total Not in Flood Program	4
Total Suspended from Emergency Program	0
Total Suspended from Regular Program	1
Total Withdrawn Communities Not In Program	1
Total Not In Program With Hazard Area Identified	4
Total Not In Program With Hazard Area Identified < 1 Year	0

Legend:

(E)	Indicates Entry In Emergency Program
NSFHA	No Special Flood Hazard Area - All Zone C
(>)	Date of Current Effective Map is after the Date of This Report
N/A	Not Applicable At This Time
(S)	Suspended Community
(W)	Withdrawn Community
(M)	No Elevation Determined - All Zone A, C and X
(L)	Original FIRM by Letter - All Zone A, C and X

Figure 8-3 **Alaska NFIP Participation Status as of April 2018** *Source: NFIP 2018*

Community Rating System

The NFIP provides opportunities for jurisdictions to voluntarily participate in the Community Rating System (CRS). The 2018 Flood Insurance Manual describes the CRS and summarizes a few of its benefits as follows:

> *The Community Rating System (CRS) is a voluntary program for National Flood Insurance Program (NFIP) participating communities. The goals of the CRS are to reduce flood damages to insurable property, strengthen and support the insurance aspects of the NFIP, and encourage a comprehensive approach to floodplain management.*
>
> *The CRS has been developed to provide incentives in the form of premium discounts for communities to go beyond the minimum floodplain management requirements to develop extra measures to provide protection from flooding.*

TABLE 2. CRS PREMIUM DISCOUNTS

Rating	*Percentage (%)*	*Rating*	*Percentage (%)*
1	*45%*	*6*	*20%*
2	*40%*	*7*	*15%*
3	*35%*	*8*	*10%*
4	*30%*	*9*	*5%*
5	*25%*	*10*	*0%*
SFHA (Zones A, AE, A1–A30, V, V1–V30, AO, and AH): Discount varies depending on class. *SFHA (Zones A99, AR, AR/A, AR/AE, AR/A1–A30, AR/AH, and AR/AO): 10% discount for Classes 1–6; 5% discount for Classes 7–9.** *Non-SFHA (Zones B, C, X, D): 10% discount for Classes 1–6; 5% discount for Classes 7–9.*			

** In determining CRS Premium Discounts, all AR and A99 Zones are treated as non-SFHAs.*

Source: FEMA FIM 2018, https://www.fema.gov/media-library/assets/documents/162601

The following jurisdictions participate in the Community Rating System and receive applicable flood insurance discounts (Table 8-9).

Table 8-9 Community Rating System Eligible Communities

Effective May 1, 2018

State	CID	Community Name	CRS Entry Date	Current Effective Date	Current Class	Discount (%)	Discount For Non-SFHA [1] (%)	Status[2]
AK	020005	Anchorage, Municipality of	10/1/95	10/1/09	6	20	10	C
AK	020107	Homer, City of	05/1/16	05/1/16	8	10	5	C
AK	020012	Kenai Peninsula, Borough of	05/1/00	05/1/00	8	10	5	C
AK	020003	Ketchikan Gateway Borough	10/1/05	05/1/16	10	0	0	R
AK	020069	Nome, City of	10/1/05	10/1/16	9	5	5	C
AK	020113	Seward, City of	10/1/05	10/1/16	9	5	5	C
AK	020094	Valdez, City of	10/1/92	10/1/14	9	5	5	C

1. For the purpose of determining CRS discounts, all AR and A99 Zones are treated as non-SFHAs.
2. Status: C = Current, R = Rescinded.

8.4.1. REPETITIVE LOSS PROPERTIES

Repetitive loss properties are properties that have had at least two $1,000 claims within any 10-year period since 1978. Severe repetitive loss properties have experienced four or more separate building and content claims since 1978 each exceeding $5,000 with cumulative claims exceeding $20,000; or at least two separate building claims with cumulative losses exceeding the value of the main living structure.

Due to limited FEMA funding, there are very few of Alaska communities with Flood Insurance Rate Maps (FIRMs) (Figures 8-1, 8-2, & 8-3). Therefore, the majority of Alaska's flood-prone communities do not participate in the NFIP, many do not have a repetitive flood property inventory that meets NFIP criteria as the loss thresholds are substantially below FEMA values, nor do they have any historical flood hazard maps or funding to create them.

Figure 8-4 Alaska's Mapped NFIP locations (Blue Shaded Areas) *Source: FEMA 2018*

8.4.2. REPETIVE LOSS AND SEVERE REPETITIVE LOSS FUNDING OPPORTUNITIES

There are numerous repetitive flood properties and damage claims within Alaska NFIP participating communities as noted in Table 8-10. These data reflect 2017 federally declared flood disasters, as well as additional best available data. Applicants can file for NFIP damage claims based on their community's status and whether the individual home or facility owner is eligible to participate.

Table 8-10 Repetitive Flood Claim (RFC) Communities

Area	Community	Total Payments ($)	Losses	Properties	As of Date
Municipality of Anchorage	Municipality of Anchorage	19,801.06	4	2	05/31/2018
Bethel Census Area	City of Aniak	161,072.58	14	5	05/31/2018
Bethel Census Area	City of Bethel	21,040.18	3	1	05/31/2018

Table 8-10 Repetitive Flood Claim (RFC) Communities

Area	Community	Total Payments ($)	Losses	Properties	As of Date
Bethel Census Area	City of Kwethluk	14,600.57	2	1	05/31/2018
Fairbanks North Star Borough	Fairbanks North Star Borough	900,177.78	52	19	05/31/2018
Juneau Borough	City and Borough of Juneau	270,393.58	9	2	07/30/2018
Kenai-Cook Borough	Kenai Peninsula Borough	127,304.44	12	6	07/30/2018
Nome Census Area	City of Nome	80,930.85	6	3	07/30/2018
Valdez Cordova Census Area	City of Valdez	34,859.96	3	1	07/30/2018

Future SHMP updates will strive to obtain more comprehensive property loss information to facilitate updating Table 8-11 and the Mitigation Strategy to garner additional NFIP and Community Rating System (CRS) benefits.

NFIP RL/SRL Program Challenges

There are only 33 jurisdictions that participate in the NFIP. All of which qualify for FMA's RL/SRL repetitive loss funding. However that is only 33 of Alaska's 184 flood threatened communities.

The remaining 151 communities do not have repetitive loss property inventories that meet FEMA NFIP standards, flood insurance study (FIS) based flood hazard maps, or FEMA, USACE, NRCS or other agency sponsored flood impact studies and are therefore ineligible for most agency funding. Severely flood threatened communities cannot even apply for nationally competitive PDM grants because they do not participate in the NFIP.

The only potential funding sources for repetitive flood impact locations comes from the state's federal declared disaster sponsored HMGP opportunities.

State NFIP Goals Going Forward

- The State NFIP Coordinator has an essential role in this collaborative effort by:
- Guiding and coordinating effort to address the RL and SRL properties challenges by working with the communities that have these properties and helping them to prioritize desired remediation practices. This would assist those properties that are most in need. Those property owners have the least ability to address needed property remediation.
- Helping each community to identify their RL/SRL properties within their hazard mitigation plan.
- Encouraging each NFIP participating community to identify their RL/SRL properties as they are the ones who are able to obtain specific property information.
    - Assisting communities with reducing repetitive property losses through structure acquisition, elevation, or relocation.
    - Developing strategies to assist these communities with applying for grants.

Regional Cooperative Assistance Opportunities

NORFMA is a nonprofit organization for regional networking and support on issues of environmental quality, economic sustainability, and scientific discovery on a watershed basis.

NORFMA provides a channel for regional communication and cooperation for all Alaska, Idaho, Oregon, Washington, and British Columbia, Canada's floodplain managers.

NORFMA's mission is to:

- Provide for free exchange of ideas and information among members.
- Support the integration of multi-disciplinary programs and interests in floodplain management.
- Promote educational programs on floodplain and water shed management topics.
- Increase public awareness of the value and function of floodplains.
- Encourage government involvement in programs to reduce flood damages and to protect, manage, and restore floodplains.

8.5. VULNERABILITY ASSESSMENT METHODOLOGY

A worst case exposure analysis was conducted using GIS. The project team gathered data from SHMP participating agencies such as the AVO, DGGS, DOT, AICC, and others. Infrastructure values were totaled for each affected borough or REAA. This analysis is a simplified potential hazard risk assessment without considering recurrence probability or damage level.

The methodology used a two-pronged effort. First, the project team, State, and participating agencies compiled critical facility inventory for potential hazard threat exposure and vulnerability analysis. Second, these data were used to develop a relevant location vulnerability assessment for those facilities.

For example, the following process was used to define potential volcanic ash impacts throughout the state:

> *To analyze the volcanic ashfall hazard, the state was divided into 10km grids. Each grid was given a score for historic ashfall event frequency and a score for their proximity to volcanos. These two scores were totaled for each grid square resulting in a hazard score.*
>
> *Therefore:* ***X+Y=Z***
>
> *"**X**" represents the value given for the total number of historic ashfall events within each 10km square.*
>
> *If 0-4 events, X = 0*
> *If 5-9 events, X = 1*
> *If 10-13 events, X = 2*
>
> *"**Y**" represents the value given based on each 10km square's proximity to historically active Volcanos (ash producing or not).*
>
> *If no volcano is within 100km, Y = 0*
> *If a volcano is within 100km, but has no confirmed or questionable historical ash producing eruption, Y = 0*
> *If a volcano is within 100km, and has a questionable historical ash producing eruption account, Y = 1*
> *If a volcano is within 100km, and has a confirmed historical ash producing eruptions, Y = 2*
>
> ***Note:** If a grid square is within 100km of an ash producing volcano and a non-ash producing volcano, the higher score was given.*
>
> *"**Z**" represents the calculated hazard score of X+Y for each 10km grid square.*
>
> *If Z = 0, Hazard is Low*
> *If Z =1, Hazard is Low-Moderate*
> *If Z = 2, Hazard is Moderate*
> *If Z = 3 or 4, Hazard is High*

In summary the Ash hazard level is based on the proximity to ash producing, historically active volcanos and the frequency of historic ashfall events across the state. Source DGGS and AECOM 2018

Volcano Ash Frequency Data Recode	*Recode ash frequency (historic ashfall events) key to:* *0-4 = 0* *5-9 = 1* *10-13 = 2*
Volcano Ash Data Recode	*Ash Recode + Volcano Recode = Hazard Score:* *0 = Low* *1 = Low-Moderate* *2 = Moderate* *3 and 4 = High*
Volcano Presence Recoding	*0 = No volcano within 100km = 0* *0 = No confirmed or questionable historical eruption with ash cloud within 100km* *1 = Questionable historical eruption account that mentions ash cloud within 100km* *2 = Confirmed historical eruptions with ash cloud production within 100km*

8.5.1. DATA LIMITATIONS

The vulnerability estimates provided herein use the best data currently available, and the methodologies applied result in risk approximations. These estimates may be used to understand relative risk from hazards and potential losses. However, uncertainties are inherent in any loss estimation methodology, arising in part from incomplete scientific knowledge concerning hazards and their effects on the built environment as well as the use of approximations and simplifications that are necessary for comprehensive spatial analyses.

It is also important to note that the quantitative vulnerability assessment results are limited to the exposure of people, buildings, critical facilities, and infrastructure to the identified hazards. It was beyond the scope of this SHMP to develop a more detailed or comprehensive assessment of risk (including annualized losses, people injured or killed, shelter requirements, loss of facility/system function, and economic losses). Such impacts may be addressed with future SHMP updates.

8.5.2. VULNERABILITY EXPOSURE ANALYSIS

The SHMP's GIS vulnerability assessment is based on the following parameters (Table 8-11):

Table 8-11 GIS-based Exposure Analysis Assumptions

Hazard	Severity / Description Determination
Cryosphere: Glacier	DGGS identified potential glacier hazard risk zones as any flowline, area, or waterbody (as defined by the National Hydrography Dataset, www.usgs.gov/core-science-systems/ngp/national-hydrography/access-national-hydrography-products) within 1 km (0.62 mi) of a glacier (as defined by the Randolph Glacier Inventory 5.0, www.glims.org/RGI/randolph50.html).
Cryosphere: Avalanche	DGGS identified Potential Release Areas (PRAs) using a digital surface model as input and modeled based on geostatistical parameters (elevation, slope, and curvature) and land cover overlay (excluding conifer forest). Therefore, avalanche high risk will occur from slope grades spanning from 28 to 60 degrees on non-evergreen vegetated slopes.
Cryosphere/ Ground Failure: Permafrost	No risk along with low, moderate, and high risk categories are based on the likelihood of permafrost degradation as a function of permafrost distribution (extent), soil texture, ground ice volume, current modeled mean annual ground surface temperature, and year 2040 modeled change in active layer thickness (seasonally thawed surface layer above permafrost) (based on data from

Table 8-11 GIS-based Exposure Analysis Assumptions

Hazard	Severity / Description Determination
	Jorgenson and others, 2008; and Denali Commission Threat Assessment & UAF, 2018). See Table 8-12 and Table 8-13.
Earthquake	Ground Motion expressed as a percentage of gravitational (%g) forces Moderate Shaking : 3.9-9.2 (%g) Strong Shaking: 9.2-18 (%g) Very Strong + Shaking: >18 (%g)
Coastal Flooding	AECOM used 0.5 mile buffer along DGGS identified coastal flood threatened communities (based on data from USACE, GAO, IAWG)
Coastal Erosion	USACE identified coastal erosion threatened communities
Riverine Flooding	USACE and DGGS identified riverine flood threatened communities (based on data from USACE, GAO, NOAA-NWS)
Ground Failure Landslide	DGGS identified one category: slopes over 28° AECOM added a 0.5 mile buffer to simulate release downslope runout/washout areas
Volcanic Ash	Classification number 1, 2, 3 represents (Event Frequency) + (Proximity to historically active ash volcanoes)
Tsunami	AECOM assessed USACE and DGGS identified tsunami threatened community areas spanning from sea level to approximately 100ft elevation
Weather	All Alaska population and infrastructure is vulnerable to weather impacts

Permafrost analysis assumptions and detailed parameters are listed in Table 8-12. Scores of 0–3 were tallied from all five input parameters to arrive at a total Permafrost Risk Level; risk level scoring schema is shown in Table 8-13.

Table 8-12 Permafrost Data and Risk Analysis Parameters

Score	Jorgenson PF_EXTENT	Jorgenson TEXTURE	Jorgenson ICECLOWASS	MAGST	Active Layer Thickness Change (ALTC)
0	G, U, W	Ice, Water	Glacier, Unfrozen	no permafrost, based on Jorgenson dataset	no permafrost, shown as no data in ALTC dataset
1	I	Rocky	Low	< -5 degrees C	0.0 to 0.05 m
2	D, S	Sandy	Moderate, Variable	-5 to -2 degrees C	> 0.05 m
3	C	Silty	High	> -2 degrees C	Permafrost disappears, shown as -9999 in ALTC dataset

Source Data:
- Jorgenson and others, 2008
- •Mean Annual Ground Surface Temperature (MAGST) (Data source: Denali Commission Threat Assessment, & UAF, 2018)
- 2040 Projected Active Layer Thickness Change (ALTC) (Data source: Denali Commission Threat Assessment, & UAF, 2018)

Acronyms:
PF-EXTENT: Permafrost extent
- C: Continuous permafrost (>90%)
- D: Discontinuous permafrost (50-90%)
- S: Sporadic permafrost (10-50%)
- I: Isolated permafrost (>0-10%)
- U: Unfrozen
- G: Glacier
- W: Water

TEXTURE: General textural composition of surface deposits
ICECLOWASS: Excess ice volume in top 5 m of ground
- High (>40% volume)
- Moderate (10-40% volume)
- Low (<10% volume)
- Variable (buried glacial ice)
- Unfrozen
- Glacier

Table 8-13 Permafrost Risk

Risk Level (total score)
No risk: 0
Low risk: 1-5
Moderate risk: 6-11
High risk: 12-15

Section 8.6.2 Tables 8-14 through 8-21 summarize GIS-based exposure analyses for Alaska's loss estimation. Section 8-7 provides a narrative explanation of these data results.

Table 8-14 Potential Cryosphere Hazard Exposure Analysis Population and Buildings

Hazard Type	Severity	Description	Population	Housing Units
Glacier	High	Descriptive	23,865	11,542
Avalanche	High	Slopes 28° to 60°	85,380	38,567
Ground Failure – Permafrost	Low risk: 1-5	<10% volume	119,544	53,568
	Moderate risk: 6-11	10-40% volume	249,145	102,930
	High risk: 12-15	>40% volume	115,618	49,021

Table 8-15 Potential Cryosphere Hazard Exposure Analysis – Critical Facilities (Public Statewide)

Hazard Type	Severity	Description	Government	Emergency Response	Education	Medical	Utilities
Glacier	High	Descriptive	9	5	6	4	84
Avalanche	High	Slopes 28° to 60°	20	22	23	13	200
Ground Failure – Permafrost	Low risk: 1-5	<10% volume	105	56	59	36	546
	Moderate risk: 6-11	10-40% volume	206	112	126	78	983
	High risk: 12-15	>40% volume	32	18	17	15	297

Table 8-16 Potential Cryosphere Hazard Exposure Analysis – Critical Facilities (Railroad)

Hazard Type	Severity	Description	Track Miles	Facilities
Glacier	High	Descriptive	87	3
Avalanche	High	Slopes 28° to 60°	248	5
Ground Failure – Permafrost	Low risk: 1-5	<10% volume	116	3
	Moderate risk: 6-11	10-40% volume	192	3
	High risk: 12-15	>40% volume	145	8

Table 8-17 Potential Cryosphere Hazard Exposure Analysis – Critical Facilities (DOT&PF)

Hazard Type	Severity	Description	Road Miles	Bridges	Maintenance Facilities	Airports	Ports	Harbors	Ferry Terminals
Glacier	High	Descriptive	673	164	6	10	4	7	2
Avalanche	High	Slopes 28° to 60°	4,407	285	15	12	1	5	2
Ground Failure – Permafrost	Low risk: 1-5	<10% volume	2,944	183	8	50	0	7	0
	Moderate risk: 6-11	10-40% volume	4,960	436	35	100	0	4	0
	High risk: 12-15	>40% volume	1,758	139	4	17	0	1	0

Table 8-18 Potential Hazard Exposure Analysis – Population and Buildings

Hazard Type	Severity	Description	Population	Housing Units
Earthquake	Moderate Shaking	3.9-9.2 (%g)	47,701	19,187
	Strong Shaking	9.2-18 (%g)	61,477	27,233
	Very Strong + Shaking	>18 (%g)	592,399	257,733
Flood (Coastal Storm Surge, Waves, etc.)	Descriptive	0.5 mile Buffer Along Threatened Community Coastlines	87,188	39,119
Flood (Coastal Erosion)	Descriptive	USACE Identified Threatened Community Coastlines	50,194	21,295
Flood (Riverine)	Descriptive	0.25 mile Buffer Along Threatened Community Embankments	66,315	28,241
Ground Failure: (Landslide	Descriptive	Slopes > 28 degrees (°)	85,380	38,567
Tsunami (Seiche)	Descriptive	Sea Level to 100' Elevation	115,113	53,921
Volcano (Ash) * Table 8-12 Event frequency and proximity classification	Low-Moderate	1	132,209	65,267
	Moderate	2	396,846	159,999
	High	3	40,764	22,566
Weather: (Cold, Drought, Rain, Snow, Wind, etc.)	Descriptive	Entire State	710,047	306,973
Wildland Fire (Tundra, Interface, etc.)	Moderate	Moderate Fuel Rank	324,356	132,928
	High	High Fuel Rank	123,109	49,548
	Very High	Very High Fuel Rank	50,389	24,723
	Extreme	Extreme Fuel Rank	202,269	94,630

Table 8-19 Potential Hazard Exposure Analysis – Critical Facilities (Public Statewide)

Hazard Type	Severity	Description	Government	Emergency Response	Education	Medical	Utilities
Earthquake	Moderate Shaking	3.9-9.2 (%g)	134	74	81	40	522
	Strong Shaking	9.2-18 (%g)	229	104	121	70	892
	Very Strong + Shaking	>18 (%g)	173	142	109	87	1,268
Flood (Coastal Storm Surge, Waves, etc.)	Descriptive	0.5 mile Buffer Along Threatened Community Coastlines	187	118	88	62	700
Flood (Coastal Erosion)	Descriptive	USACE Identified Threatened Community Coastlines	256	166	129	88	1,121
Flood (Riverine)	Descriptive	0.25 mile Buffer Along Threatened Community Embankments	204	88	106	64	882
Ground Failure (Landslide)	Descriptive	Slopes >28°	20	22	23	13	200
Tsunami (Seiche)	Descriptive	Sea Level to 100' Elevation	44	31	17	14	163
Volcano (Ash) * Table 8-12 Event frequency and proximity classification	Low-Moderate	1	79	50	58	37	598
	Moderate	2	38	24	15	21	315
	High	3	54	49	27	28	350
Weather (Cold, Drought, Rain, Snow, Wind, etc.)	Descriptive	Entire State	565	339	323	209	2,819
Wildland Fire (Tundra, Interface, etc.)	Moderate	Moderate Fuel Rank	285	165	158	108	1139
	High	High Fuel Rank	30	18	20	13	285
	Very High	Very High Fuel Rank	64	54	45	30	437
	Extreme	Extreme Fuel Rank	68	48	55	29	534

Table 8-20 Potential Hazard Exposure Analysis – Critical Facilities - Railroads

Hazard Type	Severity	Description	Track Miles	Facilities
Earthquake	Moderate Shaking	3.9-9.2 (%g)	0	0
	Strong Shaking	9.2-18 (%g)	3	0
	Very Strong + Shaking	>18 (%g)	623	13
Flood (Coastal Storm Surge, Waves, etc.)	Descriptive	0.5 mile Buffer Along Threatened Community Coastlines	38	4
Flood (Coastal Erosion)	Descriptive	USACE Identified Threatened Community Coastlines	0	0
Flood (Riverine)	Descriptive	0.25 mile Buffer Along Threatened Community Embankments	180	8
Ground Failure (Landslide)	Descriptive	Slopes >28°	248	5
Tsunami (Seiche)	Descriptive	Sea Level to 100' Elevation	4	0
Volcano (Ash) * Table 8-12 Event frequency and proximity classification	Low-Moderate	1	387	7
	Moderate	2	214	7
	High	3	0	0
Weather (Cold, Drought, Rain, Snow, Wind, etc.)	Descriptive	Entire State	626	13
Wildland Fire (Tundra, Interface, etc.)	Moderate	Moderate Fuel Rank	141	8
	High	High Fuel Rank	139	0
	Very High	Very High Fuel Rank	119	2
	Extreme	Extreme Fuel Rank	204	2

Table 8-21 Potential Hazard Exposure Analysis – Critical Facilities – DOT&PF

Hazard Type	Severity	Description	Road Miles	Bridges	Maintenance Facilities	Airports	Ports	Harbors	Ferry Terminals
Earthquake	Moderate Shaking	3.9-9.2 (%g)	909	97	8	55	0	37	6
	Strong Shaking	9.2-18 (%g)	2,357	231	19	91	0	34	4
	Very Strong + Shaking	>18 (%g)	10,736	915	50	136	13	78	29
Flood (Coastal Storm Surge, etc.)	Descriptive	0.5 mile Buffer Along Threatened Community Coastlines	1,500	226	14	84	13	117	32
Coastal Erosion	Descriptive	USACE Identified Threatened Community Coastlines	1,760	185	20	100	7	58	19
Flood (Riverine)	Descriptive	0.25 mile Buffer Along Threatened Community Embankments	1,666	309	7	48	0	0	0
Ground Failure (Landslide)	Descriptive	Slopes >28°	4,407	285	15	12	1	5	2
Tsunami (Seiche)	Descriptive	Sea Level to 100' Elevation	351	105	3	29	9	131	39
Volcano (Ash) * Table 8-12 Event frequency and proximity classification	Low-Moderate	1	4,838	433	25	54	6	19	5
	Moderate	2	4,325	358	14	31	4	17	7
	High	3	1,552	55	7	30	2	6	2
Weather (Cold, Drought, Rain, Snow, Wind, etc.)	Descriptive	Entire State	14,108	1,245	78	294	13	149	39
Wildland Fire (Tundra, Interface, etc.)	Moderate	Moderate Fuel Rank	7,193	820	70	173	2	68	17
	High	High Fuel Rank	1,710	88	2	24	0	8	1
	Very High	Very High Fuel Rank	1,705	86	3	45	0	1	1
	Extreme	Extreme Fuel Rank	3,417	161	3	22	2	0	1

8.6. EXPOSURE ANALYSIS – NARRATIVE SUMMARIES

Cryosphere Vulnerabilities

Alaska can expect to experience ever-changing effects from melting polar ice sheets, mountain glaciers, and other cryosphere hazard impacts. Global sea level rise will most likely increase as the ice continues to melt.

Based on human location and habitation, a person could experience exposure risks ranging from moderate to significant ground failure as the ground ice melts and residential and public infrastructure is negatively impacted. It is probable that Alaska residents could experience infrastructure damage and personal injury throughout the northern portions of the state where permafrost and subsurface conditions are changing. Northern hemisphere coastal residents will likely experience less sea ice and more open water, which in turn will impact their hunting and fishing subsistence capacity. The existing, transient, and future population, residential structures, critical facilities, and infrastructure are exposed to changing cryospheric impacts (Section 6.1) that potentially threaten:

"Glacier" related events

- 23,865 people in 15,542 housing units
- 9 government facilities
- 5 emergency response facilities
- 6 education facilities
- 4 medical facilities
- 673 highway/road system miles
- 164 highway/road bridges
- 6 maintenance facilities
- 10 airports
- 4 ports
- 7 harbors
- 2 ferry terminals
- 87 railroad track miles
- 3 railroad facilities
- unknown railroad bridges
- 13 railroad facilities
- 84 utilities

"High risk" avalanche risk for slope grade spanning from 28 to 60 degrees on non-evergreen vegetated slopes

- 85,380 people in 38,567 housing units
- 20 government facilities
- 22 emergency response facilities
- 23 education facilities
- 13 medical facilities
- 200 utilities
- 4,407 highway/road system miles
- 285 highway/road bridges
- 15 maintenance facilities
- 12 airports

- 1 port
- 5 harbors
- 2 ferry terminals
- 248 railroad track miles
- 5 railroad facilities
- unknown railroad bridges

Ground Failure hazards periodically cause structure and infrastructure displacement resulting from weather and changing climate influences. Alaska communities have various permafrost conditions classified as limited, discontinuous, or continuous. Permafrost degradation is sometimes coupled with high ground water and expansive soils which accelerates failure.

"Low risk" permafrost having <10 percent by volume

- 119,544 people in 53,568 housing units
- 105 government facilities
- 56 emergency response facilities
- 59 education facilities
- 48 medical facilities
- 546 utilities
- 2,944 highway/road system miles
- 183 highway/road bridges
- 8 maintenance facilities
- 50 airports
- 0 ports
- 7 harbors
- 0 ferry terminals
- 116 railroad track miles
- 3 railroad facilities
- unknown railroad bridges

"Moderate risk" permafrost having 10-40 percent by volume

- 249,145 people in 102,930 housing units
- 206 government facilities
- 112 emergency response facilities
- 126 education facilities
- 78 medical facilities
- 983 utilities
- 4,960 highway/road system miles
- 436 highway/road bridges
- 35 maintenance facilities
- 100 airports
- 0 ports
- 4 harbors
- 0 ferry terminal
- 192 railroad track miles
- 3 railroad facility
- unknown railroad bridges

"High risk" permafrost having >40 percent by volume

- 115,618 people in 6,609 housing units
- 32 government facilities
- 18 emergency response facilities
- 17 education facilities
- 15 medical facilities
- 219 utilities
- 1,758 highway/road system miles
- 139 highway/road bridges
- 4 maintenance facilities
- 17 airports
- 0 ports
- 1 harbor
- 0 ferry terminals
- 145 railroad track miles
- 8 railroad facility
- unknown railroad bridges

Similar to weather vulnerabilities, changing cryospheric conditions also vary across Alaska. For example, northern coasts experience late ice formations; some areas that formerly experienced land fast or ice locked coastlines now have open water throughout the winter. Southern Alaska (southeast, southcentral, and southwest) areas experience wetter winter weather with less snow and more rain. These conditions will negatively impact future populations, residential structures, critical facilities, and infrastructures. Therefore the entire population and infrastructure is vulnerable to recurrent cryosphere hazard impacts.

Earthquake Vulnerabilities

Alaska should expect the full spectrum of potential earthquake ground motion scenarios. Severe shaking may result in infrastructure damage that is equally as extreme. Although all structures are at some risk due to earthquakes, short wooden buildings are less vulnerable than multi-story and complex masonry/steel structures. The majority of Alaska's school, state, and federal buildings are built and sited based on stringent seismic construction standards and are expected to survive major earthquake vents.

Based on Probabilistic Seismic Hazard Analyses (PSHA) conducted by the USGS in 2007, the entire State may be at risk of experiencing moderate to significant earthquake impacts. The PSHA maps (Figure 6-25) depict peak ground accelerations (PGAs) that can be expected for a range of earthquake exceedance probabilities. The whole state is capable of experiencing earthquake effects and the active geology of Alaska guarantees that there will continue to be earthquakes. Therefore the probability of earthquakes in Alaska is categorized as "highly likely", even though earthquake prediction is impossible (Section 6.2). In "severe" cases, ground motion may result in infrastructure damage and personal injury throughout the middle and southern portions of the State.

"Moderate risk" shaking causing "very light" potential damage: 3.9-9.2(%g)

- 47,701 people in 19,187 housing units
- 134 government facilities
- 74 emergency response facilities
- 81 education facilities

- 40 medical facilities
- 909 highway/road system miles
- 97 highway/road bridges
- 8 maintenance facilities
- 55 airports
- 0 ports
- 37 harbors
- 6 ferry terminals
- 0 railroad track miles
- unknown railroad bridges
- 0 railroad facilities
- 522 utilities

"Strong risk" shaking causing "light" potential damage: 9.2-18 (%g)

- 61,477 people in 27,233 housing units
- 229 government facilities
- 104 emergency response facilities
- 121 education facilities
- 70 medical facilities
- 2,357 highway/road system miles
- 231 highway/road bridges
- 19 maintenance facilities
- 91 airports
- 0 ports
- 34 harbors
- 4 ferry terminals
- 3 railroad track miles
- unknown railroad bridges
- 0 railroad facilities
- 892 utilities

"Very Strong risk" shaking causing "**moderate"** damage: >18 (%g)

- 592,399 people in 257,733 housing units
- 173 government facilities
- 142 emergency response facilities
- 109 education facilities
- 87 medical facilities
- 10,736 highway/road system miles
- 915 highway/road bridges
- 50 maintenance facilities
- 136 airports
- 13 ports
- 78 harbors
- 29 ferry terminals
- 623 railroad track miles
- unknown railroad bridges
- 13 railroad facilities
- 1,268 utilities

Due to Alaska's highly active geologic setting at a tectonic plate boundary, future populations, residential structures, critical facilities, and infrastructure will be exposed to continued earthquakes of various magnitudes—from those that are barely felt to those that detrimentally affect large regions of the state.

Flood and Erosion Vulnerabilities

Typical flood and erosion impacts include:

- High water flow storm surge floods scour (erode) coastal embankments, coastal protection barriers, and result in infrastructure and residential property losses. Additional impacts can include roadway embankment collapse, foundations exposure, and damaging impacts.
- Damage to structures, roads, bridges, culverts, and other features from high-velocity flow and debris carried by floodwaters. Such debris may also accumulate on bridge piers and in culverts, decreasing water conveyance and increasing loads which may cause feature overtopping or backwater damages.
- Sewage, hazardous or toxic materials release, materials transport from wastewater treatment plant or sewage lagoon inundation, storage tank damages, and/or severed pipeline damages can be catastrophic to rural remote communities.
- Economic losses through business and government facility closure; utilities such as energy generation, communications, potable water and wastewater, and transportation service disruptions.
- Flood soil and debris deposition as well as embankment or shoreline erosion from coastal and riverine high water flow, and wind.

  (See Section 6.3.4)

No detailed 100 year flood analysis has been prepared for all Alaska flood prone communities due to FEMA and State budgetary constraints. Neither has the USACE Floodplain Manager been able to provide flood information or 100-year floodplain maps that comply with NFIP regulations. Alaska flood and erosion threatened population and infrastructure potentially include:

"Coastal storm surge flood risk" potentially impacting community within 0.5 miles of shoreline

- 87,188 people in 39,119 housing units
- 187 government facilities
- 118 emergency response facilities
- 88 education facilities
- 62 medical facilities
- 1,500 highway/road system miles
- 226 highway/road bridges
- 14 maintenance facilities
- 84 airports
- 13 ports
- 117 harbors
- 32 ferry terminals
- 38 railroad track miles
- unknown railroad bridges

- 4 railroad facilities
- 700 utilities

"Coastal erosion risk" USACE identified threatened community coastlines

- 50,194 people in 21,295 housing units
- 256 government facilities
- 166 emergency response facilities
- 129 education facilities
- 88 medical facilities
- 1,760 highway/road system miles
- 185 highway/road bridges
- 20 maintenance facilities
- 100 airports
- 7 ports
- 58 harbors
- 19 ferry terminals
- 0 railroad track miles
- unknown railroad bridges
- 0 railroad facilities
- 1,121 utilities

"Riverine flood risk" potentially impacting community within 0.25 miles of major river embankments

(Note: Alaska has very few communities with identified 100- and 500-year floodplains)

- 66,315 people in 28,241 housing units
- 204 government facilities
- 88 emergency response facilities
- 106 education facilities
- 64 medical facilities
- 1,666 highway/road system miles
- 309 highway/road bridges
- 7 maintenance facilities
- 48 airports
- 0 ports
- 0 harbors
- 0 ferry terminals
- 180 railroad track miles
- unknown railroad bridges
- 8 railroad facilities
- 882 utilities

Impacts to future populations, residential structures, critical facilities, and infrastructure are anticipated to increase over historical impact rates due to changing climate, inconsistent weather patterns, glacial melt, and rain/snowmelt run-off.

Ground Failure Vulnerabilities

Potential ground failure impacts from landslides and subsidence are widespread. Potential debris flows and landslides can damage and disrupt transportation, utility systems, and water and waste treatment infrastructure along with damaging public, private, and business structures located

adjacent to steep slopes, along riverine embankments, or within alluvial fans or natural drainages.

Response and recovery efforts will likely vary from minor cleanup to more extensive utility system rebuilding. Utility disruptions are usually local and terrain dependent. Damages may require re-establishing electrical, communication, and fuel pipeline connections occurring from specific breakage points. Initial debris clearing from emergency routes and high traffic areas may be required. Water and wastewater utilities may need treatment to quickly improve water quality by reducing excessive water turbidity and re-establishing waste disposal capability. Ground failure events are typically caused by ground water, degrading permafrost, and local or region subsidence or upheaval.

Landslide, mud, and debris flow impacts are based on their slope. USGS elevation datasets were used to determine where these risks are located throughout Alaska. Slopes greater than 28 degrees was assigned a "high" risk where various cohesion failures occur. (see Section 6.4). Threatened population and infrastructure potentially include:

"High risk" landslide due to having greater than (>) 28 degree slopes

- 85,380 people in 38,567 housing units
- 20 government facilities
- 22 emergency response facilities
- 23 education facilities
- 13 medical facilities
- 4,407 highway/road system miles
- 285 highway/road bridges
- 15 maintenance facilities
- 12 airports
- 1 port
- 5 harbors
- 2 ferry terminals
- 248 railroad track miles
- unknown railroad bridges
- 5 railroad facilities
- 200 utilities

Ground Failure hazards periodically cause structure and infrastructure displacement resulting from weather and changing climate influences. Alaska communities have various permafrost conditions classified as limited, discontinuous, or continuous. Permafrost degradation is sometimes coupled with high ground water and expansive soils which accelerates failure.

"Low risk" permafrost having less than <10 volume

- 296,850 people in 125,388 housing units
- 111 government facilities
- 59 emergency response facilities
- 58 education facilities
- 48 medical facilities
- 3,699 highway/road system miles
- 298 highway/road bridges
- 15 maintenance facilities
- 44 airports

- 0 ports
- 4 harbors
- 0 ferry terminals
- 209 railroad track miles
- unknown railroad bridges
- 7 railroad facilities
- 580 utilities

"Moderate risk" permafrost having 10-40 percent volume

- 121,031 people in 55,565 housing units
- 67 government facilities
- 53 emergency response facilities
- 55 education facilities
- 29 medical facilities
- 4,133 highway/road system miles
- 300 highway/road bridges
- 22 maintenance facilities
- 54 airports
- 0 ports
- 3 harbors
- 0 ferry terminals
- 236 railroad track miles
- unknown railroad bridges
- 5 railroad facilities
- 501 utilities

"High risk" permafrost having >40 percent volume

- 18,153 people in 6,609 housing units
- 77 government facilities
- 34 emergency response facilities
- 39 education facilities
- 23 medical facilities
- 918 highway/road system miles
- 93 highway/road bridges
- 8 maintenance facilities
- 37 airports
- 0 ports
- 2 harbors
- 0 ferry terminals
- 9 railroad track miles
- unknown railroad bridges
- 1 railroad facility
- 341 utilities

Impacts to future populations, residential structures, critical facilities, and infrastructure are anticipated to increase over historical impact rates due to changing climate, inconsistent weather patterns, glacial melt, and rain/snowmelt runoff.

Tsunami and Seiche Vulnerabilities

Alaska communities in the Aleutian Islands, the Alaska Peninsula (including the southern Bering Sea communities), the Gulf of Alaska, and Southeast Alaska all have and will continue to be exposed to local and distant tsunami and seiche impacts (See Section 6.5).

Threatened residential structures and infrastructure in these communities include.

"Tsunami risk"

- 115,113 people in 53,921 housing units
- 44 government facilities
- 31 emergency response facilities
- 39 education facilities
- 23 medical facilities
- 351 highway/road system miles
- 105 highway/road bridges
- 3 maintenance facilities
- 29 airports
- 9 ports
- 131 harbors
- 39 ferry terminals
- 4 railroad track miles
- unknown railroad bridges
- 0 railroad facilities
- 341 utilities

Tsunamis and seiches are generated by a range of natural phenomena and are therefore impossible to predict. All communities along Alaska's Pacific Ocean coastline (from Southeast Alaska to the far western Aleutians) should be aware of potential local and distant tsunami hazards. Bering Sea communities may also experience tsunamis, though they are slightly more removed from the Alaska-Aleutian Subduction Zone. Underwater slope failures can generate a tsunami anywhere along Alaska's vast coastline.

Volcano Vulnerabilities

A significant volcanic eruption in southeast and southcentral Alaska will certainly necessitate air route deviations and will cause strain on response, financial, and service availability throughout the entire state. Other impacts include respiratory problems from airborne ash, displaced persons, lack of shelter, and personal injury general property damage (e.g., electronics and unprotected machinery), structural damage from ash loading, state/regional transportation interruption, loss of commerce, and water supply contamination (See Section 6.6).

Alaska's entire existing and future population, residences, and critical facilities have a potential volcanic ash impact risk. Population and infrastructure potentially threatened by volcanic hazards include:

"Low Moderate risk" from volcanic ashfall

- 132,209 people in 65,267 housing units
- 79 government facilities
- 50 emergency response facilities
- 58 education facilities
- 37 medical facilities

- 4,838 highway/road system miles
- 433 highway/road bridges
- 25 maintenance facilities
- 54 airports
- 6 ports
- 19 harbors
- 5 ferry terminals
- 387 railroad track miles
- unknown railroad bridges
- 7 railroad facilities
- 598 utilities

"Moderate risk" from volcanic ashfall

- 396,846 people in 159,999 housing units
- 38 government facilities
- 24 emergency response facilities
- 15 education facilities
- 21 medical facilities
- 4,325 highway/road system miles
- 358 highway/road bridges
- 14 maintenance facilities
- 31 airports
- 4 ports
- 17 harbors
- 7 ferry terminals
- 214 railroad track miles
- unknown railroad bridges
- 7 railroad facilities
- 315 utilities

"High risk" from volcanic ashfall

- 40,764 people in 22,566 housing units
- 54 government facilities
- 49 emergency response facilities
- 27 education facilities
- 28 medical facilities
- 1,552 highway/road system miles
- 55 highway/road bridges
- 7 maintenance facilities
- 30 airports
- 2 ports
- 6 harbors
- 2 ferry Terminals
- 0 railroad track miles
- unknown railroad bridges
- 0 railroad facilities
- 350 utilities

Weather Vulnerabilities

Impacts associated with severe weather events includes roof collapse, trees and power lines falling, damage to light aircraft and sinking small boats, injury and death resulting from snow machine or vehicle accidents, and overexertion while shoveling due to heavy snow. A quick thaw after a heavy snow can also cause substantial flooding. Impacts from extreme cold include hypothermia, halting transportation from fog and ice, congealed fuel, frozen pipes, utility disruptions, and carbon monoxide poisoning. Additional impacts may occur from secondary weather hazards or complex storms such as extreme high winds combined with freezing rain, high seas, and storm surge. Section 6.7 provides additional detail regarding severe weather impacts. Buildings that are older and/or not constructed with materials designed to withstand heavy snow and wind (e.g., hurricane ties on crossbeams and appropriate roofing materials) are more vulnerable to severe weather damage. The entire state is threatened by severe weather events. Current and future population and infrastructure potentially include:

"Severe Weather risk"

- 710,047 people in 306,973 housing units
- 565 government facilities
- 339 emergency response facilities
- 323 education facilities
- 209 medical facilities
- 14,108 highway/road system miles
- 1,245 highway/road bridges
- 78 maintenance facilities
- 294 airports
- 13 ports
- 149 harbors
- 39 ferry terminals
- 626 railroad track miles
- unknown railroad bridges
- 13 railroad facilities
- 2,819 utilities

Climate change impacts vary across Alaska. For example, northern coasts experience late ice formations; some areas that formerly experienced landfast or ice locked coastlines now have open water throughout the winter. Southern Alaska (southeast, south central and southwest) areas experience wetter winter weather with less snow and more rain. These conditions will negatively impact future populations, residential structures, critical facilities, and infrastructure over historical impacts.

Wildland Fire Vulnerabilities

Impacts associated with a wildland fire event include the potential for loss of life and property. A wildland fire event can also impact livestock and pets, destroy forest resources, and contaminate water supplies. Buildings closer to the outer edge of town, those with heavy vegetation surrounding structures, and those constructed with wood are more vulnerable to wildland fire damages. Section 6.8 provides additional detail regarding wildland/tundra fire impacts

According to the Alaska Fire Service, 3,077 wildland fires have occurred within Alaska (Section 6.8.3) costing nearly $294 million since the legacy 2013 SHMP was implemented. The state's population centers' wildfire threats and recurrence probabilities are provided for locations

dependent upon fuel loading and weather. The following threat classifications: moderate, high, very high, and extreme, describe potential impacts within the following ranked fuels locations potentially include:

"Moderate risk" areas having moderate fuel ranking

- 324,356 people in 132,928 housing units
- 285 government facilities
- 165 emergency response facilities
- 158 education facilities
- 108 medical facilities
- 7,193 highway/road system miles
- 820 highway/road bridges
- 70 maintenance facilities
- 173 airports
- 2 ports
- 68 harbors
- 17 ferry terminals
- 141 railroad track miles
- unknown railroad bridges
- 8 railroad facilities
- 1,139 utilities

"High risk" areas having high fuel ranking

- 123,109 people in 49,548 housing units
- 30 government facilities
- 18 emergency response facilities
- 20 education facilities
- 13 medical facilities
- 1,710 highway/road system miles
- 88 highway road bridges
- 2 maintenance facilities
- 24 airports
- 0 ports
- 8 harbors
- 1 ferry terminal
- 139 railroad track miles
- unknown railroad bridges
- 0 railroad facilities
- 285 utilities

"Very High risk" areas having very high fuel ranking

- 50,389 people in 24,723 housing units
- 64 government facilities
- 54 emergency response facilities
- 45 education facilities
- 30 medical facilities
- 1,705 highway/road system miles
- 86 highway road bridges

- 3 maintenance facilities
- 45 airports
- 0 ports
- 1 harbor
- 1 ferry terminal
- 119 railroad track miles
- unavailable railroad bridges
- 2 railroad facilities
- 437 utilities

"Extreme risk" areas having extreme fuel ranking

- 202,269 people in 94,630 housing units
- 68 government facilities
- 48 emergency response facilities
- 55 education facilities
- 29 medical facilities
- 3,417 highway/road system miles
- 161 highway road bridges
- 3 maintenance facilities
- 22 airports
- 2 ports
- 0 harbors
- 1 ferry terminal
- 204 railroad track miles
- unavailable railroad bridges
- 2 railroad facilities
- 534 utilities

Dry forest and tundra conditions increase fire fuels and insect infestations. These conditions create optimum conditions for wildfire propagation, especially around housing and other areas where fire fuels are not controlled near public or private structures. Future populations, residential structures, critical facilities, and infrastructure located in dryer regions of Alaska are anticipated to experience increased wildfire events compared to historical impacts.

Hazard Probably Tables

Tables 8-22 and 8-23 quantify the hazards for each borough or REAA and determine recurrence probability. The ratings are low, moderate, and high, and indicate the number of previous occurrences. This information references DHS&EM internal records, individual community and borough Emergency Operations Plans (EOPs), and available HVAs.

A summary of community EOPs and HVAs were used and applied to census areas. Table 8-22 references the DHS&EM Disaster Cost Index from 1978 to 2018. This matrix also includes large documented events prior to 1978, such as the 1964 earthquake, 1958 Lituya Bay landslide and tsunami, and the 1946 Unimak Island tsunami.

Note: *Hazard Frequency and Extent Table Keys:*

Table 8-22 Borough or Rural Education Attendance Area (REAA) Event Probability

Borough / REAA (as appropriate)	Cryosphere	Earthquake	Flood	Ground Failure	Tsunami & Seiche	Volcano	Weather	Wildland Fire
Alaska Gateway (REAA)	Y	Y-M	Y-M	Y-L	N	N	Y-L	Y-H
Aleutians East Borough	Y	Y-M	N	Y-M	Y-H	Y-M	Y-M	N
Aleutian Region (REAA)	Y	Y-M	N	N	Y-M	Y-M	Y-H	N
Annette Island (REAA)	Y	Y-L	N	N	Y-L	N	Y-L	Y-L
Bristol Bay Borough	Y	Y-L	Y-L	N	N	Y-L	Y-M	N
Bering Strait (REAA)	Y	Y-M	Y-M	Y-M	N	N	Y-H	Y-M
Juneau	Y	Y-M	Y-M	Y-M	Y-L	N	Y-H	Y-M
Sitka	Y	Y-H	Y-M	Y-H	Y-H	N	Y-H	Y-L
Yakutat	Y	Y-L	Y-M	Y-H	Y-H	Y-L	Y-H	Y-L
Chatham (REAA)	Y	Y-M	Y-L	Y-H	Y-M	N	Y-H	Y-M
Chugach (REAA)	Y	Y-H	Y-H	Y-L	Y-H	Y-L	Y-M	Y-M
Copper River (REAA)	Y	Y-M	Y-M	Y-L	N	Y-L	Y-M	Y-M
Denali Borough	Y	Y-M	Y-L	Y-M	N	N	Y-H	Y-H
Delta/Greely (REAA)	Y	Y-M	Y-L	Y-M	N	N	Y-H	Y-H
Fairbanks North Star Borough	Y	Y-M	Y-M	Y-M	N	N	Y-M	Y-H
Haines Borough	Y	Y-H	Y-M	Y-M	Y-L	N	Y-H	Y-M
Iditarod Area REAA	Y	Y-L	Y-H	Y-M	N	N	Y-H	Y-M
Kashunamiut REAA	Y	Y-M	Y-H	Y-H	N	N	Y-H	Y-L
Ketchikan Gateway Borough*	Y	Y-M	Y-M	Y-L	Y-L	N	Y-L	Y-L
Kodiak Island Borough	Y	Y-H	Y-H	Y-H	Y-M	Y-H	Y-H	Y-M
Kenai Peninsula Borough	Y	Y-H	Y-H	Y-L	Y-H	Y-H	Y-H	Y-H
Kuspuk REAA	Y	Y-M	Y-H	N	N	N	Y-H	Y-M
Lower Kuskokwim REAA	Y	Y-M	Y-H	Y-H	N	N	Y-H	Y-M
Lake & Peninsula Borough	Y	Y-H	Y-M	Y-L	Y-M	Y-H	Y-H	Y-M
Lower Yukon REAA	Y	Y-M	Y-H	N	N	N	Y-H	Y-H
Municipality of Anchorage	Y	Y-H	Y-M	Y-L	N	Y-M	Y-M	Y-M
Matanuska-Susitna Borough	Y	Y-H	Y-H	Y-L	N	Y-M	Y-M	Y-H
Northwest Arctic Borough	Y	Y-M	Y-M	N	N	N	Y-H	Y-M
North Slope Borough	Y	Y-L	Y-M	Y-M	N	N	Y-H	Y-L
Petersburg	Y	Y-L	Y-L	Y-M	Y-L	N	Y-M	Y-M
Pribilof Island REAA	Y	Y-M	Y-L	N	Y-L	N	Y-H	N
Southeast Island REAA	Y	Y-M	Y-L	Y-L	Y-M	N	Y-M	Y-M
Southwest Region REAA	Y	Y-M	Y-M	N	Y-L	Y-L	Y-H	Y-M
Wrangell	Y	Y-L	Y-L	Y-M	Y-L	N	Y-M	Y-M
Yukon Flats REAA	Y	Y-M	Y-H	N	N	N	Y-M	Y-M
Yukon-Koyukuk REAA	Y	Y-L	Y-H	Y-L	N	N	Y-M	Y-M
Yupiit REAA	Y	Y-M	Y-H	Y-L	N	N	Y-M	N

Key: Y: Yes, event is likely to occur; **N: No** hazard for this area
Event Probability: *H: High, M: Medium; L: Low*

Table 8-23 Borough or REAA Frequency and Extent

Borough / REAA (as appropriate)	**Cryosphere**	**Earthquake**	**Flood**	**Ground Failure**	**Tsunami & Seiche**	**Volcano**	**Weather**	**Wildland Fire**
Alaska Gateway REAA	L	1 L	7 L				1 L	2 L
Aleutians East Borough	L			1 L			2 L	
Aleutian Region REAA	L			1 L			2 L	
Annette Island REAA	L						2 L	
Bristol Bay Borough	L		2 L	1 L			5 L	
Bering Strait REAA	L		3 L				21 L	3 L
Juneau	L		2 L				1 L	
Sitka	L		2 L	1 L			3 L	
Yakutat	L	1 L					1 L	
Chatham REAA	L		4 L	1 L	1 L		3 L	3 L
Chugach REAA	L	1 L	3 L	4 L			4 L	
Copper River REAA	L	1 L	8 L				3 L	
Denali Borough	L	1 L	2 L	1 L			1 L	1 L
Delta/Greely REAA		1 L	2 L					4 L
Fairbanks North Star Borough	L	1 L	5 L	1 L			3 L	1 L
Haines Borough	L		6 L				1 L	
Iditarod Area REAA			7 L					3 L
Kashunamiut REAA	L						1 L	
Ketchikan Gateway Borough*								
Kodiak Island Borough	L		2 L	1 L			7 L	
Kenai Peninsula Borough	L	1 L	11 L			3 L	9 L	
Kuspuk REAA			10 L					1 L
Lower Kuskokwim REAA	L		13 L				10 L	1 L
Lake & Peninsula Borough	L		2 L				4 L	2 L
Lower Yukon REAA	L		12 L				7 L	4 L
Municipality of Anchorage	L	2 L	5 L			2 L	5 L	
Matanuska-Susitna Borough	L	2 L	9 L			2 L	7-L	2 L
Northwest Arctic Borough	L		8 L				10 L	
North Slope Borough	L		3 L				4 L	2 L
Pribilof Island REAA	L						3 L	
Southeast Island REAA	L		2 L	2 L			3 L	1 L
Southwest Region REAA	L		2 L				7 L	1 L
Wrangell								
Yukon Flats REAA			10 L					5 L
Yukon-Koyukuk REAA	L	1 L	12 L				1 L	1 L
Yupiit REAA	L		2 L				2 L	
Statewide	L		1 L				3 L	10 L

Key:

Extent *with Number of total event occurrences,* ***Zero (Z):*** *Used for historical information. An event occurred but caused no damage or loss;* ***Limited (L):*** *Minimal through maximum damage to part of community. Short of the definition for total extent;* ***Total (T):*** *Impact encompasses the entire community;*

Frequency: *H: High, M: Medium; L: Low*

9. Mitigation Strategy

9.1. OVERVIEW

The mitigation strategy provides the blueprint for implementing desired activities that will enable Alaska communities to continue to save lives and preserve infrastructure by systematically reducing hazard impacts, damages, and community disruptions. The mitigation strategy is divided into five steps:

1. Evaluate the state's hazard management policies, programs, capabilities, and funding sources to mitigate the hazards identified in the risk assessment
2. Describe and analyze local and tribal mitigation policies, programs, and capability effectiveness
3. Describe the process to support the development of approvable local and tribal, as applicable, mitigation plans
4. Describe funding prioritization criteria
5. Describe process and timeframe for local and tribal HMP review, coordination, integration within the SHMP
6. Address Repetitive Loss elements

DMA 2000 and its state implementing regulations for a comprehensive mitigation strategy include:

DMA 2000 Requirements
STANDARD. State Mitigation Capabilities
S12. Does the plan discuss the evaluation of the state's hazard management policies, programs, capabilities, and funding sources to mitigate the hazards identified in the risk assessment? [44 CFR §201.4(c)(3)(ii)]
S13. Does the plan generally describe and analyze the effectiveness of local and tribal, as applicable, mitigation policies, programs, and capabilities? [44 CFR §201.4(c)(3)(ii)]
S14. Does the plan describe the process to support the development of approvable local and tribal, as applicable, mitigation plans? [44 CFR §§201.3 (c)(5) and 201.4(c)(4)(i)]
S15. Does the plan describe the criteria for prioritizing funding? [44 CFR §201.4(c)(4)(iii)]
S16. Does the plan describe the process and timeframe to review, coordinate and link local and tribal, as applicable, mitigation plans with the state mitigation plan? [44 CFR §§201.3(c)(6), 201.4(c)(2)(ii), 201.4(c)(3)(iii), and 201.4(c)(4)(ii)]
Source: FEMA, March 2015

and

DMA 2000 Requirements
STANDARD STATE. Repetitive Loss (RL) Strategy
RL2. Did Element S8 (mitigation goals) address RL and SRL properties? [44 CFR §§201.4(c)(3)(i) and 201.4(c)(3)(v)]
RL3. Did Element S9 (mitigation actions) address RL and SRL properties? [44 CFR §§201.4(c)(3)(iii) and 201.4(c)(3)(v)]
RL4. Did Element S10 (funding sources) address RL and SRL properties? [44 CFR §§201.4(c)(3)(iv) and 201.4(c)(3)(v)]
RL5. Did Element S13 (local and tribal, as applicable, capabilities) address RL and SRL properties? [44 CFR §§201.4(c)(3)(ii) and 201.4(c)(3)(v)]
RL6. Did Element S15 (prioritizing funding) address RL and SRL properties? [44 CFR §§201.4(c)(4)(iii) and 201.4(c)(3)(v)]
Source: FEMA, March 2015.

The Hazard Mitigation Strategy overview defines how the state strives to implement processes that will fulfill the State's needs, while integrating, state, local, and tribal, as well as FEMA programs and initiatives throughout the SHMP update processes.

The State of Alaska is committed to supporting local mitigation planning efforts. There are currently 120 FEMA-approved hazard mitigation plans with an additional 25 that are "Approvable Pending Adoption." DHS&EM's normal annual planning cycle includes 10 city/tribal plans. The state projects eight plans for the 2017 PDM planning cycle that will contain several borough-level multi-jurisdictional plans. The fiscal year 2014 PDM cycle contained 21, and the 2015 PDM cycle contained 25 update or new plans. Many of these boroughs, cities, and tribes were in rural locations with no community planning assets. The state assisted these communities by providing contractors to guide local planning teams while drafting, compiling, and completing a FEMA-approvable hazard plan with the ultimate goal to use the plan to spur a comprehensive and deliberate planning approach. This methodology leads to jurisdictional staff capacity along with the future potential to reduce historic disaster losses.

9.2. STATE, LOCAL AND AGENCY COORDINATION AND MITIGATION CAPABILITY AND FUNDING RESOURCES

The Alaska's constitution provides a very diverse self-governance structure. Therefore, "formal" planning and land management capabilities throughout Alaska's borough, city, and tribal governments vary widely due to their respective constitutional authorities. Possible strengths and limitations include available funding, local staffing capacity, and resource capabilities. Each of these strengths or limitations could facilitate or restrict implementing and integrating FEMA, state, local, and tribal hazard mitigation actions and initiatives.

Alaska communities work closely with state agencies and their staff, such as the DCRA, DHS&EM, DEC, DOT/PF, and DHSS to help guide them through specific subject matter planning and project activities. Most also receive funding, as well as project development and implementation guidance from these same agencies. Available resources in these areas are continually assessed by DHS&EM hazard mitigation planning team to determine how to deliver the most appropriate technical assistance that would best fulfill their needs.

9.2.1. CAPABILITY ASSESSMENT

DHS&EM Core Capabilities

The Core Capabilities, Mission Areas describe how the DHS&EM addresses rural community resilience and mitigation challenges:

Planning

- ***Mission Areas:*** *All*
- ***Description:*** *Conduct a systematic process engaging the whole community as appropriate in the development of executable strategic, operational, and/or community-based approaches to meet defined objectives*

Community Resilience

- ***Mission Area:*** *Mitigation*
- ***Description:*** *Lead the integrated effort to recognize, understand, communicate, plan, and address risks so that the community can develop a set of actions to accomplish Mitigation and improve resilience.*

Long-Term Vulnerability Reduction

- ***Mission Area:*** *Mitigation*
- ***Description:*** *Build and sustain resilient systems, communities, and critical infrastructure and key resources lifelines so as to reduce their vulnerability to natural, technological, and human-caused incidents by lessening the likelihood, severity, and duration of the adverse consequences related to these incidents.*

Risk and Disaster Resilience Assessment

- ***Mission Area:*** *Mitigation*
- ***Description:*** *Assess risk and disaster resilience so that decision makers, responders, and community members can take informed action to reduce their entity's risk and increase their resilience.*

Threats and Hazard Identification

- ***Mission Area:*** *Mitigation*
- ***Description:*** *Identify the threats and hazards that occur in the geographic area; determine the frequency and magnitude; and incorporate this into analysis and planning processes so as to clearly understand the needs of a community or entity."*

Source: DHS&EM

Statewide Resources

Tables 9-1 provides a snapshot of federal and state agency plans and authorities, regulatory tools, and technical resources available for project management.

Table 9-1 Agency Plans and Regulatory Tools

Regulatory Tools (ordinances, codes, plans)	Comments
Robert T. Stafford Disaster Relief and Emergency Assistance Act (Stafford Act), Section 322	New hazard mitigation planning and implementation initiative
Title 42 of the U.S. Code [USC] 5121, Section 322	(b)(5) encourages hazard mitigation measures to reduce losses from disasters, including development of land use and construction regulations
Disaster Mitigation Act of 2000	Amended the Robert T. Stafford Disaster Relief and Emergency Assistance Act to authorize a program for pre-disaster mitigation, to streamline the administration of disaster relief, to control the Federal costs of disaster assistance, and for other purposes
Code of Federal Regulations, Title 44, Chapter 1, Emergency Management and Assistance	Guides emergency management and assistance programs
44 CFR Section 201, Mitigation Planning	Defines HMP development requirements
Alaska Statute 26.23.040 and 060	Fulfills requirement to assist jurisdictions with mitigation disaster impacts
Alaska Administrative Order 175	Tasks DHS&EM To maximum extent possible, consistent with existing law, all state agencies with construction authority, or that administer grants, loans, or disaster assistance for construction, shall use pertinent portions of the FEMA National Flood Insurance Program regulations, 44 CFR Part 60, as a guide for such construction activities, and shall encourage a broad and united effort to lessen the

Table 9-1 Agency Plans and Regulatory Tools

Regulatory Tools (ordinances, codes, plans)	Comments
	risk of flood and erosion losses in connection with state lands and installation and state-financed or supported improvements.. (https://gov.alaska.gov/admin-orders/175.html)
SHMP Appendices	SHMP Section 13 Appendices
• DHS&EM Standard Operating Procedures	Appendix 13.14
• Existing Hazard Mitigation Plans	Appendix 13.17
• State Administrative Orders	Appendix 13.22
• Potential Agency Funding Resources	Appendix 13.24

DHS&EM strives to pursue strict regulatory compliance. To that end the agency uses the following audits and inspection resources to assure they fulfill programmatic criteria (Table 9-2).

Table 9-2 Agency Audit and Inspection Resources

Audits or Inspections	Description
DHS&EM Project and Disaster Specific Internal Audits and Project Status Monitoring	The DHS&EM's grant administrators and emergency management specialists (EMS's) project managers monitor and perform internal audits with every reimbursement request. The EMS audit reimbursements when routing for payment approval.
State Legislative Audit	Conducts Operations and Management Budget (OMB) compliance audits
Federal Agency Audits	Review grant projects based on their programmatic guidelines and as required by CFR Part 200.328, and applicable OMB Circulars
FEMA	Regulatory compliance audits
NOAA	Regulatory compliance audits

9.2.2. MITIGATION POLICIES, PROGRAMS, AND CAPABILITIES

9.2.2.1. COMPLIANCE, MONITORING, AND AUDITS:

Internal Division

DHS&EM Mitigation Section and Grants Section staff monitors each HMGP and PDM project award along with the HMGP disaster or PDM funding cycle funding the projects. This is done through the following:

- Division quarterly project reports,
- Program check lists,
- Funding and performance data-base tracking within the internal division and with the Division of Administrative Services.

The division also provides a sub-grantees handbook via the division website to enable grant recipients to provide accurately documentation progress and financial reports.

State

The State of Alaska, Inspector General's Office auditors perform annual or as-needed program and grant audits to ensure compliance and Single Audit Act reporting.

Federal Funding Accountability and Transparency Act (FFATA): the division, through the Division of Administrative Services reports all federal funding awards into the FFATA website to facilitate public visibility for associated federal funds.

Federal

The FEMA, Region 10 Grants Program Division conducts annual monitoring visits on each HMGP and PDM project award along with the HMGP disaster or PDM funding cycle funding the projects. FEMA audits are conducted on an as-needed basis. FEMA compliance and audit reports are provided to the division following each monitoring or audit.

9.2.3. LOCAL AND TRIBAL HMP DEVELOPMENT PROCESSES

9.2.3.1. CURRENT JURISDICTION HMP STATUS

FEMA provides a monthly HMP status report (Table 9-3) and tribal HMP state report (Table 9-4). The current report is accurate as of August 20, 2018. The reports states whether these plans are approved and in-force, pending adoption, in-review, awaiting revision, update in progress, or expired.

Table 9-3 Alaska Jurisdictional HMP Status Report - FEMA

Alaska State: Status of Mitigation Plans Dashboard as of 8/20/18				
Total Approved Plans	*113*		*Total Plans expiring within 1 month*	*2*
Total Plans Pending Adoption	*35*		*Total Plans expiring between 1-6 months*	*13*
Total Plans In Review	*0*		*Total Plans expiring between 6-12 months*	*6*
Total Plans Awaiting Revisions	*5*		*Total Plans expiring between 12-24 months*	*10*
Total Plans In Progress	*8*		*Total Plans expiring beyond 24+ months*	*49*
Total Expired Plans	*58*			
Total LHMPs in Report:	***228***			

Source: FEMA 2018

Table 9-4 Alaska Tribal HMP Status Report - FEMA

Alaska State: Status of Mitigation Plans Dashboard as of 8/20/18				
Total Approved Plans	*30*		*Total Plans expiring within 1 month*	*1*
Total Plans Pending Adoption	*9*		*Total Plans expiring between 1-6 months*	*0*
Total Plans In Review	*0*		*Total Plans expiring between 6-12 months*	*2*
Total Plans Awaiting Revisions	*5*		*Total Plans expiring between 12-24 months*	*6*
Total Plans In Progress	*6*		*Total Plans expiring beyond 24+ months*	*38*
Total Expired Plans	*1*			
Total THMPs in Report:	*51*			

Source: FEMA 2018

9.2.3.2. FUTURE HMP DEVELOPMENT AND SELECTION PROCESSES

Planning Considerations, Rationale, and Criteria

- History or risk of disaster damage (Disaster Cost Index, Hazard & Risk Assessments, State Hazard Mitigation Plan, DHS&EM Experience)
- Full-time residents/population (Threshold for inclusion is roughly 100)
- Level of government: borough, first class city, second class city, etc.
- Community interest in mitigation planning and projects
- Significant infrastructure
- Plan will address multiple hazards which may include seismic, flood, ground failure, wildland fire, etc.
- Location in state (geographical grouping for contract efficiency and value)
- Unplanned communities in a federally declared disaster area will be considered for immediate planning priority through HMGP (7percent for planning initiative).

Note: *Mitigation planning policies and standard operating procedures are located in Appendix 13-14*

1. Planning Initiatives
   - Mitigation planning will be done primarily through PDM
     - State-managed planning will be funded through a state contract paid for through PDM (75 percent FEMA and 25 percent State match). This will follow the 5-year list for community planning.
   - DHS&EM focuses HMGP funds into construction projects striving to reduce disaster damages and losses. However, planning may be funded through HMGP on a "case by case" basis upon considering:
     - Priority: Mitigation planning becomes essential after the community experiences recent disaster losses.
     - Advisable need: Special community circumstances warrant mitigation planning.
   - Organized boroughs school districts will be included within their borough mitigation plan for project and planning eligibility.
   - Unorganized boroughs' school districts will be included within the State Hazard Mitigation Plan for project and planning eligibility.
2. Plan Updates
   - Updates will ordinarily be funded through PDM or local funds, not HMGP
     - It is essential that communities show a desire to develop a hazard mitigation plan and to be engaged ("buy-in") throughout the new or update HMP development process. Interest and commitment can be demonstrated by funding HMP development through local funding or by providing the PDM 25 percent cost share. Rural and impoverished communities may qualify to have their cost share (match) reduced to 10 percent using local funds, direct legislative appropriations, or by obtaining other funds.

3. Grant Funding for Mitigation Plan Studies
   - Specialized stand-alone studies are not funded. However, those that improve the communities' hazard mitigation plans and lead to specific, identified "brick and mortar" mitigation projects, will be prioritized for grant funding.

State LEPC's and Mitigation Planning

State Local Emergency Planning Committees (LEPC's) assist with local hazard mitigation planning through:

- Providing a forum for annually reviewing local mitigation plans within their membership area.
- Providing a forum for communities to pursue information gathering within their jurisdictions that are undertaking hazard mitigation planning.
- Providing a forum for review and input when communities within their jurisdictions are undertaking their required 5-year hazard mitigation plan update.

State Hazard Mitigation Advisory Committee (SHMAC)

The State Hazard Mitigation Advisory Committee (SHMAC) originated in 2002 when DHS&EM was tasked with developing the first DMA 2000 compliant state hazard mitigation plan that replaced the Stafford Act's 409 Plan. The SHAMC's mission is to advise DHS&EM by guiding SHMP development and project prioritization. SHMAC participation seeks to assist participant agencies with achieving their respective disaster mitigation goals. SHMAC members are identified by their agencies as either having decision-making authority, or reporting directly to those who do. They represent the following departments or agencies:

- Department of Military and Veterans Affairs / DHS&EM (Chair)
- Department of Environmental Conservation
- Department of Natural Resources
- Department of Public Safety
- Department of Transportation and Public Facilities
- Department of Administration / Risk Management
- Department of Community and Economic Development
- Department of Health and Social Services
- Department of Law
- Office of Management and Budget (Director)
- Governor's Office / Governor's Authorized Representative (GAR)

Note: *Other departments or agencies participate as required based on the disaster event.*

State Local Mitigation Plan Reviews

- Community hazard mitigation plans submitted to DHS&EM, will be reviewed within 2 weeks of receipt. Following DHS&EM review, the plan will either be returned to the community for revision, or forwarded to FEMA for review.

9.2.4. MITIGATION PROJECT AND FUNDING PROCESSES

9.2.4.1. HAZARD MITIGATION ASSISTANCE (HMA) APPLICATIONS

General Selection Criteria

The following general criteria are used by the State Hazard Mitigation Officer (SHMO) in selecting and prioritizing applications for hazard mitigation financial assistance.

- Consistency with the goals and priorities established in the State Hazard Mitigation Plan
- Consistency with the goals and priorities established in the applicant's local Hazard Mitigation Plan
- History or risk of disaster losses in the community based upon the Alaska Disaster Cost Index, hazard and risk assessments, the State Hazard Mitigation Plan, and DHS&EM experience
- The project's role in mitigating losses (including RL/SRL) to critical facilities and infrastructure
- The community's interest in mitigation planning and long-term mitigation actions
- The jurisdiction's grant compliance history
- The community's population, level of government, and ability to take independent mitigation actions

Grant Specific Selection Processes

Disaster Funded, Hazard Mitigation Grant Program (HMGP)

State mitigation team members will travel to disaster areas and search for appropriate mitigation opportunities (Public Assistance 406 Mitigation and Robert T. Stafford Disaster Relief and Emergency Assistance Act 404 Mitigation).

Following a federal disaster declaration, DHS&EM announces that HMGP funding opportunity is available statewide to local jurisdictions, IRA tribes, and state agencies. The announcement explains HMGP eligibility criteria, necessity of submitting an "Intent to Apply" form, application submittal instructions and content, and the disaster period's application submittal deadlines.

HMGP applicant briefings are held in the most appropriate declared disaster area in conjunction with FEMA and State Public Assistance (PA) briefings. HMGP briefings are provided to other potential applicants around the state as requested. Potential applicants with formally adopted and approved hazard mitigation plans and those with previously identified mitigation projects in their local hazard mitigation plans are recruited to produce HMGP applications. DHS&EM's staff provides technical assistance to applicants developing their project applications.

Submitted "Intent to Apply" forms are screened by the State mitigation staff for applicant and project eligibility and feasibility. State mitigation staff assist each eligible applicant with project development while ineligible projects are guided to other resources.

Complete HMGP applications are forwarded SHMAC review. The DHS&EM guides the SHMAC with determining the merit as to how each project application's mitigation approach meets the SHMP's mitigation goals including RL/SRL initiatives. The SHMAC then jointly ranks each project application for funding priority.

Note: *This ranking system is most needed when the number of eligible project applications exceeds available funds. Those that are not selected are filed and potentially funded when previous selected applications cannot be implemented, or when subsequent disaster grants become available.*

The SHMO submits the SHMAC's prioritized project application list to the GAR. The GAR then reviews applications and their respective ranking against State priorities and available funding, and subsequently approves for FEMA submittal.

The SHMO then submits the approved applications to FEMA for review and funding.

Non-Disaster Hazard Mitigation Assistance (HMA) Grants Including the Pre-Disaster Mitigation (PDM) Grant Program

Following the opening of FEMA's HMA Pre-Disaster Mitigation (PDM) application period, DHS&EM announces the nationally competitive PDM funding opportunity statewide to agencies, local governments, and IRA tribes. The announcement explains PDM eligibility criteria, the necessity of submitting an "Intent to Apply" form, application submittal instructions and content, and disaster period's application submittal deadlines.

The State conducts PDM briefings upon request. DHS&EM submits a State application for potential construction project applicants with previously identified mitigation projects in their local hazard mitigation plans. These applicants are recruited to produce PDM applications. PDM project applications must include as appropriate all required engineering drawings, plans, maps, and photos as well as environmental impact statements. Applicants are provided with technical assistance throughout application development.

Submitted "Intent to Apply" forms are screened by the State mitigation staff for applicant and project eligibility, and feasibility. State mitigation staff assists each eligible applicant with project development while ineligible projects are guided to other resources.

Complete PDM applications are forwarded SHMAC review. The DHS&EM guides the SHMAC with determining the merit as to how each project application's mitigation approach meets the SHMP's mitigation goals including RL/SRL initiatives. The SHMAC then jointly ranks each project application for funding priority.

The SHMO then submits each of the PDM sub-grant applications within the State's PDM grant application to FEMA for funding under the HMA program. FEMA reviews planning and project applications for eligibility and completeness. FEMA subsequently makes funding decisions based on the agency's priorities for the most effective use of available grant funds posted on Grants.gov and its Notice of Funds Opportunity announcement. The PDM program is a highly competitive grant program.

Note: See Appendix 13.14 DHS&EM Standard Operating Procedures

NOAA (Department of Commerce) Funded Grants

NOAA grant funding applications are evaluated based upon similar, general selection criteria listed above as they pertain to NOAA's specific grant programs' guidance.

State Hazard Mitigation Grants

Applications for State hazard mitigation grants are evaluated based upon the general selection criteria listed above as well as the State's specific grant program guidance. Priority is given to projects that are deemed to be effective mitigation by the SHMO and selected mitigation staff

panel; potential agencies determine their viability and the project's mitigation effectiveness. The project would not be eligible for funding under FEMA grant requirements.

State Mitigation Prioritization Process

Prior to DHS&EM's Resilience Section developing the "Community Score Methodology," database; the state held a State Hazard Mitigation Advisory Committee (SHMAC) meeting quarterly, as warranted, to prioritize projects. The SHMAC validated each project's potential effectiveness and priority.

The "Community Score Methodology," database assigns a numerical value that contains 12 areas as well as the associated risk values (Figure 9-2). Those values translate to a numerical value that ranks each city and factors in the mitigation and outreach effort and the project's subsequent priority. The cities are divided into categories by effort priority. The highest category communities are deemed to have significant risk. The lowest category a city can achieve is minimal risk. The ranking system provides the State with an overall picture of where to address needs within the state based on community metrics.

DHS&EM's Resilience Section database provides a thorough analysis of all communities based on vulnerability. The data used to assign a ranking is derived from outside sources and is not influenced by the DHS&EM. Using

Alaska Remote Community Challenges:

DHS&EM strives to address Alaska's remote community challenges during grant application development by ensuring communities:

- Describe their specific challenges associated with shipping goods to their location such as severe weather conditions, barging, port availability, community access, river navigability, distance, materials costs, experienced labor costs, outside area payroll rate requirements etc.
- Describe their geographical separation, minimal road access, bridge or airport availability (to assure safe travel across large rivers and to/from other jurisdictions), and other barriers that prevent evacuation or other disaster response capabilities if faced with natural hazard induced damages.
- Describe how the community is distressed or located within an imperiled area of the state.
- Describe any language barriers, need for translation into native languages, or any limiting capacity such as qualified office staffing, office staff or leadership turn-over, or an extremely transient population.
- Define how the jurisdiction, tribe, and/or impoverished community is unable to generate funds to enable them to meet project cost (25 percent) matching.
- Define how NFIP participating communities identify and track RL/SRL property impacts and disaster damage claims to fulfill FEMA criteria.

Note: There are only 31 NFIP participating jurisdictions (boroughs and cities) out of approximately 200 (depending on how they are counted).

Note: Non NFIP participant jurisdictions (cities and/or tribes) are not required to track RL/SRL properties. Neither do they have RL/SRL property lists that fulfill NFIP criteria.

Note: See Section 8.4 NFIP participant

FEMA and Other Mitigation Programmatic Funding Initiatives

A FEMA-approved and jurisdiction adopted SHMP, LHMP, MJHMP and/or THMP ensures participant eligibility for FEMA mitigation grant programs and initiatives. Finalized HMPs enable jurisdictions to participate in various mitigation grant programs. Table 9-5 displays a representative sample of a few agency available program grants, while Appendix 13.24 provides a detailed list of potential state and federal agency funding resources.

Table 9-5 Federal Agency Mitigation Programs

Financial Resources	Accessible or Eligible to Use for Mitigation Activities
Hazard Mitigation Grant Program (HMGP)	FEMA funding available to eligible local and tribal jurisdictions after a presidentially declared disaster. It can be used to fund both pre- and post-disaster mitigation plans and projects.
Pre-Disaster Mitigation (PDM) grant program	FEMA funding available to eligible local and tribal jurisdictions on an annual basis. This grant is nationally competitive and can only be used to fund pre-disaster mitigation plans and projects.
Flood Mitigation Assistance (FMA) grant program	FEMA funding available to eligible local and tribal jurisdictions on an annual basis. This grant can be used to mitigate repetitively flooded structures and infrastructure to protect repetitive flood structures. Qualified jurisdictions may qualify for this funding source if they participate in, and compliant with NFIP requirements.
United State Fire Administration (USFA) Grants	USFA grant funding available to assist national, state, regional, local or tribal organizations to address fire prevention and safety. The primary goal is to reach high-risk target groups including children, seniors, and firefighters.
Fire Mitigation Fees	These grants can finance future fire protection facilities and provide fire capital expenditures for new development within special districts.

9.2.5. LOCAL AND TRIBAL HMP DEVLOPMENT SUPPORT AND SHMP INTEGRATION

DHS&EM subscribes to a whole community approach to emergency management, as it is expected that extensive collaboration with the public, all levels of government, the private sector, non-governmental organizations, and community organizations will be required. The State's intent is to foster a cooperative relationship with the community in order to build the most resilient Alaska possible. Open dialogue between local and tribal communities and the state is fostered and assistance is offered at all stages of HMP development.

DHS&EM's hazard mitigation planning process incorporates information from other plans, business practices, and governmental operations to supplement State data. The State strives to create a holistic approach for local communities to help them realize that integrating mitigation concepts and goals into other plans, such as comprehensive, transportation, and capital improvement plans, can guide their community decision-making processes. A component of updating Alaska's mitigation strategy is to consider and include local and tribal mitigation plan strategies. This comprehensive planning approach may ultimately improve their respective hazard risk reduction efforts from future disaster events.

The State reviews new or updated local and tribal HMPs for consistency with the SHMP. Whereas the State has large scale goals; communities can focus on smaller jurisdictional or

regional goals that directly link to their respective hazard threats. Local plans also offer communities the chance to consider state and federal mitigation actions to better guide and develop local hazard reduction strategies.

By reviewing, prioritizing, and incorporating the types or categories of community identified actions or projects, the State can better understand how to support investments in community-level mitigation efforts. The state reviews and includes these strategies to provide appropriate resources and support when available. The State strives to understand community vulnerabilities and priorities to ensure that their plans align with the state programs and strategies (e.g. Appendix 13-23 Distressed Community when prioritizing state actions or initiatives to address RL or SRL threatened communities.

DHS&EM's HMP development support includes but is not limited to financial assistance as well as the following:

- DHS&EM provides a one page document titled "I have a Mitigation Plan: What do I do now?" This assists jurisdictions with understanding the State and FEMA grant application processes by explaining how to get projects off the paper and move toward completion.
    - The guide provides direction and information relating to program and funding availability, the application process, deadlines and contact information, and the next steps toward fulfilling grant deliverable requirements. The State also provides local and tribal governments the "HMA Factsheet" and handout, "Mitigation Planning Benefits and Process," "Maintaining your Hazard Mitigation Plan," and "Notice of Funding Opportunity."
- DHS&EM supports local requests for an annual Post Disaster Damage Assessment Course.
- DHS&EM Mitigation Planner and Resilience Section staff provide technical assistance to cities and tribes in order to facilitate program participation and enable success.

Available Hazard Mitigation Management Policies, Programs, Capabilities, and Funding Sources

While the State of Alaska has Public Assistance (PA) and Individual Assistance (IA) programs under State-declared disasters, Alaska does not have a State Disaster Mitigation Program. However, there have been a few occasions in which the governor and legislature have elected to identify and fund mitigation work using State Disaster Relief Funds (DRF). These actions occur under discretionary authority; however, no permanent State mitigation funded program fund has been established.

There are several mitigation programs in which the State of Alaska provides the entire non-federal match for local communities resulting in 100 percent of the funds being granted for the community. This is important to remember, as 218 communities are considered distressed in accordance with the surrogate standard methodology found in the 2017 Denali Commission Report. Another 25 are considered in distress using the expanded standard. The complete list is found in the SHMP Appendix 13.24, "2017 Alaska Distressed Community Report – Denali Commission." Other available funding sources include: Community Development Block Grant (CDBG), Indian CDBG, Alaska Regional Develop Organizations, Rural Development Assistance Mini-grants, and Unincorporated Community Grants.

The State staffs auditing and accounting representatives who provide community assistance to ensure community single audit act compliance.

The State provides community mitigation assistance through:

DHS&EM

- DHS&EM applies for and receives Pre-Disaster Mitigation (PDM) and Hazard Mitigation Grant Program (HMGP) planning grants to develop New and Update local, tribal, and State Hazard Mitigation Plans.
  - Hiring and coordinating with funded project managers
  - Grant and project application development.
- In collaboration with NOAA and FEMA; DHS&EM Prepared Section staff supports community volcano, earthquake, flood, tsunami, and siren program campaigns.
- Participates in the National Tsunami Hazard Mitigation Program (NTHMP), which provides annual funding for developing tsunami hazard mapping products, warning siren purchases and installation, and supports and encourages communities to participate in NOAA's TsunamiReady community recognition, outreach, and planning initiatives.
- The Spring Preparedness Conference happens annually. Emergency managers and local officials learn updated methods to better prepare their communities for future disaster event response, recovery, and mitigation actions.
- The Alaska Local Emergency Planning Committee (LEPC) Association and State Emergency Response Commission (SERC) meet twice a year. Once in the spring and once in the fall. DHS&EM, DEC, as well as SERC subcommittees present their reports (e.g., planning, communications, and hazardous materials) and discuss identified initiatives and strategies to reduce community impacts.
- Rural Resiliency Workshops are conducted biannually. These workshops are held in regional hubs throughout the state. They are locally hosted by tribal non-profit, LEPC, or other local organizations. The local government participants determine workshop focused areas, issues, and needs.
- DHS&EM staffs cultivate new projects with partner agencies and academia to support statewide earthquake, flood, tsunami, and volcano preparedness programs.
- DHS&EM staffs attend various workshops, meetings, and conferences as appropriate, or as invited, to share Alaska mitigation initiatives (e.g. NFIP, earthquake preparedness, tsunami warnings, etc.).

DCCED/DCRA

- DCCED/DCRA manages Alaska's Risk MAP program by providing communities with flood and other hazard information, risk assessment tools, and outreach support. These activities help communities understand their local risk, teach them how to make risk-based decisions, and ultimately lead to local action development to increase the community's natural hazard event resilience.
- DCRA's Floodplain Management program focuses on reducing RL and SRL flood damages through resilient community decision-making, and by implementing preventive, and when required, corrective measures.
  - The National Flood Insurance Program (NFIP) is one portion of the floodplain

management toolbox along with floodplain mapping, land use, and coastal protection planning initiatives. The NFIP provides minimum development standards for preventive and protective measures through improved land use and building practices, and encourages communities to evaluate and determine usage of higher standards.

Jurisdictional NFIP participation is based on an agreement between a local government and the federal government. If the community adopts and enforces a floodplain management ordinance that meets program standards, the federal government will make flood insurance available within the community. Participants assure they will give priority to RL and SRL property mitigation initiatives.

- DCCED funds and manages the state's RUBA – Rural Utility Business Advisor Program (https://www.commerce.alaska.gov/web/dcra/RuralUtilityBusinessAdvisorProgramRUBA/BusinessPlanningforRuralAlaskaUtilities.aspx).
  - The RUBA program began in 1994 and continues to provide technical, managerial, and financial training and assistance as mandated. The RUBA program increases the managerial and financial capacity of rural water and wastewater utility providers. The federal government amended the Safe Water Drinking Act in 1996 to require states to ensure that new systems are viable and that there is sufficient local technical, managerial, and financial capacity to operate the water or wastewater system.

DMA 2000 Requirements
STANDARD. State Mitigation Capabilities
S12. Does the plan discuss the evaluation of the state's hazard management policies, programs, capabilities, and funding sources to mitigate the hazards identified in the risk assessment? [44 CFR §201.4(c)(3)(ii)]
Source: FEMA, March 2015

9.2.6. STATE'S POLICIES, PROGRAMS, AND CAPABILITIES EVALUATION

9.2.6.1. BUILDING CODE EVALUATION

The Alaska Constitution and applicable statutes delegates Alaska building code requirements by borough and city class. The regulations states:

Home rule borough:

- Home rule, 1st and 2nd class boroughs **shall** have building codes and non-unified **may** have building codes.
  - Borough level has 12 that shall and 7 that may.
  - The borough requirement for building codes is 63% shall have codes and 37% may.

Home rule city:

- Home rule and 1st Class cities **shall** have building codes and non-unified **may** have building codes.
  - That would be 29 **shall** and 114 **may**.
  - The cities show a vastly different dynamic with 20% having to incorporate building codes and 80% may.

Most cities that are not required to have building codes do not. Those with building codes face enforcement difficulties due to lack of funding, staff, and geographical area that needs to be covered.

For example, the city of Palmer, Alaska (Home rule City) only began building code enforcement on 11 April 2017.

9.2.6.2. STATE AGENCY CAPABILITIES

Participating agencies have robust agency focused hazard mitigation programmatic capacity to provide community outreach, project development, and construction. The SHMAC's 52 agency membership (Appendix 13.7) participate in mitigation plan development, project review, and grant program application selection, review, and funding prioritization. Many SHMAC agencies seek to mitigate and upgrade their infrastructure using their agency's funding programs and resources as well as applying for HMGP and PDM funding.

Available federal programs provide limited funding opportunities. Federal programmatic decisions are based on community size. Alaskan communities have small populations compared to most lower contiguous lower 48 states. For example, the December 2003 Government Accounting Office's "Alaska Native Village – Most are Affected by Flooding and Erosion, but Few Qualify for Federal Assistance" report describes Alaska's community flood threats:

> *Flooding and erosion affects 184 out of 213, or 86 percent, of Alaska Native villages to some extent. While many of the problems are long-standing, various studies indicate that coastal villages are becoming more susceptible to flooding and erosion due in part to rising temperatures.*
>
> *The Corps of Engineers and the Natural Resources Conservation Service administer key programs for constructing flooding and erosion control projects. However, small and remote Alaska Native villages often fail to qualify for assistance under these programs—largely because of agency requirements that the expected costs of the project not exceed its benefits. Even villages that do meet the cost/benefit criteria may still not receive assistance if they cannot meet the cost-share requirement for the project. Source: GAO 2003*

Many federal agencies such as FEMA, USACE, NRCS and others view cost for protecting small community populations and infrastructure as too high. They prefer to seek larger jurisdictions where they can realize greater benefits. This is one of the main reasons that Alaska has very few NFIP participating jurisdictions – FEMA does not fund flood hazard studies and flood hazard map development due to excessive costs associated with remote locations.

9.2.6.3. REMOTE COMMUNITY CHALLENGES

As stated in Section 2, Alaska encompasses 656,425 square miles of land. A vast majority of Alaska's communities are considered remote. Few communities have road interconnectivity with other communities because there are only 13,546 paved and 1,601 unpaved road miles.

Most communities are only accessible by air or water. Travel into these areas is often dictated by weather and other sometimes seasonal terrain limitations. Continuing resilience and mitigation progress is further hampered by low populations and transient local and tribal government leadership, staff, community workers, as well as residents.

Remote communities have very diverse cultural and dietary needs such as seasonal subsistence harvesting that includes fishing, hunting, berry picking, and vegetable gathering and

preservation. Community artisans use antler, bone, and vegetation to create handicrafts that are sold to supplement their meager income.

DHS&EM's Resilience Section developed an "Alaska Community Resilience Analysis (ACRA) tool" to facilitate reviewing pertinent community data (Figures 9-1 and 9-2). These data identifies and considers their respective challenges such as the distance from medical care, safe village water availability, utility infrastructure capacity, and fuel expenses to name a few. The tool then ranks and scores the data categories resulting in a numerical score. The higher the score the higher the risk.

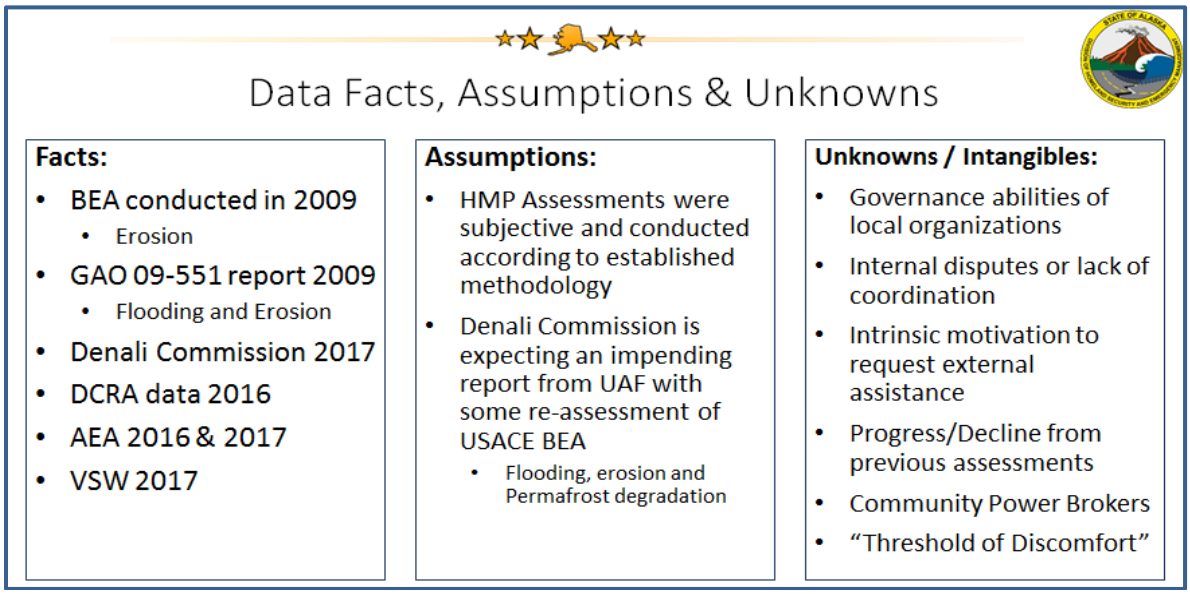

Figure 9-1 Alaska Community Resilience Analysis Community Scoring – Beta Version

The community score methodology is a beta version that will undergo stringent review and validation, but is a great representation of how the Resiliency Section strives to accurately assess communites.

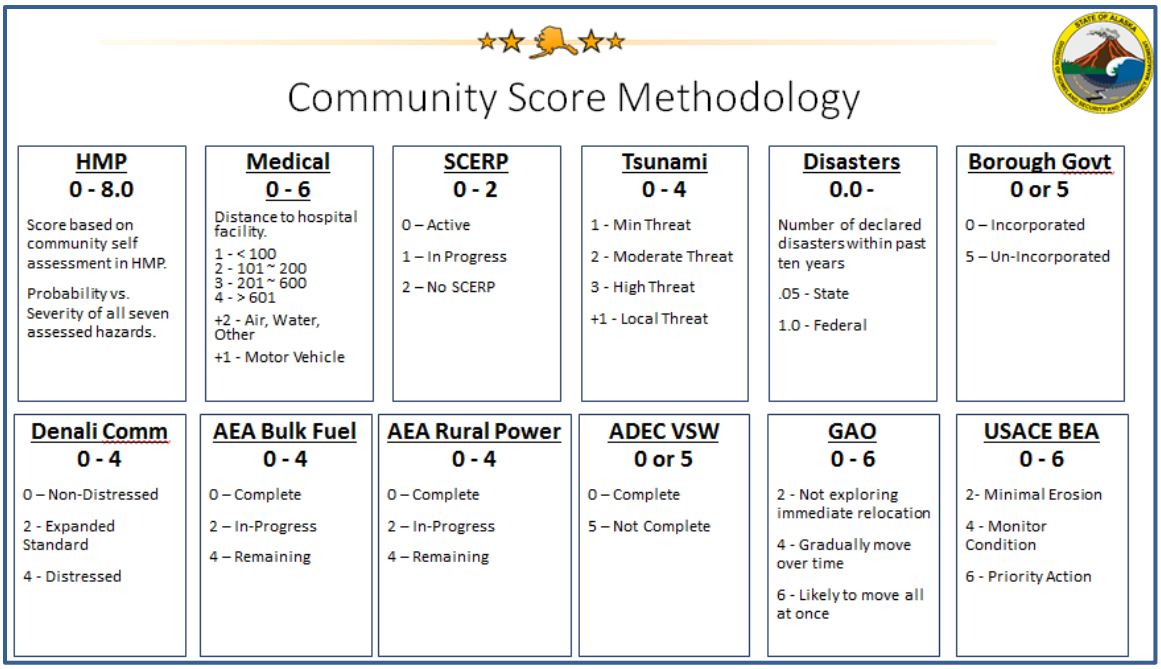

Figure 9-2 Alaska Community Resilience Analysis Community Scoring – Beta Version
Source: DHS&EM Resiliency Section 2018

9.3. DEVELOPING SHMP MITIGATION GOALS

DMA 2000 stipulated and implementing state governance regulations for developing hazard mitigation goals include:

DMA 2000 Requirements
STANDARD. Mitigation Goals
S8. Does the mitigation strategy include goals to reduce / avoid long-term vulnerabilities from the identified hazards? [44 CFR §201.4(c)(3)(i)]
Source: FEMA, March 2015.

Alaska's Mitigation Vision Statement

It is Alaska's vision to protect its citizens, promote resiliency, and reduce the long-term negative impacts from natural hazards on human, economic, and infrastructure throughout the state.

DHS&EM's Mission Statement

Protect/save life, property, and infrastructure. Minimize public and private property damages from natural hazard events. Increase citizen resiliency through training, education, and outreach programs to promote hazard impact awareness. Enhance and maintain state capability to implement a comprehensive statewide hazard loss reduction strategy. Integrate jurisdictional HMPs and concepts within all community plans, future policies, regulations, and laws.

9.3.1. REALIGNING SHMP GOALS

Mitigation goals are defined as general guidelines that describe what a community wants to achieve in terms of hazard and loss prevention. Goal statements are typically long-range, policy-oriented statements representing state-, community-, or tribal village-wide visions. The planning

team updated the mitigation goals to better focus statewide mitigation policies, procedures, projects, and actions intended to reduce or avoid future potential impacts to existing and future facilities.

The planning team reviewed and redefined their legacy 2013 SHMP's mitigation goals to better align with DHS&EM's Vision and Mission Statements. The SHMP's exposure analysis results coupled with participating state agencies' desires to simplify mitigation goals, resulted in the following four new mitigation goals that address combined hazard impacts. They are classified as Multi-Hazard (MH) categories that can address all multiple individual as well as complex natural hazard impact actions. For example, winter storms could cause avalanches or wet landslides while also causing economic losses when airlines or barge operations stop, preventing medical or response personnel transport and/or essential goods deliveries.

Table 9-6 lists the State's newly refined strategic mitigation goals, which form the foundation for the SHMP's Mitigation Strategy focused initiatives and processes.

Table 9-6 Mitigation Goals

No.	Goal Description
Multi-Hazards (MH)	
MH 1	Provide outreach activities to educate and promote recognizing and mitigating natural hazards that affect Alaska.
MH 2	Integrate community and state agency plans, mitigation goals, and initiatives throughout Alaska agency planning mechanisms and projects.
MH 3	Develop construction activities that reduce potential natural hazard damages and losses to support statewide initiatives, such as NFIP participation and RL/SRL property mitigation, etc.
MH 4	Increase funding opportunities for hazard mitigation actions and initiatives such as agency and community planning and project implementation.
Natural-Hazards	
CR 5	Reduce potential **cryosphere** (CR) vulnerability, damage, and loss.
EQ 6	Reduce potential **earthquake** (EQ) vulnerability, damage and loss.
FL 7	Reduce potential riverine and coastal **flood (FL)**, erosion vulnerability, damage, and loss.
GF 8	Reduce potential **ground failure** (GF) vulnerability, damage, and loss.
TS 9	Reduce potential **tsunami** (TS) vulnerability, damage, and loss.
VO 10	Reduce potential **volcanic** ashfall vulnerability, damage, and loss.
WX 11	Reduce potential **severe weather** vulnerability, damage, and loss.
WF 12	Reduce potential **wildland/tundra** fire vulnerability, damage, and loss.

9.4. Identifying Mitigation Actions

Mitigation actions are activities, initiatives, measures, or projects that help achieve the goals of a mitigation plan. Mitigation actions are usually grouped into three broad categories: property protection, public education and awareness, and construction projects.

The FEMA Hazard Mitigation Assistance Guidance and Addendum (HMA) states the importance of considering, evaluating, and implementing the most effective mitigation actions, projects, activities, and potential alternatives:

> *Reviewing and incorporating information from the State, tribal, or local mitigation plan can help an Applicant or subapplicant facilitate the development of mitigation project alternatives. Linking the existing mitigation plan to project scoping can support the Applicant and subapplicant in selecting the most appropriate mitigation activity that best addresses the identified hazard(s), while taking into account community priorities, climate change, and resiliency. In particular, the mitigation strategy section of the plan identifies a range of specific mitigation activities that can reduce vulnerability and includes information on the process that was used to identify, prioritize, and implement the range of mitigation actions considered…*
>
> *It is important to reference the mitigation plan as potential project alternatives may have been considered during the planning process. If the project alternatives were not considered during the mitigation planning process, they should be considered in the next mitigation plan update. Source: FEMA 2015b*

The planning team assessed the legacy 2013 SHMP's existing mitigation actions status and provided an explanation as to any changes that may have occurred (Table 9-7). The planning team defined legacy MHMP mitigation project's status as: "Completed", "Deleted", "Deferred," "Ongoing", and "Re-Defined" to better meet participant's needs.

The planning team determined that due to the volume of identified projects only the "High Priority" projects would be listed within the 2018 SHMP mitigation strategy's mitigation action plan (MAP) Table 9-10. All Medium and Low priority projects are listed in Appendix 13.26.

Note: *crossed out text indicate combined and/or edited projects. The most current project data was placed within the 2018 MAP (Table 9-10).*

Table 9-7 Alaska SHMP Update – Existing and New Mitigation Actions Status

(Blue text items are the legacy 2018 SHMPMAP actions and their respective status determinations)

Goals		Status			Actions
No.	**Description**	**Responsible Agency (ies)**	**New *Considered, Selected* Brought Forward *Complete, Deferred, Deleted, or Ongoing***	**Explain Status**	**Description**
MH 1	Provide outreach activities to educate and promote recognizing and mitigating natural hazards that affect Alaska	**Lead:** Fire Marshall's Office, Construction Industry **Support:** DCCED, Anchorage Geotechnical Commission, Insurance Industry, AHFC, mortgage	Annual-Ongoing	Moved from EQ	Host workshops for builders to teach or demonstrate new seismic construction techniques.

Table 9-7 Alaska SHMP Update – Existing and New Mitigation Actions Status

(Blue text items are the legacy 2018 SHMPMAP actions and their respective status determinations)

Goals		Status			Actions
No.	**Description**	**Responsible Agency (ies)**	**New *Considered, Selected* Brought Forward *Complete, Deferred, Deleted, or Ongoing***	**Explain Status**	**Description**
		lenders			
		Lead: State Legislature, Local communities **Support:** DHS&EM, Governor's Office, DCCED, ASHSC	Former timeline: 10 years	Reworded for clarity Moved from EQ	Support the legislature initiatives that establish new programs to provide earthquake hazard risk information to the public.
		Lead: DEED, DHS&EM **Support:** ARC, AEIC, DEED, AST, local communities	Annual - Ongoing During each school year	Moved from EQ Converted to action reflecting all hazard education activity	Continue all-hazard focused safety education and preparedness in Alaska's schools.
		Lead: DCCED **Support:** DHS&EM, DNR, DOT/PF	Ongoing	Moved from, FL Edited to reflect multi-hazard programs	Educate Alaska communities about the benefits of the NFIP, Storm Ready, and Firewise programs.
		Lead: DEED, DHS&EM **Support:** ARC, AEIC, DEED, AST, local communities	Annual - Ongoing During each school year	Moved from EQ Edited to reflect multi-hazard focused education activity	Encourage non-structural mitigation and preparedness activities.
		Lead: AEIC, UAA **Support:** USGS, ASHSC, DHS&EM	Updated action	No available funding Moved from EQ Combined objective and action into one concise action to reflect all-hazard focus	Expand the number and locations of modern strong motion and broadband seismic recording instruments in "low-noise" installations throughout Alaska to record and evaluate the seismic response of built infrastructure for opportunities to improve design and construction in all hazard locations.
		Lead: DCCED NFIP Coordinator **Support:** DHS&EM,	Ongoing	Moved from FL to reflect an all-hazard effort	Provide technical support for multi-hazard focused mitigation project grant applications that reduce future earthquake, flood, ground failure, tsunami, weather, wildland fire, etc.

Table 9-7 Alaska SHMP Update – Existing and New Mitigation Actions Status

(Blue text items are the legacy 2018 SHMPMAP actions and their respective status determinations)

Goals		Status			Actions
No.	**Description**	**Responsible Agency (ies)**	**New *Considered, Selected* Brought Forward *Complete, Deferred, Deleted, or Ongoing***	**Explain Status**	**Description**
		FEMA		DHS&EM provides technical assistance on an as needed basis	losses.
		Lead: AVO **Support:** DGGS, DNR, NWS, DHS&EM, FAA, Aviation industry, Military aviation	Ongoing	Moved from VO This is an outreach activity	Disseminate Alaska and Russian volcano hazard information to the civilian and military aviation communities, trade shows, and other public events.
		Lead: USGS, NOAA **Support:** AVO, DNR/DGGS, UAF/GI, USCG	Ongoing	Moved from VO This is an outreach activity	Expand volcano hazard information dissemination to all Alaskan maritime and coastal communities.
		Lead: *State DHS&EM, DCCED/DCRA, DNR/DOF* ***Support:*** *DPS, DLAW, ICC*	Ongoing	Moved from WF	Provide planning development, administrative processes, technical writing, and grant application development training to improve community leadership capabilities.
MH 2	Cross-reference mitigation goals and actions throughout Alaska agency planning mechanisms and projects	**Lead:** DHS&EM **Support:** SHMAC participating agencies	Selected	New	Continue DHS&EM's Mitigation Section's forward progress to implement, monitor, review, and evaluate community and tribal mitigation plan identified actions.
		All state agencies will individually share this responsibility	Selected	New	State agencies will strive to coordinate, incorporate, and integrate mitigation planning provisions into all community planning processes such as comprehensive, capital improvement, and land use plans, etc. to demonstrate multi-benefit considerations and facilitate using multiple funding source consideration.
		Lead: Fire Marshal's Office **Support:**	Updated action	Moved from EQ	Encourage all state and local jurisdictions to adopt the current IBC, and enforce commercial and residential construction for all high hazard risk locations.

Table 9-7 Alaska SHMP Update – Existing and New Mitigation Actions Status

(Blue text items are the legacy 2018 SHMPMAP actions and their respective status determinations)

Goals		Status			Actions
No.	**Description**	**Responsible Agency (ies)**	**New *Considered, Selected* Brought Forward *Complete, Deferred, Deleted, or Ongoing***	**Explain Status**	**Description**
		ASHSC, State Legislature, Anchorage Geotechnical Commission			
		Lead: Fire Marshal's Office **Support:** ASHSC, State Legislature, Anchorage Geotechnical Commission	Updated action	Moved from EQ	Provide sufficient resources and incentives to encourage compliance with the most current IBC all high hazard risk locations.
		Lead: Fire Marshal's Office **Support:** ASHSC, State Legislature, Anchorage Geotechnical Commission	Updated action	Moved from EQ	Encourage all communities to adopt or update to the current IBC for residential construction.
		Lead: DCCED, DHS&EM, Local governments, DOT/PF **Support:** State Legislature	Updated action	Moved from FL	Develop land-use planning tools such as sample regulations, land use policies, and zoning procedures that reduce or prevent development in high hazard areas such as flood, ground failure, tsunami, wildfire, etc.
MH 3	Develop construction activities that reduce potential natural and manmade hazard damages and losses	**Lead:** DCCED **Support:** DHS&EM, DGGS, and Local communities	3-5 years	Moved from GF Deferred: lack of funding	Develop an historical landslides, landslide prone, permafrost, and other soil instability locations inventory linked to specific ground failure hazard maps.
		Lead: DHS&EM **Support:** DCCED, DOT/PF, DEED, DEC, SHMAC	Ongoing	Moved from FL Combined and edited two projects with similar action intent	Promote development practices that reduce the flood risk (i.e. relocation, elevate at least 2 ft above BFE, or buy-out property). ** Purchased property deeds "must be" restricted for open space uses for perpetuity to keep people from rebuilding in known hazard areas.*).
		Lead: DCCED,	Ongoing	Moved from FL	Support community relocation site planning to remove threatened structures outside

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		USACE, DHS&EM **Support:** Denali Commission, FEMA, DOT/PF		Edited to reflect for all hazard action focus	threatened structures outside high hazard threat areas e.g., the cryosphere, floodplain, erosion, ground failure, etc.
MH 4.	Increase funding opportunities for hazard mitigation actions and initiatives such as agency and community planning and project implementation.	All Agencies	Selected	New	Identify and pursue funding opportunities to implement mitigation actions (erosion control, structure elevation or relocation, etc.)
		Lead: Fire Marshal's Office **Support:** ASHSC, State Legislature, Anchorage Geotechnical Commission		Moved from EQ	Provide sufficient resources and incentives to ensure IBC development and compliance.
		Lead: DHS&EM. DEED **Support:** FEMA, State Legislature, US Congress	Annual-Ongoing	Moved from EQ Reworded for all hazard & for clarity	Fund seismic hazard mitigation retrofits projects for all public facilities such as schools, bridges, airports, etc.
		Lead: USACE **Support:** DCCED, DHS&EM, Denali Commission	Ongoing	Moved from FL Edited to refine action intent	Prepare and fund a statewide community erosion assessment and prioritize at risk communities and infrastructure.
		Lead: DCCED, USACE, DHS&EM **Support:** Denali Commission, FEMA, DOT/PF	Ongoing	Moved from FL Edited to refine action intent	Support community relocation site planning to remove threatened structures outside high hazard threat areas e.g., the cryosphere, floodplain, erosion, ground failure, etc.
		Lead: DCCED **Support:** DHS&EM, SHMAC, DOT/PF,	Ongoing	Moved from GF and edited to reflect an all-hazard action intent	Support and fund relocating structures and other infrastructure from high hazard risk areas. (e.g. cryospheric, earthquake, flood, ground failure, wildfire, etc.)

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		DEED, DEC			
		Lead: DCCED **Support:** DHS&EM, SHMAC, DOT/PF, DEED, DEC	Ongoing	Moved from FL Edited to reflect an all-hazard action intent	Create a prioritized list of potential all hazard (e.g., cryospheric, earthquake, flood, ground failure, wildfire, etc.) damaged or impacted structures and prepare grant applications to relocate them away from high hazard risk areas for potential FEMA funding.
CR 5	Reduce potential cryosphere (CR) vulnerability, damage, and loss.	***Legacy 2013 SHMP Section 5.3.3 Snow Avalanche Goals, Objectives, and Actions***			
		High Priority			
		Lead: DHS&EM, Local communities, Avalanche centers **Support:** DHS&EM, DOT/PF, DNR	Deferred Former timelines: 2-5 years	Moved from GF Combined objective and action into one concise actions	**Objective 1.1:** Encourage communities to prohibit development in avalanche areas and relocate existing development.
					GF Action 1.1.1: Support and fund community avalanche risk assessments and incorporate them into community hazard mitigation plans.
					GF Action 1.1.4: Support and fund development of local avalanche zone maps for use in construction and land use planning and zoning.
					Encourage agencies to develop localized landslide and avalanche zone maps and support community risk assessment efforts that provide justification for prohibiting development in high hazard areas.
EQ 6	Reduce earthquake (EQ) damage and loss possibilities	***Legacy 2013 SHMP Earthquake Section 5.5.3 Goals, Objectives, and Actions***			
		High Earthquake Priority			
		Lead: DNR/DGGS **Support:** AEC, DNR, DMVA, FEMA, NOAA, USGS	Completed	Gov. authorized commission through 2020	E**Q Action 1.1.1:** Continue the Commission's statutory existence beyond the current June 2014 "sunset" authorization.
		Lead: Fire Marshal's Office, State Legislature **Support:** ASHSC, DOT/PF, Anchorage Geotechnical Commission, State Fire Marshal,	Former timeline: 10 years	Combined similar actions into one concise action Moved to MH 2	**EQ Action 2.1.1:** Encourage communities to adopt the most current International Building Code (IBC)
					EQ Action 2.1.2: Enforce requirement that all State facilities be designed and constructed in accordance with the current IBC.
					EQ Action 2.1.3: Support legislation to require communities use and enforce IBC seismic codes in design and construction as a

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		AHFC, mortgage lenders, DHS&EM			condition for receiving State and Federal funds.
		Lead: Fire Marshal's Office **Support:** ASHSC, State Legislature, Anchorage Geotechnical Commission	Former timeline: 10 years	Moved to MH 2 Divided legacy Project into separate actions see action references	**EQ Action 2.1.4:** Encourage all communities to adopt or update to the current IBC for residential construction and provide sufficient resources and incentives to ensure compliance.
		Lead: DEED, DHS&EM **Support:** ARC, AEIC, DEED, AST, local communities	Annual - Ongoing During each school year	Moved to MH 1 Convert to Action – Education activity	**Objective 4.1:** Continue earthquake safety education and preparedness in Alaska's schools.
		Lead: DEED, DHS&EM **Support:** ARC, AEIC, DEED, AST, local communities	Annual - Ongoing During each school year	from EQ Edited to reflect multi-hazard focused education activity	**EQ Action 4.1.1:** Encourage non-structural mitigation and preparedness activities.
		Lead: DOT/PF, ASHSC, DEED **Support:** DHS&EM, DEED, Community Insurers, State Fire Marshal	Delete	This is already a federal grant funding requirement	**EQ Action 4.2.3:** Encourage seismic safety reviews of new schools designs and construction in Alaska.
FL 7	Reduce flood, coastal storm surge, and erosion related damage and loss possibilities	***High Flood Priority***			
		Lead: DCCED **Support:** DHS&EM, SHMAC, DOT/PF, DEED, DEC	Ongoing	Edited to reflect an all-hazard action intent Moved to MH 4	**Edited:** FL Action 1.1.1: Create a prioritized list of potential all hazard (e.g., cryospheric, earthquake, flood, ground failure, wildfire, etc.) damaged or impacted structures and prepare grant applications for FEMA funded programs.

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		Lead: DHS&EM **Support:** DCCED, DOT/PF, DEED, DEC, SHMAC	Ongoing	Combined and edited two projects with similar action intent Moved to MH 3	FL Action 1.4.1: Encourage the State and communities to purchase flood-prone property and convert to open space for perpetuity.
					FL Action 1.2.1: Promote development practices that reduce the flood risk
		Lead: DHS&EM **Support:** DCCED, DOT/PF, DEED, DEC, SHMAC	Ongoing	Moved to MH 4 Edited to reflect an multi-hazard focus intent	**Edited:** Provide technical support for multi-hazard focused mitigation project grant applications that reduce future earthquake, flood, ground failure, tsunami, weather, wildland fire, etc. losses.
		Lead: DCCED, USACE, DHS&EM **Support:** Denali Commission, FEMA, DOT/PF	Ongoing	Edited to reflect for all hazard action focus Moved to MH 3	FL Action 1.3.2: Support the planning of community relocation sites outside the flood plain in the event of available funds.
		Lead: DCCED, Local governments, DOT/PF **Support:** State Legislature, DHS&EM	Ongoing	Combined and edited two projects with similar action intent Moved to MH 2	FL Action 1.4.2: Encourage land-use planning to reduce development in floodplains.
					FL Action 1.4.3: Develop community planning tools that include sample regulations, land use policies and zoning procedures reduce development in the floodplain.
		Lead: DCCED NFIP Coordinator **Support:** DHS&EM, FEMA	Ongoing	Moved to MH 1 DHS&EM provides technical assistance on an as needed basis	FL Action 1.5.1: Provide technical support for mitigation project grant applications that reduce future flood losses.
		Lead: DCCED NFIP Coordinator **Support:** DHS&EM, FEMA NFIP Program Manager	Ongoing		FL Action 1.5.2: Encourage State and Federally funded flood elevation projects result in elevations a minimum of two feet above the identified base flood elevation (BFE).
					Edited FL Action 1.5.2: Require that all State and Federally funded flood elevation projects be elevated a minimum of two feet

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					above the identified or projected base flood elevation (BFE).
		Lead: DCCED **Support:** DHS&EM, USACE, UAF/GI, FEMA, DNR/DGGS, DEED, USGS	Ongoing	Convert Objective and edited as a statewide action. No available funding for statewide remote communities	**FL Objective 6.1 -** Carry forward as a stand-alone project: Increase the coverage and accuracy of Alaska's flood-prone communities by developing flood hazard area mapping.
		Legacy SHMP Section 5.9.3 Erosion Goals, Objectives and Actions			
		High Erosion Priority (will combine within Flood Hazard)			
		Lead: DNR/DGGS, DCCED, and USACE **Support:** NRCS, DHS&EM	Deferred Former Timeline: 5-years	No available funding	**ER Action 1.1.1:** Support and fund local community erosion studies and incorporate them into their hazard mitigation planning.
		Lead: DHS&EM, DOT/PF, DCCED **Support:** Denali Commission, local communities, and FEMA	Deferred Former Timeline: 5-years	Moved to MH 4 Edited to reflect an all-hazard action intent No available funding	**ER Action 2.1.1:** Support and fund the relocation of structures and facilities from areas that have been identified as high risk for erosion.
		Lead: USACE, NRCS, DEC **Support**: DNR, Denali Commission, Local communities, FEMA, DOT/PF, and EPA	Deferred Former Timeline: 5-years	No available funding Combined actions into one concise action	**ER Action 2.2.1:** Encourage the retention and planting of natural vegetation in coastal areas.
					ER Action 2.3.1: Encourage the retention and planting of natural vegetation in riverine areas.
					Edited: Encourage developing erosion damaged embankment restoration projects that use natural vegetation to stabilize and fortify high risk coastal and riverine erosion damaged locations.
GF 8	Reduce ground failure (GF) damage and loss	***Legacy 2013 SHMP Section 5.8.3 Ground Failure Goals, Objectives, and Actions***			
		High Priority			
		Lead: USGS and DGGS		Combined objective and	**O**bjective 1.1: Identify and map areas prone to ground failure.

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	possibilities	**Support:** DOT/PF, AKRR, and DHS&EM		action into one concise action	Action 1.1.1: Develop maps of landslides and landslide-prone areas in urban areas.
					Objective 1.2: Combine maps with the historical records of landslides.
					Action 1.2.1: Develop an inventory of landslide events.
					Edited GF Obj. 1.1, Action 1.1.1 with Obj 1.2 & Action 1.2.1: Develop an inventory of historical landslides and landslide prone areas for use with producing location specific landslide hazard maps.
TS 9	Reduce tsunami (TS) damage and loss possibilities	***Legacy 2013 SHMP Section 5.6.3 Tsunami Goals, Objectives, and Actions***			
		High Priority			
		Lead: DHS&EM, NOAA **Support:** AEIC, DOT/PF, local jurisdictions	Ongoing	Combined redundant objectives and actions into one concise actions (State DHS&EM and NOAA conducted tsunami workshops for Alaska communities for years 2013 – 2016. Workshops are planned for years 2016 – 2019 to address warning, evacuation, recovery, and mitigation.)	Objective 1.1: Encourage all tsunami-threatened coastal communities to participate in the **DHS&EM Tsunami Program.**
					Action 1.1.1: Conduct community outreach and discuss available mitigation partnerships, benefits, and grant opportunities.
					Objective 1.2: Tsunami Ready - Encourage all tsunami high-risk communities to participate in the **NWS/DHS&EM** TsunamiReady Program.
					Action 1.2.1: Assist all tsunami communities towards TsunamiReady certification.
					Edited TS Obj 1.1, Action 1.1.1 with Obj 1.2 & Action 1.2.1: Conduct community outreach to encourage all tsunami threatened communities to participate in **NOAA Tsunami Ready Program**. Provide platform for discussing available mitigation partnerships, benefits, and grant opportunities by preparing: • Tsunami Hazard Plan (or annex to existing Emergency Operations or Comprehensive Plans), • Identify Tsunami Evacuation Routes, and • Agree to place tsunami awareness signs in their community for those that participate in the program.
		Lead: DHS&EM Support: NOAA, DOT/PF, local jurisdictions	Ongoing	Edited for clarity (Tsunami evacuation signs have been installed in 25 Alaskan	**TS Action 1.1.2:** Provide tsunami hazard and evacuation signs for at risk tsunami prone communities. The sign program requires communities to complete a Tsunami Hazard Plan (or annex to existing Emergency Operations or Comprehensive Plans), identify Tsunami Evacuation Routes, and agree to place tsunami awareness signs in

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				communities as of 2016)	their community. **Edited Action TS 1.1.2:** Provide tsunami hazard and evacuation signs for TsunamiReady Certified communities.
		Lead: DHS&EM Support: AEIC, NOAA, Local jurisdictions	Ongoing	Tsunami warning sirens have been installed in 38 Alaskan communities as of 2016.	**TS Action 1.1.3:** Install tsunami warning sirens in at-risk tsunami communities.
		Lead: DHS&EM Support: AEC, NOAA, Local jurisdictions	Ongoing	Live tsunami warning system code tests in Alaska are conducted annually; coinciding with the 1964 Good Friday earthquake and tsunami anniversary.	**TS Action 1.1.5:** Conduct statewide tests of the tsunami warning system annually.
		Lead: NTWC, DHS&EM, NOAA **Support:** Local jurisdictions, ASHSC	Ongoing	Annual process Edited to update current processes	**TS Action 1.2.2:** During the third year of their TsunamiReady certification, contact TsunamiReady communities and support them through the renewal process. **Edited TS Action 1.2.2:** Contact TsunamiReady Certified communities during the third year of their TsunamiReady certification to support them throughout their renewal process.
		Lead: UAF/GI, AEC, DNR/DGGS, USGS **Support:** NTWC, NOAA, DHS&EM, ASHSC, FEMA, NPS	Ongoing Former timeline: 10 years	Should consider combining these as a multi-phased project because each aspect is needed before modeling or mapping can occur	4. Objective 2.1: Research and model the tsunami risk for vulnerable coastal communities. 5. Action 2.1.1: Develop tsunami inundation maps for tsunami-threatened communities statewide.
		Lead: NOAA **Support:** DHS&EM, AEC, DNR/DGGS,	Ong0ing Former timeline: 10 years		3. Action 2.1.2: Obtain bathymetric data for accurate tsunami inundation mapping.

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		NTWC, NOAA, ASHSC			
		Lead: NOAA **Support:** DHS&EM, AEC, DNR/DGGS, USGS, NTWC, NOAA, FEMA, ASHSC	Ongoing Former timeline: 10 years		2. Action 2.1.3: Obtain coastal ground elevation datasets for accurate tsunami inundation mapping.
		Lead: NOAA **Support:** DHS&EM, AEC, DNR/DGGS, USGS, NTWC, NOAA, FEMA, ASHSC	Ongoing Former timeline: 10 years		1. Action 2.1.4: Identify, locate, and characterize tsunami sources in Alaska.
		Lead: State DHS&EM, NOAA, local communities **Support:** AEC, DNR/DGGS, NTWC, NOAA, ASHSC	Ongoing Former timeline: 2 years	Moved to MH 2 Edited to reflect multi-hazard initiative	TS Action 2.1.5: Encourage communities to document tsunami risk areas in land-use plans, zoning and evacuation plans.
		Lead: DHS&EM, AEC **Support:** ASHSC, DNR/DGGS	Ongoing	Annual recurrence DHS&EM in 2013-2016 served on both the NTHMP coordination committee and mitigation sub-committee.	TS Objective 3.1: Continue State and Federal advocacy partnerships such as the National Tsunami Hazard Mitigation Program (NTHMP).
					TS Action 3.1.1: Continue the State of Alaska participation on the NTHMP through a DHS&EM and UAF/GI AEIC partnership while advocating for continued Congressional funding of the NTHMP.
					Edited TS Obj 3.1 & Action 3.1.1: Continue DHS&EM's participation on the NTHMP with UAF/GI, AEC, and DGGS partnership while advocating for continued Congressional NTHMP funding.
		Lead: UAF/GI,	Ongoing Former	Limited available	TS Objective 3.2: Research and implement rapid tsunami forecasting methods.

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		AEC **Support:** University of California Berkley, NOAA	timeline: 5 years	funding	TS Action 3.2.1: Collaborate with researchers studying the implementation of near-real-time moment tensor inversion and extension of earthquake source inversion procedures for rapid tsunami forecasting.
					TS Action 3.2.2: Continue development of a "GPS shield technique" for tsunami early warning.
					TS Edited Obj 3.2, Action 3.2.1, & 3.2.2: Encourage NOAA to continue researching and developing rapid tsunami warning technologies such as near-real-time moment tensor inversion, extension of earthquake source inversion procedures, and "GPS shield technique" early tsunami warning efforts.
VO 10	Reduce volcanic (VO) activity disruption, damage, and loss possibilities	***Legacy 2013 SHMP Section 5.4.3 Volcano Goals, Objectives, and Actions***			
		High Priority			
		Lead: USGS **Support:** DNR/DGGS, UAF/GI	Ongoing	Convert this objective to an action	**VO Objective 1.1:** Conduct a comprehensive volcano hazard and risk assessment for the Cook Inlet and surrounding areas and incorporate the results into hazard mitigation planning.
			Ongoing	Move to MH 1 First generation hazard assessments for nearly half of the 52 historically active volcanoes in Alaska are complete or in progress. Funding Dependent	**VO Action 1.1.1:** Conduct and publish individual volcano hazard and risk assessments in Cook Inlet.
		Lead: DHS&EM, Local communities **Support:** DNR, DGGS, AVO, NOAA	Ongoing Former timeline: 1 years	AVO representatives historically participate on SHMP update planning teams	**VO Action 1.1.2:** Incorporate updated volcanic hazard assessments in State and local hazard mitigation plans as appropriate.
		Lead: DHS&EM, Local communities	Ongoing	Volcanic hazard assessments were included	**VO Action 1.1.3:** Include updated volcanic hazard assessments in State and local Emergency Response and Operations Plans as appropriate.

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		Support: DNR, DGGS, AVO, NOAA		in the 2010 State Emergency Operations Plan update	
		Lead: DNR, DGGS, AVO, NOAA **Support:** DSH&EM, ADEC, DHSS, Land management agencies	Ongoing Former timeline: 3 years	The USGS published a 2014 Interagency Ash Plan update	**VO Action 1.3.2:** Create and disseminate volcano hazard information products. Lead: AVO and its constituent agencies
		Lead: AVO, NWS, FAA **Support:** DHS&EM, Aviation industry, Military aviation	Ongoing Former timeline: 2-5 years	Move to MH 1 Combine and edit actions to better reflect needs Partially accomplished - funding dependent	**VO Objective 1.4:** Conduct specific outreach to the Alaskan aviation community regarding the hazards posed by Alaskan and Russian volcanoes.
					VO Action 1.4.1: Disseminate information at military and civilian air shows.
					VO Action 1.4.2: Attend the Alaska State Aviation Trade Show and other public events in Alaska to provide information and training on volcano hazards.
					Edited VO Obj 1.4, Actions 1.4.1, & 1.4.2: Disseminate Alaska and Russian volcano hazard information to the civilian and military aviation communities, trade shows, and other public events.
		Lead: USGS, NOAA **Support:** AVO, DNR/DGGS, UAF/GI, USCG	Ongoing Former timeline: 3 years	Move to MH 1 In 2015, NOAA published via a web page, "Maritime Impacts of Volcanic Eruptions: A guide for the Prudent Mariner".	VO Objective 1.5: Expand awareness of volcanic hazards to the maritime industry and community.
					VO Action 1.5.1: Expand education, outreach and improved warning dissemination of volcanic hazard information for the public.
					Edited VO Obj 1.5 & Action 1.5.1: Expand volcano hazard information disseminate to maritime and coastal communities.
		Lead: AVO, DHS&EM **Support:** NWS/NOAA	Redundant effort Former timeline: 3 years	**Delete**	Objective 1.6: Disseminate specific information regarding volcanic hazards and mitigation to Alaskan communities at risk to volcanic eruptions.
					Action 1.6.1: Conduct outreach and education on volcanic hazards and risk mitigation for the remote communities of the

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					Alaska Peninsula and the Aleutian Islands.
		Lead: AVO Support: USFWS, NPS, village corporations, local governments	Deferred	Funding and volcanic activity dependent **Merged with EQ Similar Seismic initiative**	Objective 3.1: Expand real time seismic and other geophysical monitoring to high-priority volcanoes in Alaska.
					Action 3.1.1: Install, maintain, and repair monitoring equipment on, selected volcanoes
WX 11	Reduce weather related (WX) damage and loss possibilities	***2013 Legacy SHMP Section 5.7.3 Weather Goals, Objectives, and Actions***			
		High Priority			
		Lead: *NWS, DHS&EM* ***Support:*** *DCCED, DEC, DOT/PF*	*Delete old Objectives and actions and replace with the edited version as Ongoing Former Timeline: 5-years*	*Combined two Objectives and associated actions to create one viable project. DHS&EM conducted Disaster Preparedness Conferences during 2015, 2016, 2017, and 2018 NOAA & DHS&EM communities each year to support Storm and Tsunami Ready programs between 2013 and 2015.*	*Objective 1.1: Conduct special statewide outreach/awareness activities, such as Lightning Safety Awareness Week, Winter Weather Awareness Week, and Flood Awareness Week.*
					Action 1.1.1: Host a minimum of four outreach events each year.
					Objective 5.1: Complete joint, NOAA/NWS/State, community visits to encourage Storm Ready and Tsunami Ready qualification.
					Action 5.1.1: Complete a minimum of two community visits per year in support of Tsunami Ready and Storm Ready certification.
					Edited WX Obj 1.1, Action 1.1.1 with Obj 5.1, Action 5.1.1: *Strive to conduct four special statewide outreach and awareness activities to support Lightning Safety Awareness Week, Winter Weather Awareness Week, Flood Awareness Week, Tsunami Ready ,and Storm Ready education and certification as applicable.*
		Lead: *NWS* ***Support:*** *DHS&EM*	*Ongoing Former Timeline: 5-years*	*Combined Objective and action into one action to refine projects focus and purpose*	*Objective 2.1: Expand public awareness of NOAA Weather Radio (NWR) for continuous weather broadcasts and warnings.*
					Action 2.1.1: Add more weather stations and high sites to the NWR network.
					Combined WX Obj 2.1 & Action 2.1.1: *Install more weather stations and "high sites" to the NWR network to facilitate expanding continuous broadcast and warning availability to remote locations.*
		Lead: *DHS&EM*	*Ongoing Former*	*Information was added to*	*Objective 2.2: Encourage local communities to employ redundant methods of receiving*

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		Support: *NWS*	*Timeline: 5-years*	*DHS&EM public outreach in 2013*	*weather warnings and disseminating those warnings throughout the community.*
					Action 2.2.1: Encourage communities to register with NOAA for warnings via FAX, E-Mail, radio, telephone and to transmit to public in redundant methods.
					Combined Obj 2.2 & Action 2.2.1: *Encourage local communities to employ and register with NOAA to receive warnings via FAX, E-Mail, radio, telephone and to transmit to public in redundant methods to fulfill StormReady criteria for redundant warning and emergency information receipt and communitywide disseminating.*
		Lead: *NWS* ***Support:*** *DHS&EM, local communities*	*Ongoing Former Timeline: 5-years*	*Combined and edited Objective and Action to create a viable project outcome.* *Spotters are recruited through the Riverwatch program, but not yet trained or networked in 2016*	*Objective 3.1: Train volunteers in the use of all-season storm spotter networks.*
					Action 3.1.1: Host workshops in communities.
					Combined Obj 3.1 & Action 3.1.1: *Conduct workshops to train community volunteers to perform all-season Storm Spotter Network activities such as Riverwatch and other extreme weather event reporting and coordination.*
		Lead: *NWS* ***Support:*** *DSH&EM and local communities*	*Ongoing Former Timeline: 10-years*	*Move to MH 1* *As of 2012, NOAA has partnered with State DHS&EM and is seeking other partnerships.*	*Objective 3.2: Expand weather monitoring networks through partnerships with other agencies.*
					Action 3.2.1: Conduct outreach activities with other agencies.
					Combined Obj 3.2 & Action 3.2.1: *Conduct agency outreach activities to expand Weather Monitoring Networks to facilitate communicating warnings and severe event communication and warnings.*
		Lead: *NWS, Building industry, and local communities* ***Support:*** *DHS&EM*	*Ongoing Former Timeline: 5-years*	*Move to MH 1* *Participants have presented this information in multiple formats and forums since*	*Objective 4.1: Encourage weather resistant building construction materials and practices.*
					Action 4.1.1: Encourage education and training on the value and use of weather resistance building construction.
					Combined Obj 4.1 & Action 4.1.1: *Encourage and conduct education or hands-on training to demonstrate the value of*

Table 9-7 Alaska SHMP Update – Existing and New Mitigation Actions Status

(Blue text items are the legacy 2018 SHMPMAP actions and their respective status determinations)

Goals		Status			Actions
No.	**Description**	**Responsible Agency (ies)**	**New *Considered, Selected* Brought Forward *Complete, Deferred, Deleted, or Ongoing***	**Explain Status**	**Description**
				2012.	*various hazard resistant construction practices and appropriate materials selection to improve hazard event damage resistance.*
WF 12	Reduce tundra/wildland fire (WF) damage and loss possibilities	***2013 Legacy SHMP Section 5.2.3 Wildland Fire Goals, Objectives, and Actions***			
		High Priority			
		Lead: *DNR/DOF, local communities* ***Support:*** *DCCED, DHS&EM, FEMA, NFA, ICC*	*Ongoing Former Timeline: 2-years*	*Move to MH 1* *FEMA and DHS&EM have added a Fire Mitigation Assistance Grant (FMAG) addressing the 2015 Sockeye and Card Street wildfires.*	***WF Objective 1.1:*** *Promote the Firewise program and encourage Firewise risk mitigation practices.*
					WF Action 1.1.1: *Support community based wildland fire mitigation workshops.*
					Combined WF Obj 1.1 & Action 1.1.1: *Conduct Firewise and other hazard resistant construction and materials selection workshops to teach program requirements and best risk mitigation practices*
		Lead: *State DHS&EM, DCCED/DCRA, DNR/DOF* ***Support:*** *State Legislature, Governor*	*Ongoing Former Timeline: 2-years*	*Move to MH 1* *The State provided matching funds for federal plan grants Until 2014*	***WF Objective 1.2:*** *Support Community Wildfire Protection and Hazard Mitigation plan development.*
					WF Action 1.2.1: *Provide matching funds for federal planning grants.*
					Combined WF Obj 1.2 & 1.2.1: *Support Community planning initiatives such as Wildfire Protection, Hazard Mitigation, and other infrastructure protection plan development by providing a state grant as a matching grant to federal funding.*
		Lead: *State DHS&EM, DCCED/DCRA, DNR/DOF* ***Support:*** *DPS, DLAW, ICC*	*Ongoing Former Timeline: 2-years*	*Edited for clarity and improve intent:*	***WF Action 1.2.2:*** *Provide training for planning processes and writing techniques.*
					Edited WF Action 1.2.2: *Provide planning development, administrative processes, technical writing, and grant application development training to improve community leadership capabilities.*
		Lead: *State DHS&EM, DCCED/DCRA, DNR/DOF* ***Support:*** *State Legislature, Governor*	*Ongoing Former Timeline: 2-years*	*Moved to MH 4* *Combined similar Objective and associated actions to create one viable action.* *State DHS&EM provided*	***WF Objective 1.3*** *Support Community Wildfire Protection and Hazard Mitigation Projects.*
					WF Action 1.3.1: *For impoverished communities, provide matching funds for federal hazard mitigation project grants.*
					WF Action 1.3.2: *Provide matching funds for USFS/AKDOF Volunteer Fire Assistance grants for impoverished communities.*
					Combined WF Obj 1.3, Action 1.3.1, & 1.3.2: *Support impoverished community federal mitigation grant required matching funds for eligible mitigation projects such as*

Table 9-7 Alaska SHMP Update – Existing and New Mitigation Actions Status

(Blue text items are the legacy 2018 SHMPMAP actions and their respective status determinations)

Goals		Status			Actions
No.	**Description**	**Responsible Agency (ies)**	**New *Considered, Selected* Brought Forward *Complete, Deferred, Deleted, or Ongoing***	**Explain Status**	**Description**
				matching funds for an erosion mitigation project in 2014. Thus, the precedent exists for future State matching funds addressing federal wildland fire project grants.	*HMP, USFS/AKDOF Volunteer Fire Assistance, Wildfire Protection, and climate change adaptation planning, floodplain mapping and other eligible construction project related grants.*
		Lead: *DNR/DOF, Local communities, DHS&EM* ***Support:*** *FEMA, BLM/AFS, DNR/DOF, USFS*	***Complete*** *Former Timeline: 2-years*	***Determine whether to delete or classify as Ongoing*** *This action is conducted during mitigation grant training and upon request.*	***O****bjective 2.1: Support wildland fire hazard fuel reduction programs.*
					A*ction 2.1.1: Provide technical assistance to communities applying for wildland fire fuel mitigation grants.*
		Lead: *DNR/DOF, Local communities, BLM/AFS, DNR/DOF, USFS* ***Support:*** *FEMA, DHS&EM*	*Ongoing Former Timeline: 5-years*	*The State DNR/DOF awarded a USFS sponsored Volunteer Fire Assistance Award to 30 Alaskan communities for wildland fire mitigation in 2015.*	***WF Action 2.1.2:*** *Identify, organize, and monitor the various programs responsible for fuel management in the wildland/urban interface.*

The planning team then developed a list of their new disaster grant awarded projects (Table 9-8) since the legacy 2013 SHMP was implemented. These disaster-related hazard mitigation projects focused on funding projects that reduce impacts to RL/SRL, threatened, and disaster-impacted properties and infrastructure throughout the legacy 2013 SHMP's 5-year life cycle.

It is important to note that the Newtok Native Village and Galena's Louden Tribe have received repetitive flood losses. However, neither the Louden tribe nor Newtok Native Village

participates in the NFIP. Fort Yukon is an NFIP member. Their respective disaster funded projects addressed RL/SRL property impacts. Table 7-10 identify projects the state will continue to manage during the 2018 SHMP's lifecycle.

Table 9-8 Mitigation Goals and Disaster-Funded Actions

Goals		Status		Funding Sources	Actions
No.	**Description**	**Unfunded Brought Forward, Open, Closed**	**New, Ongoing**	**State Level**	**Description**
Multi-Hazards (MH)					
MH 1	*Provide outreach activities to educate and promote recognizing and mitigating natural hazards that affect Alaska*	N/A	New	**EMPG, HMA**	Identify and pursue funding opportunities to implement mitigation actions.
		N/A	New	**EMPG, HMA**	Continue DHS&EM's Mitigation Section's forward progress to implement, monitor, review, and evaluate community and tribal mitigation plan identified actions.
MH 2	*Integrate mitigation goals and initiatives throughout Alaska agency planning mechanisms and projects*	N/A	New	**SHMAC Agency, HMA**	Establish a formal role for the SHMAC to develop a sustainable process to implement, monitor, review, and evaluate responsible agencies' mitigation actions.
		N/A	New	**SHMAC Agency Leads**	State agencies will strive to coordinate, incorporate, and integrate mitigation planning provisions into all community planning processes such as comprehensive, capital improvement, and land use plans, etc. to demonstrate multi-benefit considerations and facilitate using multiple funding source consideration.
		Open Expires: 10/01/18		**HMGP**	**2015:** 4244.0001, City and Borough of Sitka, LHMP Update
		Open Expires: 06/30/19		**HMGP**	**2015:** 4244.0002, City of Skagway LHMP Update
		2016 Unfunded	N/A	**HMGP**	**2016:** 4257.0007, Denali Borough, Multi-Jurisdictional, Multi-Hazard Plan Update Project
MH 3	*Develop construction activities that reduce potential natural hazard damages and losses to support statewide initiative, such as NFIP participation*	Closed	Complete	**HMGP**	**2012:** 4094.0002, Louden Tribal Council, (13) Galena Structures Elevation Projects (RL/SRL)
		Withdrawn/ Closed	N/A	**--**	**2012:** 4094.0003, City of Galena, City Hall and Clinic Structure Elevation Projects (RL/SRL)
		Open Expires: 12/20/20		**HMGP**	**2012:** 4094.0004, Newtok Village Council, 7 Home Acquisition & Demolition Projects (RL/SRL)
		2012 Unfunded	N/A	**HMGP**	**2012:** 4094.0005, Fort Yukon Village 9 Structure Elevation Projects (RL/SRL)
		Withdrawn	N/A	**HMGP/ PDM**	**2014:** 4162.0002, Newtok Village Council, 5 Homes Acquisition Project Alternate Project - If Funding Is Available (RL/SRL)
		Closed	Complete	**HMGP**	**2014:** 4162.0003, Newtok Village Council, 13 Homes Relocation Project (RL/SRL)
		Open	Expires: 08/13/20	**HMGP**	**2014:** 4162.0004, MSB Matanuska River Erosion Mitigation Project - Butte Area (10 Properties, 11 Homes RL/SRL)

Table 9-8 Mitigation Goals and Disaster-Funded Actions

Goals		Status		Funding Sources	Actions
No.	**Description**	**Unfunded Brought Forward, Open, Closed**	**New, Ongoing**	**State Level**	**Description**
		Open	Expires: 08/13/20	**HMGP**	**2014:** 4162.0005, MSB Matanuska River Erosion Mitigation Project - Sutton Area (5 Properties, 5 Homes RL/SRL)
		Open	Expires: 08/01/19	**HMGP**	**2015:** 4244.0003, State of Alaska, Department of Natural Resources, Division of Parks and Outdoor Recreation (State of Alaska / DNR-DOPR), Anchor River State Recreational Area Embankment Stabilization Project
		Open	Expires: 09/15/18	**HMGP**	**2015:** 4244.0004, Kenai Peninsula Borough (KPB), GIS Software for Land Cover Hazard Assessment
		Withdrawn	N/A	--	**2015:** 4244.0004, Kenai Peninsula Borough (KPB), Extreme Fire Hazard Forest Fuel Mitigation Project
		Withdrawn	N/A	**--**	**2015:** 4244.000?, Alaska Railroad Corporation (ARRC), Hazardous Fuels Reduction Mile Post (MP) 185 to 194 Mitigation Project
		2016 Unfunded	N/A	**HMGP/ PDM**	**2016:** 4257.000?, UAA, Seismic Gas Shut-off Valves (30) Project
		2016 Unfunded	N/A	**HMGP/ PDM**	**2016:** 4257.000?, Hughes Tribal Council, Tribal Bldg. Elevation Project (RL/SRL)
		2016 Unfunded	N/A	**HMGP/ PDM**	**2016:** 4257.000?, Nunam Iqua, Swan Lake Boardwalk Elevation Project (RL/SRL)
		2016 Unfunded	N/A	**HMGP/ PDM**	**2016:** 4257.000?, City of Alakanuk, Tribal Office Structure Relocation Project
		2016 Unfunded	N/A	**HMGP/ PDM**	**2016:** 4257.000?, City of Fairbanks, Public Works Cold Storage Bldg. Seismic Retrofit Project
		2016 Unfunded	N/A	**HMGP/ PDM**	**2016:** 4257.000?, City of Fairbanks, Fire Station No.3 Seismic Retrofit Project
		2016 Unfunded	N/A	**HMGP/ PDM**	**2016**: 4257.000?, City of Fairbanks, Public Works Facility Bldg. Structure Retrofit Project
		2017 Unfunded	All	**HMGP/ PDM**	**2017:** No projects funded at this time
		Unfunded	All	**HMGP/ PDM**	**2018:** No projects funded at this time
MH 4	*Increase funding opportunities for hazard mitigation actions and initiatives such as agency and community planning and project implementati on*	2017 Unfunded	N/A	**HMGP/ PDM**	**2017:** No projects funded at this time
		2018 Unfunded	N/A	**HMGP/ PDM**	**2018:** No projects funded at this time

9.5. EVALUATING AND PRIORITIZING MITIGATION ACTIONS

DMA 2000 requirements and governance regulations for implementing mitigation actions are as follows:

DMA 2000 Requirements
STANDARD STATE: Prioritizing Mitigation Actions
S9. Does the plan prioritize mitigation actions to reduce vulnerabilities identified in the risk assessment? [44 CFR §201.4(c)(3)(iii) and (iv)]
STANDARD STATE: Prioritizing Mitigation Actions
RL5. Did Element S13 (local and tribal, as applicable, capabilities) address RL and SRL properties? [44 CFR §§201.4(c)(3)(ii) and 201.4(c)(3)(v)]
Source: FEMA, March 2015

The State of Alaska has a long history of supporting state and community mitigation activities, as well as sponsoring its own mitigation programs. DHS&EM Hazard Mitigation staff are very successful in developing State mitigation policies and initiatives while garnering SHMAC participant validation. Project costs are shared by FEMA and the State at 75 and 25 percent respectively. Each state differs in its method of attributing the cost share; historically the State of Alaska with governor support has funded this match.

The State provides this information to local and tribal governments to develop their own plans, which will bring them in compliance with the DMA 2000 local and tribal HMP requirements. Once local and tribal communities fulfill FEMA HMP criteria, formally adopt their plans and receive FEMA final approval they can apply for FEMA and other federal agency grants.

To be eligible for HMGP funding, applicants must be: a state agency, a local government, a private non-profit organization, an Alaska Native Village or organization, or a federally recognized IRA tribe. An eligible applicant must apply to the State (specifically DHS&EM) for funding, and may submit hazard mitigation plan development or construction projects (e.g., structural flood control [debris basins or floodwalls], retrofitting [seismic or flood], and structure acquisition or relocation away from hazard-prone areas [flood or avalanche]) to be considered by the State. Projects must meet the State's minimum criteria:

- Does the project conform to the State Hazard Mitigation Plan?
- Does the project provide a beneficial impact on the designated area such as RL/SRL locations?
- Is it cost effective?
- Will the project meet environmental requirements?

Available Funding Notification

DHS&EM notifies local communities, tribal governments, and state agencies of available HMGP funding for each disaster. Prospective applicants are provided Preliminary Project Proposal Sheets with instructions to briefly describe proposed mitigation projects, estimate project costs, and indicate whether the project has addressed repetitive problems.

The State Hazard Mitigation Officer (SHMO), along with DHS&EM leadership and mitigation staff sort project submittals, then categorize them according to SHMP goals, and prioritizes in numerical order after ensuring that they adhere to the following:

1. Projects that address life safety concerns,
2. Local hazard mitigation plan development,
3. Other eligible mitigation projects, such as NFIP-identified RL or SRL properties,
4. Non-eligible projects or initiatives:
    a. Other available funding sources – Non-natural hazards (e.g., Terrorism, HAZMAT)
    b. Not mitigation projects: (e.g., aircraft, boats, or equipment)

Once the initial proposed project submittal sorting is completed, the list is reviewed and tentatively approved by FEMA Region 10's hazard mitigation staff to validate DHS&EM's project eligibility assessment.

Specific projects could qualify as a FEMA "Expedited" or "Fast Track" project or initiative. FEMA "Expedites" or "Fast Tracks" projects to quickly fund state-identified priority projects that would not only fulfill SHMP goals, but also quickly relieve stress and hardship. This process is especially beneficial after small disasters where minimal funding is available and proposed projects are not very complex. FEMA's Hazard Mitigation staff support this simple easily approved process because it supports FEMA's goal of quickly funding projects to protect lives and property while mitigating future disaster losses in high-hazard areas.

State Hazard Mitigation Advisory Committee

The SHMAC was developed as an essential inter-agency coordination process when DMA 2000 was first implemented. SHMAC membership consists of agency-selected representatives with responsibility for agency-specific mitigation needs and priorities, which supports their agency's respective missions.

The SHMO convenes a panel consisting of key SHMAC members to further refine project priority. The typical team comprises:

- DHS&EM State Hazard Mitigation Officer (SHMO),
- DHS&EM State Disaster Mitigation Officer,
- Department of Environmental Conservation (DEC),
- Department of Natural Resources (DNR),
- Applicable Borough Emergency Manager,
- Applicable state agency infrastructure subject-matter-experts,

Additional selection criteria can include:

1. Does the project reduce the threat to health and safety?
    a. Does it reduce the threat to public facilities?
    b. Does it reduce the threat to private facilities or homes?
    c. Are the properties NFIP-designated as RL or SRL properties
2. Does the applicant have an ongoing hazard mitigation program that indicates commitment?
3. Does the project provide a long-term solution?
4. Has the applicant stated a willingness to maintain the project once it is completed?

Projects on the attached spreadsheet are only those that are consistent with the State Hazard Mitigation Plan's Vision and Mission Statements:

- Minimize loss of life and injuries
- Minimize damages
- Facilitate the restoration of public services
- Promote economic development

To achieve these goals, the State Hazard Mitigation Plan should include measures to:

1. Save lives and reduce injuries
2. Prevent or reduce property damage
3. Reduce economic losses
4. Minimize social dislocation and stress
5. Maintain critical facilities in functional order
6. Protect infrastructure from damage
7. Protect legal liability of government and public officials

Essential Required Actions – Agencies

1. Obtain SHMAC review and preliminary, project proposal priority consensus
2. Obtain SHMAC concurrence with proposed Expedited or Fast Track Proposals
3. Submit prioritized projects for DHS&EM director's (or GAR) approval for FEMA submission
4. DHS&EM will subsequently work with applicants to obtain comprehensive project applications
5. DHS&EM will submit completed applications to FEMA Region 10 for review, approval, and funding before project submission deadlines for applicable disaster or grant submittal period

9.6. MITIGATION ACTION PLAN

DMA 2000 requirements and governance regulations for implementing mitigation actions are as follows:

DMA 2000 Requirements
STANDARD STATE: Mitigation Strategy Implementing Mitigation Actions
S10. Does the plan identify current and potential sources of funding to implement mitigation actions and activities? [44 CFR §201.4(c)(3)(iv)]
Source: FEMA, March 2015

In the state of Alaska, funding for mitigation planning and projects is available through multi-agency appropriations, grants, and contracts.

Alaska's participating agency mitigation project selections, although jointly accomplished, require vastly different implementation and management processes. Each agency has specific authorities, laws, and regulations that grant funding authority, funding allocations, and applicant grant eligibility. Table 9-9 provides an abbreviated Alaska State and federal agency

programmatic funding resource list. Appendix 13.24 provides a more detailed potential funding source list.

Direct State Disaster Mitigation Funding

While the state of Alaska has Public Assistance and Individual Assistance programs under state-declared disasters, it does not have a state disaster mitigation program. However, there have been a few occasions in which the governor and/or legislature have elected to identify and fund mitigation work through the State Disaster Relief Fund (DRF). These actions were taken under discretionary authority and no permanent state mitigation program was established.

State Provision of Non-Federal Match to Federal Mitigation Programs

Many federal mitigation programs require a local non-federal funds match. The match required varies with the program regulations and community being granted funds. There are several mitigation programs in which the State of Alaska provides the entire non-federal match for local communities resulting in 100 percent of funds being granted to the community for mitigation. These programs include the Public Assistance 406 Mitigation and Hazard Mitigation Grant Program (HMGP) which are funded under federally declared disasters. The matching funds are paid through the State Disaster Relief Fund (DRF). Therefore, while these programs are federal mitigation programs; the State provides substantial funding, sometimes totalling millions of dollars. On occasion the State has likewise provided a portion of the non-federal match for National Resource Conservation Service (NRCS) projects.

DHS&EM Project and Funding Review Process

- Reviews potential projects and relevant funding sources to identify RL/SRL properties to acquire, elevate, or relocate away from high hazard threat areas
- Reviews project benefit/cost analysis (or conducts on communities' behalf) for viability as to FEMA expectations
- Schedules a SHMAC teleconference to review and validate selected projects
- Guides SHMAC with determining applicant project's funding priorities against available State/FEMA project funding availability
- Requires applicants to further refine data, drawings, engineering plans, benefit/cost analysis etc. prior to submitting to FEMA

Table 9-9 lists brief funding resource agencies and their respective acronyms. Appendix 13.24 provides detailed funding agency resource descriptions as well as funding agency website locations.

Table 9-9 Potential Funding Source Acronym List
(See complete funding resource description in Appendix 13.24

US Department of Homeland Security (DHS) Citizen Corps Program (CCP) Emergency Operations Center (EOC) Homeland Security Grant Program (HSGP) Emergency Management Performance Grant (EMPG) State Homeland Security Program (SHSP) **Federal Management Agency (FEMA)/** Hazard Mitigation Assistance Grant Programs (HMA) Emergency Management Program Grant (EMPG) Debris Management Grant (DM) Flood Mitigation Assistance Grants (FMA)

Table 9-9 Potential Funding Source Acronym List

(See complete funding resource description in Appendix 13.24

National Earthquake Hazards Reduction Program (NEHRP)
National Dam Safety Program (NDS)
Emergency Food and Shelter (EF&S)

US Department of Commerce (DOC)/
Remote Community Alert Systems Program (RCASP)

National Oceanic and Atmospheric Administration (NOAA)
Economic Development Administration (EDP)
Public Works and Development Facilities Program (PWDFP)

US Environmental Protection Agency (EPA)/
Indian Environmental General Assistance Program (IGAP)

US Department of Agriculture (USDA)/

USDA, Farm Service Agency
Emergency Conservation Program (ECF)
Rural Development (RD)

USDA, Natural Resources Conservation Service (NRCS)
Conservation Technical Assistance Program (DCT)
Conservation Innovation Grants (CIG)
Environmental Quality Incentives Program (EQIP)
Emergency Watershed Protection Program (EWP)
Watershed Planning (WSP)

US Geological Survey (USGS)
Alaska Volcano Observatory (AVO)

US Department of Housing and Urban Development

Assistance to Native Americans (ANA)
Native American Housing Assistance and Self Determination Act (NAFSMA)

US Army Corps of Engineers (USACE)/
Planning Assistance Program (PAP)
Capital Projects: Erosion, Flood, Ports & Harbors

Alaska Department of Military and Veterans Affairs (DMVA)
Division of Homeland Security and Emergency Management (DHS&EM)
Mitigation Section (for PDM & HMGP projects and plan development)
Preparedness Section (for community planning)

Alaska Department of Community, Commerce, and Economic Development (DCCED)
Division of Community and Regional Affairs (DCRA)/
Community Development Block Grant (CDBG)
Alaska Climate Change Impact Mitigation Program (ACCIMP)
Flood Mitigation Assistance Grants (FMA)

Alaska Department of Transportation
State road repair funding

Alaska Energy Authority (AEA)
AEA/Bulk Fuel (ABF)
AEA/Alternative Energy and Energy Efficiency (AEEE)

Alaska Department of Environmental Conservation (DEC)/
Village Safe Water (VSW)
DEC/Alaska Drinking Water Fund (ADWF)
DEC/Alaska Clean Water Fund [ACWF]
DEC/Clean Water State Revolving Fund (CWSRF)

Alaska Division of Forestry (DOF)/
Volunteer Fire Assistance and Rural Fire Assistance Grant (VFAG/RFAG)
Assistance to Firefighters Grant (AFG)
Fire Prevention and Safety (FP&S)
Staffing for Adequate Fire and Emergency Response Grants (SAFER)

Table 9-9 Potential Funding Source Acronym List
(See complete funding resource description in Appendix 13.24

Denali Commission (Denali) Energy Program (EP Solid Waste Program (SWP)
Lindbergh Foundation Grant Programs (LFGP)
Rasmussen Foundation Grants (RFG)

The MAP lists the state's priority projects and initiatives to address various hazard impact threats. Table 9-10 defines how each mitigation action will be implemented and administered by responsible agencies or SHMP partners.

The MAP lists each selected mitigation action, their priorities, the responsible agency office, potential funding resource(s), the anticipated implementation timeline, and provides a brief explanation as to how the overall benefit/costs and technical feasibility were taken into consideration.

Note: *The MAP identifies the "responsible office" for project or initiative implementation as the responsible entity for grant management for each project grant received for their specific organization due to sometimes frequent personnel transitions.*

Table 9-10 State of Alaska SHMP Mitigation Action Plan (MAP)

(Blue Italicized Initiatives were brought forward from legacy SHMP or other identified plans)
(See Table 9-9 Potential Funding Agency list; Appendix 13.24 contains agency programmatic details)

Goal/ Action ID	Project Description	Priority: High	Responsible Offices or Agencies	Potential Funding Source(s)	Timeframe 1-3 Years 2-4 Years 3-5 Years	Benefit-Costs (BC) / Technical Feasibility (T/F)
Multi-Hazard (MH)						
MH 1.1	Host workshops for builders to teach or demonstrate new multi-hazard construction techniques. (E.g., seismic, flood, ground failure, weather, wildfire, etc.)	✓	**Lead:** Fire Marshall's Office, Construction Industry **Support:** DCCED, Anchorage Geotechnical Commission, Insurance Industry, AHFC, mortgage lenders	DHSEM, FEMA HMA, DOF, FMAG, AFG, FP&S, SAFER, ANA, EEFSP, Denali Commission, Lindberg Grants Program, Rasmussen Fund	1-3 years	B/C: Sustained mitigation outreach program has minimal cost and will help build and support area-wide capacity. This type activity enables the public to prepare for, respond to, and recover from disasters. TF: This low cost activity can be combined with recurring community meetings where hazard specific information can be presented in small increments. This activity is ongoing demonstrating its feasibility.
MH 1.2	Encourage the legislature efforts to establish new agency programs that provide readily available locational hazard risk information to the public. (E.g., seismic, flood, ground failure, weather, wildfire, etc.)	✓	**Lead:** State Legislature, Local communities **Support:** DHS&EM, Governor's Office, DCCED, ASHSC	State Legislative and disaster funding processes	0-5 years	B/C: Working with the legislature to develop viable will assure that all agencies will be required to cooperatively produce viable products that fulfill individual agency needs. TF: This is technically feasible using existing agency resources.
MH 1.3	Continue all-hazard focused safety education and preparedness in Alaska's schools.	✓	**Lead:** DEED, DHS&EM **Support:** ARC, AEIC, DEED, AST, local communities	DHSEM, FEMA HMA, DOF, FMAG, AFG, ANA, Denali Commission, Lindberg Grants Program, Rasmussen Fund	Ongoing	B/C: This project will ensure communities and agencies look closely at their hazard areas to ensure they can safely prepare students, residents, and visitors to evacuate during a natural hazard event. TF: This is technically feasible using existing agency resources.
MH 1.4	Educate Alaska communities about the benefits of the NFIP, Storm Ready, and Firewise programs.	✓	Lead: DCCED NFIP Coordinator, DOF, and NOAA Support: DHS&EM, DNR, DOT/PF	DHSEM, FEMA HMA, DOF, FMAG, AFG, FP&S, SAFER, ANA, EEFSP, Denali Commission, Lindberg Grants Program,	1-3 years	B/C: NFIP participation while one of FEMA's highest priorities also enables communities with an effective program focus on repetitive flood loss properties and other priority flood locations and projects.

Table 9-10 State of Alaska SHMP Mitigation Action Plan (MAP)

(Blue Italicized Initiatives were brought forward from legacy SHMP or other identified plans)
(See Table 9-9 Potential Funding Agency list; Appendix 13.24 contains agency programmatic details)

Goal/ Action ID	Project Description	Priority: High	Responsible Offices or Agencies	Potential Funding Source(s)	Timeframe 1-3 Years 2-4 Years 3-5 Years	Benefit-Costs (BC) / Technical Feasibility (T/F)
				Rasmussen Fund		NOAA's Storm Ready and Tsunami Ready, as well as DOF's Firewise programs train communities how to reduce their natural hazard threats. TF: The project is technically feasible using existing agency programs, staff, and resources.
MH 1.5	Encourage non-structural mitigation and preparedness activities using an all-hazards approach.	✓	**Lead:** DEED, DHS&EM **Support:** ARC, AEIC, DEED, AST, local communities	FEMA HMA, ANA, DCCED DOF, DOT/PF, Denali Commission, Lindberg Grants Program, Rasmussen Fund	2-4 years	B/C: Non-structural mitigation projects have minimal cost and will help the community reduce recurring natural hazard impact damages. TF: This project is technically feasible using existing Tribal Council staff
MH 1.6	Expand the number and locations of modern strong motion and broadband seismic recording instruments in "low-noise" installations throughout Alaska to record and evaluate the seismic and volcanic response of built infrastructure for opportunities to improve design and construction in all hazard locations.	✓	**Lead:** AEIC, UAA **Support:** USGS, ASHSC, DHS&EM	AEC, Advanced National Seismic System (ANSS), NEHRP, National Science Foundation (NSF)	2-5 years	B/C: Coordinated planning ensures effective damage abatement and ensures proper attention is assigned to reduce losses and damage to structures and residents. Sustained mitigation outreach program is minimal in cost and will help build and support community capacity to enable the public to prepare for, respond to, and recover from disasters. TF: This action is feasible with limited fund expenditures.
MH 1.7	Provide technical assistance and development support for multi-hazard focused mitigation project grant applications that reduce future earthquake, flood, ground failure, tsunami, weather, wildland fire, etc. losses.	✓	**Lead:** DHS&EM, DCCED, NFIP Coordinator **Support:** DNR, FEMA, NOAA, NRCS, USACE	FEMA HMA, DCCED, DOF, ANA, Denali Commission, Lindberg Grants Program, Rasmussen Fund	3-5 years	B/C: Funding agencies may be able to fulfill needed training requirements for their specific programs. Trained staff would greatly improve grant writing, and reporting quality. TF: Specialized skills may need to be contracted-out depending on the skill set required for each activity.

Table 9-10 State of Alaska SHMP Mitigation Action Plan (MAP)

(Blue Italicized Initiatives were brought forward from legacy SHMP or other identified plans)
(See Table 9-9 Potential Funding Agency list; Appendix 13.24 contains agency programmatic details)

Goal/ Action ID	Project Description	Priority: High	Responsible Offices or Agencies	Potential Funding Source(s)	Timeframe 1-3 Years 2-4 Years 3-5 Years	Benefit-Costs (BC) / Technical Feasibility (T/F)
MH 1.8	Disseminate Alaska and Russian volcano hazard information to the civilian and military aviation communities, trade shows, and other public events.	✓	**Lead:** AVO **Support:** DGGS, DNR, NWS, DHS&EM, FAA, Aviation industry, Military aviation	FEMA HMA programs, UAGS, DNR, DGGS, AVO, DOF, DOT/FAA	1-3 years	B/C: Sustained mitigation outreach programs have minimal cost and will help build and support area-wide capacity. This type activity enables the public to prepare for, respond to, and recover from disasters. TF: This low cost activity can be combined with recurring community meetings where hazard specific information can be presented in small increments. This activity is ongoing demonstrating its feasibility.
MH 1.9	Expand volcano hazard information dissemination to all Alaskan maritime and coastal communities.	✓	**Lead:** USGS, NOAA **Support:** AVO, DNR/DGGS, UAF/GI, USCG	FEMA HMA programs, UAGS, DNR, DGGS, AVO, DOF, DOT/FAA	1-3 years	B/C: Sustained mitigation outreach programs have minimal cost and will help build and support area-wide capacity. This type activity enables the public to prepare for, respond to, and recover from disasters. TF: This low cost activity can be combined with recurring community meetings where hazard specific information can be presented in small increments. This activity is ongoing demonstrating its feasibility.
MH 1.10	Provide planning development, administrative process, technical writing, and grant application development training to improve community leadership capabilities.	✓	**Lead:** DHS&EM, DCCED/DCRA, DNR/DOF **Support:** DPS, DLAW, ICC	FEMA HMA, DCCED, DOF, ANA, Denali Commission, Lindberg Grants Program, Rasmussen Fund	3-5 years	B/C: Funding agencies may be able to fulfill needed training requirements for their specific programs. Trained staff would greatly improve grant writing, and reporting quality. TF: Specialized skills may need to be contracted-out depending on the skill set required for each activity.

Table 9-10 State of Alaska SHMP Mitigation Action Plan (MAP)

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MH 2.1	Continue DHS&EM's Mitigation Section's forward progress to implement, monitor, review, and evaluate community and tribal mitigation plan identified actions.	✓	DHS&EM State Hazard Mitigation Officer (SHMO) & Grants Manager	State Disaster funds and FEMA's Emergency Management Program Grants (EMPG) and HMA programs	Ongoing	B/C: The existing team has gained experienced throughout this process which can provide invaluable insight for ensuring a sustained effort toward mitigating natural hazard damages. TF: This is feasible to accomplish as no cost is associated with the action and only relies on member availability and willingness to serve their community.
MH 2.2	State agencies will strive to coordinate, incorporate, and integrate mitigation planning provisions into all community planning processes such as comprehensive, capital improvement, and land use plans, etc. to demonstrate multi-benefit considerations and facilitate using multiple funding source consideration.	✓	All state agencies	State Agency Specific Operational Funds, Denali Commission	1-3 years	B/C: Coordinated planning ensures effective damage abatement and ensures proper attention is assigned to reduce losses and damage to structures and residents. TF: This is feasible to accomplish as cost can be associated with plan reviews and updates. The action relies on staff and review committee availability and willingness to serve their community.
MH 2.3	Encourage enforcement for all state and local jurisdictions to adopt, update to the current IBC, and enforce commercial and residential construction.	✓	**Lead:** Fire Marshal's Office **Support:** ASHSC, State Legislature, Anchorage Geotechnical Commission	FEMA, DOF, DPS, State Fire Marshall's Office, BIA, ANA	0-5 years	B/C: Building code development, implementation, and enforcement can effectively reduce future losses to hazardous events. Building codes can actually assist bush communities through making maximum use of materials and shipping costs the first time. TF: This project is technically feasible as the community need only demonstrate cost savings by demonstrating losses from history utility impacts and down time.

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MH 2.4	Encourage all communities to adopt or update to the current IBC for residential construction and provide sufficient resources and incentives to ensure compliance.	✓	**Lead:** Fire Marshal's Office **Support:** ASHSC, State Legislature, Anchorage Geotechnical Commission	FEMA, DOF, DPS, State Fire Marshall's Office, BIA, ANA	0-5 years	B/C: Building code development, implementation, and enforcement can effectively reduce future losses to hazardous events. Building codes can actually assist bush communities through making maximum use of materials and shipping costs the first time. TF: This project is technically feasible as the community need only demonstrate cost savings by demonstrating losses from history utility impacts and down time.
MH 2.5	Conduct statewide tests of the state's emergency warning systems annually.	✓	**Lead:** DHS&EM **Support:** AEC, NOAA, Local jurisdictions	DHS&EM, NOAA, DHS/FEMA, DOF, Denali Commission, Lindberg Grants Program, Rasmussen Fund	Ongoing	B/C: Sustained emergency response planning, notification, and mitigation outreach programs have minimal cost and will help build and support community capacity enabling the public to prepare for, respond to, and recover from disasters. TF: This project is technically feasible using existing City staff
MH 2.6	Provide sufficient resources and incentives necessary to encourage implementing IBC construction compliance for each multi-hazard category.	✓	**Lead:** Fire Marshal's Office **Support:** ASHSC, State Legislature, Anchorage Geotechnical Commission	FEMA, DOF, DPS, State Fire Marshall's Office, BIA, ANA	0-5 years	B/C: Building code development, implementation, and enforcement can effectively reduce future losses to hazardous events. Building codes can actually assist bush communities through making maximum use of materials and shipping costs the first time. TF: This project is technically feasible as the community need only demonstrate cost savings by demonstrating losses from history utility impacts and down time.

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MH 2.7	Encourage jurisdictions to document natural hazard high-risk areas in land-use, zoning, emergency response, and evacuation plans. (e.g., flood, ground failure, tsunami, wildfire, etc.)	✓	**Lead:** State DHS&EM, NOAA, local communities **Support:** AEC, DNR/DGGS, NTWC, NOAA, ASHSC	Denali Commission, Division of Community and Regional Affairs (DCRA)	Ongoing	B/C: Land Use plans are an essential community development and land management tool. Focused and coordinated planning enables effective damage abatement and ensures proper attention is assigned to reducing losses, damage, and injuries; and strengthens materials management. TF: This action is feasible with limited fund expenditures.
MH 2.8	**2015:** 4244.0001, City and Borough of Sitka, LHMP Update	✓	DHS&EM State Hazard Mitigation Officer (SHMO) & Grants Manager	FEMA HMA programs, NRCS, USACE, USDA, ANA, Lindbergh Grants Program, Rasmussen Fund	Expires: 10/01/18	B/C: Coordinated planning ensures effective damage avoidance or reduction and ensures proper attention is assigned to reduce losses and damage to structures and City residents. TF: This activity is technically feasible and involves effective communication, and staff resources; this activity is feasible for the City to complete.
MH 2.9	**2015:** 4244.0002, City of Skagway LHMP Update	✓	DHS&EM State Hazard Mitigation Officer (SHMO) & Grants Manager	FEMA HMA programs, Natural Resources Conservation Service (NRCS), USACE, US Department of Agriculture (USDA), ANA, Lindbergh Grants Program, Rasmussen Fund	Expires: 06/30/19	B/C: Coordinated planning ensures effective damage avoidance or reduction and ensures proper attention is assigned to reduce losses and damage to structures and City residents. TF: This activity is technically feasible and involves effective communication, and staff resources; this activity is feasible for the City to complete.

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MH 3.1	Develop an historical landslides, landslide prone, permafrost, and other soil instability locations inventory linked to specific ground failure hazard maps.	✓	**Lead:** DCCED **Support:** DHS&EM, DGGS, and Local communities	FEMA HMA, NRCS, USDA, USGS, DNR, DGGS, NOAA, DHSEM	2-4 years	B/C: Identifying threatened infrastructure proximity to natural hazards is vital to their sustainability. Providing advanced warning of pending disasters further reduces life loss and potentially can reduce damage if quick action is possible to mitigate the impact. TF: The project is technically feasible as the community has staff and resources they have used to relocate and elevate buildings.
MH 3.2	Promote development practices that reduce the flood risk (i.e. relocation, elevate at least 2 ft above BFE, or buy-out property). ** Purchased property deeds "must be" restricted for open space uses for perpetuity to keep people from rebuilding in known hazard areas.*).	✓	**Lead:** DHS&EM **Support:** DCCED, DOT/PF, DEED, DEC, SHMAC	FEMA HMA, NRCS, ANA, USACE, USDA, Lindbergh Grants Program, Rasmussen Fund, Cities, Tribes	1-5 years	B/C: This project would remove threatened structures from hazard areas, eliminating future damage while keeping land clear for perpetuity. TF: This project is feasible using existing staff skills, equipment, and materials. Acquiring contractor expertise may be required for large facilities.
MH 3.3	Support community relocation site planning to remove threatened structures outside threatened structures outside high hazard threat areas e.g., the cryosphere, floodplain, erosion, ground failure, etc.	✓	**Lead:** DCCED, USACE, DHS&EM **Support:** Denali Commission, FEMA, DOT/PF	FEMA, HMA, NRCS, ANA, USACE, USDA, Lindbergh Grants Program, Rasmussen Fund	1-5 years	B/C: Coordinated planning would facilitate removing threatened structures from hazard areas and potentially reduce future damage. Placing hazard locations as open space for perpetuity will keep land clear preventing future damage losses. TF: This project is feasible using existing staff skills, equipment, and materials. Acquiring contractor expertise may be required for large facilities.

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MH 3.4	**2012:** 4094.0004, Newtok Village Council, 7 Home Acquisition & Demolition Projects (RL/SRL)	✓	DHS&EM: State Hazard Mitigation Officer (SHMO) & Grants Manager Recipient Jurisdiction's Mayor, Administrator, Council, or Tribal Council as applicable	FEMA HMA programs, Natural Resources Conservation Service (NRCS), USACE, US Department of Agriculture (USDA), ANA, Lindbergh Grants Program, Rasmussen Fund	Expires: 12/20/20	B/C: This project would remove threatened structures from hazard areas, eliminating future damage while keeping land clear for perpetuity. TF: This project is feasible using existing staff skills, equipment, and materials. Acquiring contractor expertise may be required for large facilities.
MH 3.5	**2014:** 4162.0004, MSB Matanuska River Erosion Mitigation Project - Butte Area (10 Properties, 11 Homes) (RL/SRL)	✓	DHS&EM: State Hazard Mitigation Officer (SHMO) & Grants Manager Recipient Jurisdiction's Mayor, Administrator, Council, or Tribal Council as applicable	FEMA HMA programs, Natural Resources Conservation Service (NRCS), USACE, US Department of Agriculture (USDA), ANA, Lindbergh Grants Program, Rasmussen Fund	Expires: 08/13/20	B/C: This project would remove threatened structures from hazard areas, eliminating future damage while keeping land clear for perpetuity. TF: This project is feasible using existing staff skills, equipment, and materials. Acquiring contractor expertise may be required for large facilities.
MH 3.6	**2014:** 4162.0005, MSB Matanuska River Erosion Mitigation Project - Sutton Area (5 Properties, 5 Homes)	✓	DHS&EM: State Hazard Mitigation Officer (SHMO) & Grants Manager Recipient Jurisdiction's Mayor, Administrator, Council, or Tribal Council as applicable	FEMA HMA programs, Natural Resources Conservation Service (NRCS), USACE, US Department of Agriculture (USDA), ANA, Lindbergh Grants Program, Rasmussen Fund	Expires: 08/13/20	B/C: This project would remove threatened structures from hazard areas, eliminating future damage while keeping land clear for perpetuity. TF: This project is feasible using existing staff skills, equipment, and materials. Acquiring contractor expertise may be required for large facilities.
MH 3.7	**2015:** 4244.0003, State of Alaska, Department of Natural Resources, Division of Parks and Outdoor Recreation (State of Alaska / DNR-DOPR), Anchor River State Recreational Area Embankment Stabilization	✓	DHS&EM Grants Manager & DNR/DGGS Project Manager	State Disaster Fund, FEMA HMA program grants	Expires: 08/01/19	B/C: Coordinated hazard identification activities ensure consistency, enforcement; infrastructure and vegetation protection and resource expenditure reduction. TF: This activity is technically feasible and involves effective communication, and staff resources; this activity is feasible for to complete within a compressed time line.

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	Project					
MH 3.8	**2015:** 4244.0004, Kenai Peninsula Borough (KPB), GIS Software for Land Cover Hazard Assessment	✓	DHS&EM Grants Manager & KPB Project Manager	State Disaster Fund, FEMA HMA program grants	Expires: 09/15/18	B/C: Threatened infrastructure identification ensures proper attention is assigned to reduce losses and damage to structures and residents and effective damage abatement. TF: This is technically feasible because it requires application of knowledge of the hazard mitigation plan and other planning efforts. Feasibility is reliant on technical skills already possessed by employees holding positions that would implement this action.
MH 4.1	Identify and pursue funding opportunities to implement mitigation actions.	✓	DHS&EM State Hazard Mitigation Officer (SHMO) & Grants Manager	DHS&EM staff will use Appendix A to determine appropriate funding sources for each grant program type	Ongoing	B/C: This is an ongoing activity; essential for state agencies and rural communities as there are limited funds available to accomplish effective mitigation actions. TF: This activity is ongoing demonstrating its feasibility.
MH 4.2	Fund multi-hazard hazard mitigation retrofits projects for public facilities such as schools, brides, airports, etc.	✓	**Lead:** DHS&EM. DEED, DOT/PF **Support:** FEMA, NRCS, FOT/PF, FHWA, State Legislature, US Congress	DEED, FEMA HMA, DO/PF, FHWA, State Legislature	1-4 years	B/C: Student focused mitigation outreach activities increase future generation's knowledge and willingness to mitigate rather than rework failing infrastructure. Outreach programs generally have minimal cost and help build and support community capacity; enabling the public to prepare for, respond to, and recover from, disasters. Siting education can ensure structures are sited away from known hazard areas. TF: This project is technically feasible using existing Tribal Council staff

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MH 4.3	Prepare and fund statewide community hazard assessments and prioritize at risk communities and infrastructure for all hazard types such as flood, erosion, storm surge, ground failure, wildfire, etc.	✓	**Lead:** USACE **Support:** DCCED, DHS&EM, Denali Commission, SHMAC	FEMA, HMA, DCCED/DCRA ACCIKMP, Denali Commission, Lindberg Grant Program, Rasmussen Fund	Ongoing	B/C: Infrastructure protection for essential facilities is a critical disaster management tool. Focused and coordinated planning enables effective damage abatement and ensures proper attention is assigned to reduce losses, damage, and materials management. TF: This type activity is technically feasible typically using existing labor, equipment, and materials. Specialized methods may require hiring contractors.
MH 4.5	Support and fund relocating structures and other infrastructure from high hazard risk areas. (e.g., cryospheric, earthquake, flood, ground failure, wildfire, etc.)	✓	**Lead:** DCCED **Support:** DHS&EM, SHMAC, DOT/PF, DEED, DEC	FEMA, HMA, NRCS, ANA, USACE, USDA, Lindbergh Grants Program, Rasmussen Fund	1-5 years	B/C: Coordinated planning would facilitate removing threatened structures from hazard areas and potentially reduce future damage. Placing hazard locations as open space for perpetuity will keep land clear preventing future damage losses. TF: This project is feasible using existing staff skills, equipment, and materials. Acquiring contractor expertise may be required for large facilities.
MH 4.6	Create a prioritized list of potential all hazard (e.g., cryospheric, earthquake, flood, ground failure, wildfire, etc.) damaged or impacted structures and prepare grant applications to relocate them away from high hazard risk areas for potential FEMA funding.	✓	**Lead:** DCCED **Support:** DHS&EM, SHMAC, DOT/PF, DEED, DEC	FEMA, HMA, USFS, NRCS, ANA, USACE, USDA, Lindbergh Grants Program, Rasmussen Fund	1-5 years	B/C: Coordinated planning would facilitate removing threatened structures from hazard areas and potentially reduce future damage. Placing hazard locations as open space for perpetuity will keep land clear preventing future damage losses. TF: This project is feasible using existing staff skills, equipment, and materials. Acquiring contractor expertise may be required for large facilities.

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MH 4.7	Support and fund community planning initiatives, e.g., Community Wildfire Protection Plan (CWPP), Hazard Mitigation Plan (HMP), and other infrastructure protection plan development by providing state funds to match grant to federal funding.	✓	**Lead:** State DHS&EM, DCCED/DCRA, DNR/DOF **Support:** FEMA, State Legislature, Governor	FEMA, HMA, USFS, DOF, NRCS, ANA, USACE, USDA, Lindbergh Grants Program, Rasmussen Fund	Ongoing	B/C: Coordinated planning ensures effective damage abatement and ensures proper attention is assigned to reduce losses and damage to structures and City residents. TF: This is feasible to accomplish as no cost is associated with the action and only relies on member availability and willingness to serve their community.
MH 4.8	Support impoverished community federal mitigation grant required matching funds for eligible mitigation projects such as HMP, USFS/AKDOF Volunteer Fire Assistance, Wildfire Protection, and climate change adaptation planning, floodplain mapping and other eligible construction project related grants.	✓	**Lead:** State DHS&EM, DCCED/DCRA, DNR/DOF **Support:** State Legislature, Governor	FEMA, HMA, ANA, USACE, USDA, Lindbergh Grants Program, Rasmussen Fund	Ongoing	B/C: Coordinated planning ensures effective damage abatement and ensures proper attention is assigned to reduce losses and damage to structures and City residents. TF: This is feasible to accomplish as no cost is associated with the action and only relies on member availability and willingness to serve their community.
MH 4.9	**Disaster grant brought forward** **2015:** 4244.0001, City and Borough of Sitka, LHMP Update	✓	DHS&EM State Hazard Mitigation Officer (SHMO) & Grants Manager	FEMA HMA programs, NRCS, USACE, USDA, ANA, Lindbergh Grants Program, Rasmussen Fund	Expires: 10/01/18	B/C: Coordinated planning ensures effective damage avoidance or reduction and ensures proper attention is assigned to reduce losses and damage to structures and City residents. TF: This activity is technically feasible and involves effective communication, and staff resources; this activity is feasible for the City to complete.
MH 4.10	**Disaster grant brought forward** **2015:** 4244.0002, City of Skagway LHMP Update	✓	DHS&EM State Hazard Mitigation Officer (SHMO) & Grants Manager	FEMA HMA programs, Natural Resources Conservation Service NRCS, USACE, USDA, ANA, Lindbergh Grants Program, Rasmussen Fund	Expires: 06/30/19	B/C: Coordinated planning ensures effective damage avoidance or reduction and ensures proper attention is assigned to reduce losses and damage to structures and City residents. TF: This activity is technically feasible and involves effective communication, and staff

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						resources; this activity is feasible for the City to complete.
CR 5.1	Encourage agencies to develop localized landslide and avalanche zone maps and support community risk assessment efforts that provide justification for prohibiting development in high hazard areas.	✓	**Lead:** DHS&EM, Local communities, Avalanche centers **Support:** DHS&EM, DOT/PF, DNR	FEMA HMA, NOAA, USGS, NDR, DGGS, NRCS, State Legislature	2-4 years	B/C: Identifying threatened infrastructure proximity to natural hazards is vital to their sustainability. Providing advanced warning of pending disasters further reduces life loss and potentially can reduce damage if quick action is possible to mitigate the impact. TF: The project is technically feasible as the community has staff and resources they have used to relocate and elevate buildings.
EQ 6.1	Deploy modern seismic instrumentation in critical facilities, infrastructure, and major transportation arteries to provide real-time preliminary damage assessment capability.	✓	**Lead:** AEIC, DOT/PF **Support:** UAFGI, USGS, DNR/DGGS, UAA, Advanced National Seismic Safety (ANSS)	AEC, ANSS, NEHRP, NSF	5 years	B/C: Identifying threatened infrastructure proximity to natural hazards is vital to their sustainability. Providing advanced warning of pending disasters further reduces life loss and potentially can reduce damage if quick action is possible to mitigate the impact. TF: This action is feasible with existing agency resources once funding becomes available.
EQ 6.3	Expand the number and locations of modern strong motion and broadband seismic recording instruments in "low-noise" installations throughout Alaska to record and evaluate the seismic response of built infrastructure for opportunities to improve design and construction.	✓	**Lead:** AEIC, UAA **Support:** USGS, ASHSC, DHS&EM	AEC, ANSS, NEHRP, NSF	5 years	B/C: Identifying threatened infrastructure proximity to natural hazards is vital to their sustainability. Providing advanced warning of pending disasters further reduces life loss and potentially can reduce damage if quick action is possible to mitigate the impact. TF: This action is feasible with existing agency resources once funding becomes available.

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FL 7.1	Create a prioritized list of potential flood damaged or impacted structures and prepare grant applications for FEMA funded programs.	✓	**Lead:** DCCED/NFIP Coordinator **Support:** DHS&EM, DOT/PF, DEED, DEC	FEMA HMA, DCRA, NFIP, ACCIMP, DOT/PF, NRCS, DEED, DEC, Denali Commission, Lindberg Program Grants Program, Rasmussen Fund	1-3 years	B/C: Repetitive damage reduction is a high priority for FEMA and will therefore benefit the community greatly. Identifying RL and SRL properties is the first step to reducing losses. Coordinated planning ensures effective damage abatement and ensures proper attention is assigned to reduce losses and damage to structures and City residents. TF: This is feasible to accomplish as no cost is associated with the action until appropriate mitigation actions are identified. This activity relies on community member availability and willingness to serve their community.
FL 7.2	Promote development practices that reduce the flood risk (i.e. relocation, elevate at least 2 ft above BFE, or buy-out property). * Purchased property deeds "must be" restricted for open space uses for perpetuity to keep people from rebuilding in known hazard areas.).	✓	**Lead:** DHS&EM **Support:** DCCED NFIP Coordinator, DOT/PF, DEED, DEC, SHMAC	City, Tribe, HMA, Natural Resources Conservation Service (NRCS), ANA, USACE, US Department of Agriculture (USDA), Lindbergh Grants Program	1-5 years	B/C: This project would remove threatened structures from hazard areas, eliminating future damage while keeping land clear for perpetuity. TF: This project is feasible using existing staff skills, equipment, and materials. Acquiring contractor expertise may be required for large facilities.
GF 8.1	Develop an inventory of historical landslides and landslide prone areas for use with producing location specific landslide hazard maps.	✓	**Lead:** USGS, DGGS **Support:** DOT/PF, AKRR, DHS&EM	FEMA HMA, DCRA, NFIP, ACCIMP, DOT/PF, NRCS, DEED, DEC, Denali Commission, Lindberg Program Grants Program, Rasmussen Fund	2-4 years	B/C: Identifying threatened infrastructure proximity to natural hazards is vital to their sustainability. Providing advanced warning of pending disasters further reduces life loss and potentially can reduce damage if quick action is possible to mitigate the impact. TF: The project is technically feasible as the community has staff and resources they have used to relocate and elevate buildings.

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TS 9.1	Conduct community outreach to encourage all tsunami threatened communities to participate in **NOAA Tsunami Ready Program**. Provide platform for discussing available mitigation partnerships, benefits, and grant opportunities by preparing: • Tsunami Hazard Plan (or annex to existing Emergency Operations or Comprehensive Plans), • Identify Tsunami Evacuation Routes, and • Agree to place tsunami awareness signs in their community for those that participate in the program.	✓	**Lead:** DHS&EM, NOAA **Support:** AEC, UAF/GI, DGGS, DOT/PF, local jurisdictions	NOAA, AEC, UAF/GI, FEMA/HMA, DOT/PF, NRCS, DHS/HSEP	1-3 years	B/C: Coordinated planning ensures effective damage abatement and ensures proper attention is assigned to reduce losses and damage to structures and residents. TF: This is feasible to accomplish as cost can be associated with plan reviews and updates. The action relies on staff and review committee availability and willingness to serve their community.
TS 9.2	Contact TsunamiReady Certified communities during the third year of their TsunamiReady certification to support them throughout their renewal process.	✓	**Lead:** NTWC, DHS&EM, NOAA **Support:** Local jurisdictions, ASHSC	NOAA, AEC, UAF/GI, FEMA/HMA, DOT/PF, NRCS	Ongoing	B/C: This project will ensure the community looks closely at their hazard areas to ensure they can safely evacuate their residents and visitors to safety during a natural hazard event. TF: This is technically feasible using existing city and tribal resources.
TS 9.3	Provide tsunami hazard and evacuation signs for TsunamiReady Certified communities.	✓	**Lead:** DHS&EM Support: NOAA, DOT/PF, local jurisdictions	NOAA, AEC, UAF/GI, FEMA/HMA, DOT/PF, NRCS	Ongoing	B/C: This project will ensure the community looks closely at their hazard areas to ensure they can safely evacuate their residents and visitors to safety during a natural hazard event. TF: This is technically feasible using existing city and tribal resources.

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TS 9.4	Install tsunami warning sirens in at-risk tsunami communities.	✓	**Lead:** DHS&EM Support: AEIC, NOAA, Local jurisdictions	NOAA, AEC, UAF/GI, FEMA/HMA, DOT/PF, NRCS, DHS/HSEP	Ongoing	B/C: This project will ensure the community looks closely at their hazard areas to ensure they can safely evacuate their residents and visitors to safety during a natural hazard event. TF: This is technically feasible using existing city and tribal resources.
TS 9.5	**Phase Funded Project:** 1. Identify, locate, and characterize tsunami sources in Alaska. 2. Research and model the tsunami risk for vulnerable coastal communities. 3. Obtain bathymetric data for accurate tsunami inundation mapping. 4. Research and model the tsunami risk for vulnerable coastal communities. 5. Develop tsunami inundation maps for tsunami-threatened communities statewide.	✓	**Lead:** UAF/GI, AEC, DNR/DGGS, USGS **Support:** NTWC, NOAA, DHS&EM, ASHSC, FEMA, NPS	NOAA, AEC, UAF/GI, FEMA/HMA, DOT/PF, NRCS, DHS/HSEP	2-4 years	B/C: Identifying threatened infrastructure proximity to natural hazards is vital to their sustainability. Providing advanced warning of pending disasters further reduces life loss and potentially can reduce damage if quick action is possible to mitigate the impact. TF: The project is technically feasible as the community has staff and resources they have used to relocate and elevate buildings.

Table 9-10 State of Alaska SHMP Mitigation Action Plan (MAP)

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(See Table 9-9 Potential Funding Agency list; Appendix 13.24 contains agency programmatic details)

Goal/ Action ID	Project Description	Priority: High	Responsible Offices or Agencies	Potential Funding Source(s)	Timeframe 1-3 Years 2-4 Years 3-5 Years	Benefit-Costs (BC) / Technical Feasibility (T/F)
TS 9.6	Continue DHS&EM's participation on the NTHMP with UAF/GI, AEC, and DGGS partnership while advocating for continued joint planning, outreach, and Congressional NTHMP funding.	✓	**Lead:** State DHS&EM, NOAA, local communities **Support:** AEC, DNR/DGGS, NTWC, NOAA, ASHSC	DHS&EM, NOAA, AEC, UAF/GI, FEMA/HMA, DOT/PF, NRCS, DHS/HSEP	Ongoing	B/C: This project will ensure the community looks closely at their hazard areas to ensure they can safely evacuate their residents and visitors to safety during a natural hazard event. TF: This is technically feasible using existing city and tribal resources.
TS 9.7	Encourage NOAA to continue researching and developing rapid tsunami warning technologies such as near-real-time moment tensor inversion, extension of earthquake source inversion procedures, and "GPS shield technique" early tsunami warning efforts.	✓	**Lead:** DHS&EM, UAF/GI, AEC **Support:** University of California Berkley, NOAA	DHS&EM, NOAA, AEC, UAF/GI, FEMA/HMA, DOT/PF, NRCS, DHS/HSEP	Ongoing	B/C: This project will ensure communities looks closely at their hazard areas to ensure they can safely evacuate their residents and visitors to safety during a natural hazard event. TF: This is technically feasible using existing city and tribal resources.
VO 10.1	Conduct comprehensive volcano hazard and risk assessments for the Cook Inlet and surrounding areas and include the results into hazard mitigation planning.	✓	**Lead:** USGS, DNR, DGGS, AVO **Support:** DNR/DGGS, UAF/GI, AVO, DHS&EM	DNR, DGGS, AVO, FEMA HMA, Denali Commission, Division of Community and Regional Affairs (DCRA)	Ongoing	B/C: Hazard impact assessments are essential for community development and population protection. Focused and coordinated planning enables effective damage abatement and ensures proper attention is assigned to reducing losses, damage, and injuries; and strengthens resource management. TF: This action is feasible with limited fund expenditures.

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VO 10.2	Conduct and publish individual volcano hazard and risk assessments in Cook Inlet.	✓	**Lead:** USGS **Support:** DNR/DGGS, UAF/GI	DNR, DGGS, AVO, FEMA HMA, Denali Commission, Division of Community and Regional Affairs (DCRA)	Ongoing	B/C: Hazard impact assessments are essential for community development and population protection. Focused and coordinated planning enables effective damage abatement and ensures proper attention is assigned to reducing losses, damage, and injuries; and strengthens resource management. TF: This action is feasible with limited fund expenditures.
VO 10.3	Incorporate updated volcanic hazard assessments in State and local hazard mitigation plans as appropriate.	✓	**Lead:** DHS&EM, Local communities **Support:** DNR, DGGS, AVO, NOAA	DNR, DGGS, AVO, FEMA HMA, Denali Commission, Division of Community and Regional Affairs (DCRA)	Ongoing	B/C: Hazard impact assessments are essential for community development and population protection. Focused and coordinated planning enables effective damage abatement and ensures proper attention is assigned to reducing losses, damage, and injuries; and strengthens resource management. TF: This action is feasible with limited fund expenditures.
VO 10.4	Include updated volcanic hazard assessments in State and local Emergency Response and Operations Plans as appropriate.	✓	**Lead:** DHS&EM, Local communities **Support:** DNR, DGGS, AVO, NOAA	DNR, DGGS, AVO, FEMA HMA, Denali Commission, Division of Community and Regional Affairs (DCRA)	Ongoing	B/C: Hazard impact assessments are essential for community development and population protection. Focused and coordinated planning enables effective damage abatement and ensures proper attention is assigned to reducing losses, damage, and injuries; and strengthens resource management. TF: This action is feasible with limited fund expenditures.

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VO 10.5	Create and disseminate volcano hazard information products. Lead: AVO and its constituent agencies	✓	**Lead:** DNR, DGGS, AVO, NOAA **Support:** DSH&EM, ADEC, DHSS, Land management agencies	DNR, DGGS, AVO, FEMA HMA, Denali Commission, Division of Community and Regional Affairs (DCRA)	Ongoing	B/C: Hazard impact assessments are essential for community development and population protection. Focused and coordinated planning enables effective damage abatement and ensures proper attention is assigned to reducing losses, damage, and injuries; and strengthens resource management. TF: This action is feasible with limited fund expenditures.
VO 10.6	Conduct outreach and education on volcanic hazards and risk mitigation for the remote communities of the Alaska Peninsula and the Aleutian Islands.	✓	**Lead:** AVO, DHS&EM **Support:** NWS/NOAA	DNR, DGGS, AVO, FEMA HMA, Denali Commission, Division of Community and Regional Affairs (DCRA)	Ongoing	B/C: Sustained mitigation outreach programs have minimal cost and will help build and support area-wide capacity. This type activity enables the public to prepare for, respond to, and recover from disasters. TF: This low cost activity can be combined with recurring community meetings where hazard specific information can be presented in small increments. This activity is ongoing demonstrating its feasibility.
WX 11.1	Strive to conduct four special statewide outreach and awareness activities to support Lightning Safety Awareness Week, Winter Weather Awareness Week, Flood Awareness Week, Tsunami Ready, and Storm Ready education and certification as applicable.	✓	**Lead:** NWS, DHS&EM **Support:** DCCED, DEC, DOT/PF	DNR, DGGS, AVO, FEMA HMA, NOAA, NWS	Ongoing	B/C: Sustained mitigation outreach programs have minimal cost and will help build and support area-wide capacity. This type activity enables the public to prepare for, respond to, and recover from disasters. TF: This low cost activity can be combined with recurring community meetings where hazard specific information can be presented in small increments. This activity is ongoing demonstrating its feasibility.

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WX 11.2	Install more weather stations and "high sites" to the NWR network to facilitate expanding continuous broadcast and warning availability to remote locations.	✓	**Lead:** NWS **Support:** DHS&EM	NOAA, NWS, HSEP	Ongoing	B/C: Sustained emergency response planning, notification, and mitigation outreach programs have minimal cost and will help build and support community capacity enabling the public to prepare for, respond to, and recover from disasters. TF: This project is technically feasible using existing City staff
WX 11.3	Encourage local communities to employ and register with NOAA to receive warnings via FAX, E-Mail, radio, telephone and to transmit to public in redundant methods to fulfill StormReady criteria for redundant warning and emergency information receipt and communitywide disseminating.	✓	**Lead:** DHS&EM **Support:** NWS	NOAA, NWS, HSEP	3-5 years	B/C: Sustained emergency response planning, notification, and mitigation outreach programs have minimal cost and will help build and support community capacity enabling the public to prepare for, respond to, and recover from disasters. TF: This project is technically feasible using existing City staff
WX 11.4	Conduct workshops to train community volunteers to perform all-season Storm Spotter Network activities such as Riverwatch and other extreme weather event reporting and coordination.	✓	**Lead:** NWS **Support:** DHS&EM, local communities	NOAA, NWS, HSEP	Ongoing	B/C: Sustained mitigation activity programs have minimal cost and will help build and support community capacity enabling the public to appropriately prepare for, respond to, and recover from disasters. TF: This project is technically feasible using existing City and Tribal staff.

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Goal/ Action ID	Project Description	Priority: High	Responsible Offices or Agencies	Potential Funding Source(s)	Timeframe 1-3 Years 2-4 Years 3-5 Years	Benefit-Costs (BC) / Technical Feasibility (T/F)
WX 11.5	Conduct agency outreach activities to expand Weather Monitoring Networks to facilitate communicating warnings and severe event communication and warnings.	✓	**Lead:** NWS **Support:** DSH&EM and local communities	NOAA, NWS, HSEP	Ongoing	B/C: Sustained emergency warning, communication, and response activity capabilities enable communities to warn and protect their hazard threatened populations. This project will help build and support community capacity enabling the public to prepare for, respond to, and recover from disasters. TF: This project is technically feasible using existing City staff
WX 11.6	Encourage and conduct education or hands-on training to demonstrate the value of various hazard resistant construction practices and appropriate materials selection to improve hazard event damage resistance.	✓	**Lead:** NWS, Building industry, and local communities **Support:** DHS&EM	HMA, NRCS, USACE, USDA/EWP, USDA/ECP, DCRA/ ACCIMP	1-3 years	B/C: Identifying threatened infrastructure proximity to natural hazards is vital to their sustainability. There are currently few mapped hazard areas. This is a vital first step. This knowledge will help the community focus on activities to protect their vital infrastructure. TF: Installing emergency generators is technically feasible for this community as they already have staff to maintain existing community power generation facilities. This project typically needs to be associated with essential facility upgrades for FEMA funding
WF 12.1	Conduct Firewise and other hazard resistant construction and materials selection workshops to teach program requirements and best risk mitigation practices	✓	***Lead:*** *State DHS&EM, DCCED/DCRA, DNR/DOF* ***Support:*** *State Legislature, Governor*	FEMA HMA, AFG, VFAG, RFAG FP&S, SAFER, HSEP	Ongoing	B/C: Sustained mitigation activity programs have minimal cost and will help build and support community capacity enabling the public to appropriately prepare for, respond to, and recover from disasters. TF: This project is technically feasible using existing City and Tribal staff.

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Goal/ Action ID	Project Description	Priority: High	Responsible Offices or Agencies	Potential Funding Source(s)	Timeframe 1-3 Years 2-4 Years 3-5 Years	Benefit-Costs (BC) / Technical Feasibility (T/F)
WF 12.2	Identify, organize, and monitor the various programs responsible for fuel management in the wildland/urban interface.	✓	***Lead:*** *DNR/DOF, Local communities, BLM/AFS, DNR/DOF, USFS* ***Support:*** *FEMA, DHS&EM*	FEMA HMA, DOF, AFG, FMAG, VFAG, RFAG, FP&S, SAFER, HSEP, DOT/PF, Denali Commission, Lindberg Grants Program, Rasmussen Fund	1-3 years	B/C: This sustainable mitigation activity will greatly reduce the wildland/urban interface, have minimal cost, and will help build and support community capacity to respond to wildland fire disasters. TF: This project is technically feasible using existing Tribal Council staff.

9.7. MONITORING MITIGATION STRATEGY PROGRESS

DMA 2000 requirements and governance regulations for implementing mitigation actions are as follows:

DMA 2000 Requirements
STANDARD STATE: Mitigation Strategy Implementing Mitigation Actions
S11. Was the plan updated to reflect changes in development, progress in statewide mitigation efforts, and changes in priorities? [44 CFR §201.4(d)]
Source: FEMA, March 2015

9.7.1. CHANGES IN HMP DEVELOPMENT

In partnership with the community, the State guides city and tribal planners throughout the planning process; beginning with a face-to-face kick-off meeting, which a DHS&EM Mitigation Planner attends with the contractor and community leaders (city and tribal as applicable). In some instances, due to geography or inclement weather, this may be accomplished via teleconference. Performance expectations are explained for both the contractor and the community. Community involvement, project timelines, and final planning products are defined. Future meetings are scheduled with the planning team and community council to address project progress, changes, or challenges that may have occurred. A DHS&EM mitigation planner is present to build and strengthen state-/city or state-/tribal relationships. State involvement with communities ensures that the local jurisdictions are aware of state mitigation priorities, discussing the importance of collecting best available hazard data and identifying available community planning resources.

Public comments, feedback, and input are encouraged from the kick-off meeting to the final draft HMP's delivery. The DHS&EM recognizes that community insight and collective history may be the only historical information available. It is not uncommon for native tribes to orally pass down stories from generation-to-generation.

The city and tribal planning team participants examine the plan with their public. A draft HMP is made available on city/tribe websites, at town or tribal offices, community centers, or through the state/contractor as applicable. Public comments are gathered and included within the plan as needed.

After the plan has been through the public review and comment period as well as the contractor's technical editing phase the contractor will send the final draft for state-level (DHS&EM) review. The DHS&EM uses the appropriate FEMA Review Guide to ensure that the HMP meets Stafford Act and Title 44 CFR requirements. The DHS&EM will complete the appropriate FEMA Review Guide's City or Tribal Plan Review Tool and include it with the completed Mitigation Plan for FEMA review and conditional approval.

The State's review ensures that communities have integrated state mitigation priorities throughout the HMP by describing HMP's planning processes, discussing their hazard threats, infrastructure or asset vulnerabilities, and have identifying potential actions, initiatives, or projects to reduce or eliminate future damages.

The state reviews local and tribal hazard mitigation plans to glean information and influence the state's local and tribal planning processes, infrastructure risk and vulnerability assessment, mitigation priorities and strategies.

9.7.2. REVIEWING SHMP MITIGATION EFFORT PROGRESS

The SHMP planning agency team leaders (or designees) will monitor and review their respective mitigation strategy initiatives, actions, and projects to determine potential successes or roadblocks to achieving the SHMP's mitigation goals and whether implementing the Mitigation Action Plan's initiatives were successful throughout the SHMP's 5-year life cycle and report them during the annual review process.

DHS&EM will no longer track individual agency mitigation initiatives, actions, or projects. Each SHMP participating agency or authority administering their respective mitigation projects will prepare an Annual Review Progress Report (Appendix 13.6) and provide a copy to the DHS&EM SHMO. The report will identify any project changes, a list of identified implementation challenges (with appropriate strategies to overcome them), and a statement of whether or not the project has helped achieve their identified goals.

9.7.3. SHMP INTEGRATION WITHIN AGENCY PROGRAMS

Table 9-11 lists the State Agency mitigation activities' and initiatives' integration efforts and lessons learned as to their successes, challenges, and failures. Many are ongoing annual activities due to their success or other recurring challenges.

Table 9-11 Mitigation Integration – Agency Programs

Responsible Agency	Project or Activity Title	Status (Success, Challenges, Faiure)	Status (New, Ongoing, Completed)	Progress
Department of Health and Social Services (DHSS)	Infestations, contamination of consumables, and infectious disease outbreaks	Success	Ongoing	Addressed in Biological Response Plan
	Health Emergency Response Operations (HERO)	Success	Ongoing	Ongoing: Health Emergency Response Operations works with local communities, healthcare facilities, state and federal agencies, and other private partners to help prepare and respond to an emergency or disaster impacting the health of Alaskans. This includes natural or manmade disasters as well as infectious disease outbreaks.
	Alaska Trauma Program	Success	Ongoing	• Certifying emergency medical technicians, emergency medical services instructors, emergency medical dispatchers, and ground and air ambulance services; • Reviewing and approving Emergency Trauma Technician, Emergency Medical Technician, and Mobile Intensive Care Paramedic courses in Alaska; • Administering federal grants; • Providing training and technical

Table 9-11 Mitigation Integration – Agency Programs

Responsible Agency	Project or Activity Title	Status (Success, Challenges, Faiure)	Status (New, Ongoing, Completed)	Progress
				expertise to local EMS agencies.
Department of Environmental Conservation (DEC)	Environmental Health Laboratory	Success	Ongoing	Provides analytical and technical information to support state and national environmental health programs such as surveillance of: air, food, seafood, soil, water, and zoonotic diseases from domestic and wild animals.
DEC	Alaska State Public Health Laboratory (ASPHL)	Success	Ongoing	Performs rapid and conventional detection and confirmatory methods for bio-threat agents of concern on clinical (human and animal) environmental, and food specimens.
US DOT/Federal Highways Administration (FHWA)	Alaska Launches its 511 Service in April 2003 (http://511.alaska.gov) (See Figure 9-1)	Success	Ongoing	Ongoing "Alaska 511 Traveler" Webpage provides warnings, alerts, driving conditions, weather watches, and other valuable traveler information via the internet and mobile phone applications.
Division of Homeland Security & Emergency Management (DHS&EM)	Earthquake Simulator (2002-Present)	Success	Ongoing	• Simulators have been ongoing outreach since 2002. New simulator was purchased in 2011. • The State of Alaska's new earthquake simulator provides citizens with a safe yet realistic experience of the intense shaking that can occur during an earthquake. • Priority focuses on reaching a variety of audiences; including emergency responders, medical professionals, business owners, students, teachers, community leaders, and the general public. • Each "Quake Simulator" event is designed as an educational experience.
	Small Community Emergency Response Plan (SCERP)	Success	Ongoing	The Small Community Emergency Response Plan (SCERP) is a new, exciting approach to emergency management for small communities. SCERP is a customized flip book with essential, community-specific information for responding to a disaster.
	Alaska Emergency Response Guide (ERG) for Small Communities (2017)	Success	Ongoing	The guide includes checklists for the first 72 hours of a disaster and actions to start the rebuilding process. In addition, it also augments information included in a Small Community

Table 9-11 Mitigation Integration – Agency Programs

Responsible Agency	Project or Activity Title	Status (Success, Challenges, Faiure)	Status (New, Ongoing, Completed)	Progress
				Emergency Response Plan (SCERP).
	Community Planning to Increase Community Resiliency	Success	Ongoing	• Community planning builds a safer, more secure, and more resilient Alaska. • Prepares state and local first responders to prevent, protect, respond to, and recover from a variety of emergency situations. • Alaska DHS&EM has worked with its many partners in the delivery of emergency plans to many different levels of government throughout the state.
	Alaska Community Resilience Analysis	Under Development		DHS&EM's Resilience Section developed an "Alaska Community Resilience Analysis (ACRA) tool" to facilitate reviewing pertinent community data. These data identifies and considers their respective challenges such as the distance from medical care, safe village water availability, utility infrastructure capacity, and fuel expenses to name a few. The higher the score the higher the risk.
	Alaska Partnership for Infrastructure Protection (APIP)	Success	Ongoing	The Alaska Partnership for Infrastructure Protection, or APIP, works to integrate the private and public sector critical infrastructure owners into the municipal, state, and federal emergency framework to mitigate potential damaging impacts
	Alaska [Risk] Assessment replaces the Logistics Capability Assessment (LCA)	Success	Ongoing	The Alaska Assessment expands on existing local, tribal, territorial, and other risk methodologies by broadening the factors considered in the process.
	Cyber Security Assessment	Challenges	Ongoing	Cyber Security Assessment is to improve the overall security of critical cyber infrastructure throughout the State of Alaska in all 18 Critical Infrastructure and Key Resource (CIKR) Sectors, the City of Valdez, and the MatSu Borough.
	The Great Alaska Shakeout (2018)	Success	Ongoing	• The main goal of the ShakeOut is to get Alaskans prepared for major earthquakes, so use the ShakeOut as an opportunity to learn what to do before, during, and after an

Table 9-11 Mitigation Integration – Agency Programs

Responsible Agency	Project or Activity Title	Status (Success, Challenges, Faiure)	Status (New, Ongoing, Completed)	Progress
				earthquake. • Anyone in Alaska can participate, from a single individual at their home to a major company at the office. Talk to your coworkers, neighbors and friends about the ShakeOut and encourage their participation. • Sign is free at: www.shakeout.org/alaska/register to be counted in the ShakeOut Drill, get email updates, and more.
	Tsunami Operations Workshop	Success	Ongoing	Tsunami readiness is essential to everyone in Alaska. Workshop participants receive training to help them understand how to take specific actions required during and after a tsunami warning/event. The workshop provides communities the opportunity to share best practices and lessons learned with peers. The scientific knowledge of our federal and state partners understanding community needs combined with the communities' willingness to improve tsunami readiness improves their tsunami resilience.
	Tsunami Warning Systems	Challenge	Ongoing	Villages have a hard time finding qualified maintenance technicians to troubleshoot their tsunami alert system. Remote Alaska Native Villages often experience long warning down time periods between when a system goes down and when it is repaired.
		Potential Resolution	New Initiative	DHS&EM will send two representatives to tech school in November 2018. This activity will equip them to be the first-line of maintenance to assist with trouble shooting their community warning systems.

Figure 9-3 portrays the DOT/PF's "Alaska 511 Traveler" website that provides warnings, alerts, driving conditions, weather watches, and other valuable traveler information available.

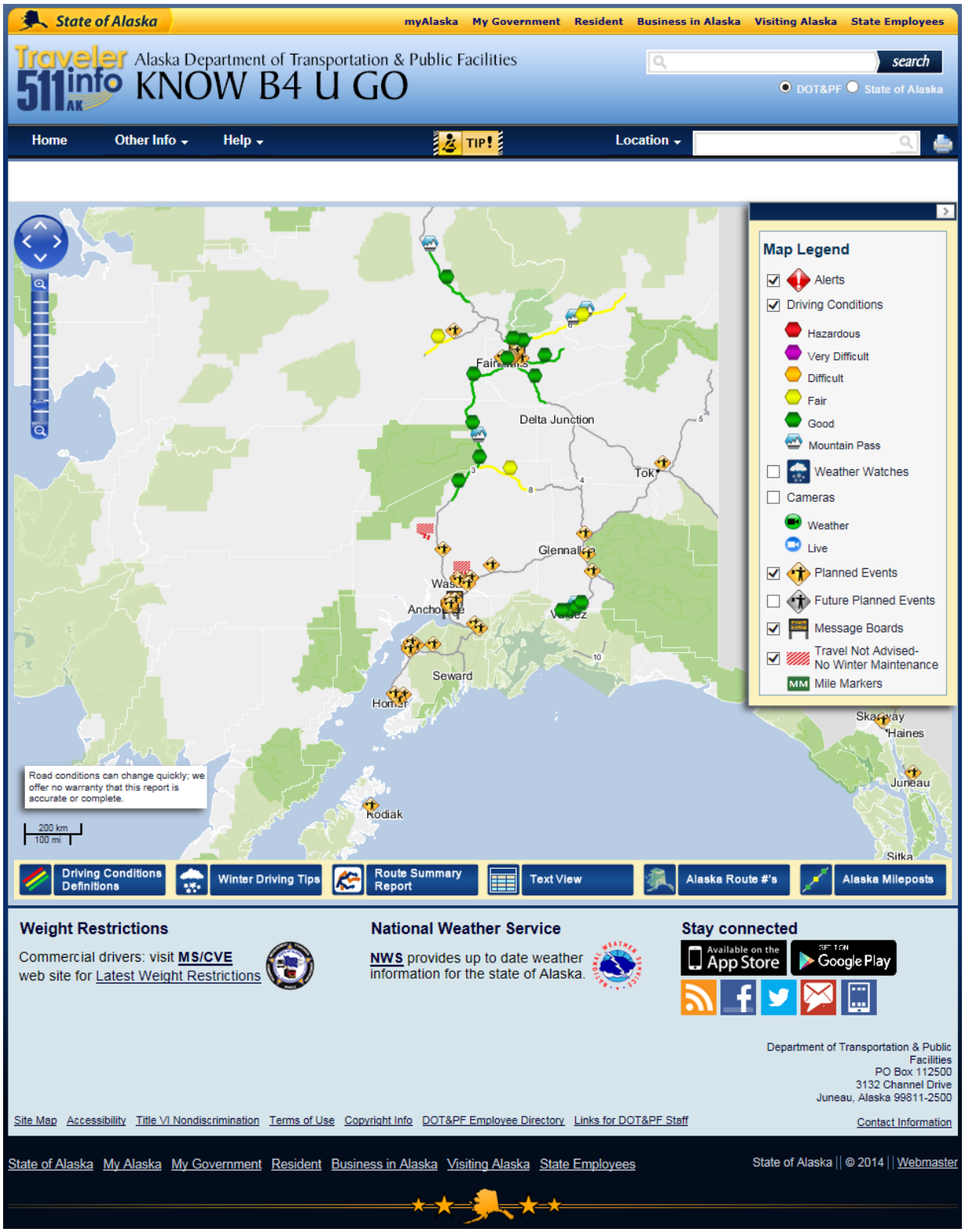


Figure 9-3 Alaska 511 Traveler Information

Source: DOT/PF http://511.alaska.gov/alaska511/mappingcomponent/index

Table 9-12 shares some of the state's challenges to implementing effective mitigation initiatives.

Table 9-12 SHMP Mitigation Challenges and Progress

Challenges	Progress
New best available science was incorporated, DGGS created new 2018 hazard profiles, impact consequences, and GIS datasets to assist the State with developing more accurate risk assessments and consequences were updated.	Included within the 2018 SHMP update
The economic downturn has significantly curtailed mitigation activities at the state agency level and slowed hazard mitigation planning efforts at the state and local level.	New staff making great strides to reduce backlogs
DHS&EM: staff turn-over causes extreme corporate memory loss. This prevents timely plan maintenance.	Ongoing DHS&EM management addressed concern with FEMA; several options were presented options to improve
Due to limited state revenue, many of the action items that had an anticipated end date during the lifespan of the 2013 plan did not occur.	SHMP no longer tracking outside agency hazard mitigation project status
DHS&EM local and tribal HMP projects: DHS&EM has successfully obtained funding for an average of approximately 40 new and update HMPs per planning cycle since the legacy 2013 SHMP was implemented	Ongoing • 113 approved city plans with 48 in various development and review stages, and 58 expired plans • 30 approved tribal plans with 20 various development and review stages, and one expired plan.
Alaska has many community challenges with completing mitigation projects. Among them are local jurisdictional capacity, resources, shipping, labor and material costs, seasonal weather delays, available / accessible ports, barge access, and associated limitations and distance, etc.	Ongoing
Remote, rural, as well as more urban communities have geographical transportation challenges. *Rural:* minimum to non-existent river or air only access. *Urban:* have road access constraints such as bridge choke points, (e.g., bridge construction or accidents close the only access roads to/from Anchorage from adjacent communities).	Ongoing
Alaska's distressed or imperiled areas have excessive wait times for emergency response and medical assistance during emergencies.	Ongoing
There are vast language barriers throughout Alaska. The State should consider translating many state level plans and documents into indigenous native languages as requested to facilitate understanding.	Ongoing

9.7.4. CHANGES IN MITIGATION PRIORITIES

On July 31, 2018, DHS&EM developed and finalized a new "Hazard Mitigation Team 3-Year Campaign Plan" dedicated to conducting scheduled and coordinated programmatic outreach initiatives such as educational conferences, workshops, and training and exercise events with an integrated focus to improve DHS&EM's programmatic reach and effectiveness. The campaign includes:

Programmatic Schedule integration with other DHS&EM Sections for the Hazard Mitigation Team. (Edited for simplification)

Conduct annual Hazard Mitigation Assistance (HMA) workshops, webinars, technical assistance and training on the HMA grant application process, benefit cost analysis (BCA), climate change, flood plain management, and environmental and historic preservation in relation to HMA project applications.

- *Annual DHS&EM Spring Conferences – HMA Sessions.*
- *Annual FEMA L0273 Floodplain Managers Course.*
- *Annual FEMA BCA Training Course.*
- *Annual FEMA G-318 Mitigation Planning Workshop.*
- *Annual FEMA/State Mitigation Consultation Meeting.*
- *Annual FEMA EO 11988/11990 Environmental and Historic Preservation Training.*
- *Annual AK Forum on the Environment / Climate Change Workshops.*
- *As Requested Community Technical Assistance.*

Provide advice and technical assistance to tribes, local jurisdictions, and eligible applicants in the development of quality Federal Emergency Management Agency (FEMA) Hazard Mitigation Assistance (HMA) Planning and Project Applications.

- *Provide technical assist for planning and project efforts as requested by communities to improve the knowledge and quality of HMA projects and plans.*

Apply for and receive Federal Emergency Management Agency (FEMA) Hazard Mitigation Assistance (HMA) Pre-Disaster Mitigation (PDM) and Hazard Mitigation Grant Program (HMGP) project "Brick & Mortar" grants to assist Local, Tribal and/or State applicants implement, manage and close out annual PDM or federal disaster HMGP projects.

- *Annually assist with the application, management, and close out process with FEMA for Local, Tribal and /or State PDM mitigation projects.*
- *Assist Local, Tribal and/or State applicants with the application, management, and close out process for FEMA for federal disaster HMGP funding, whenever HMGP funding is made available.*

Apply for and receive Pre-Disaster Mitigation (PDM) and Hazard Mitigation Grant Program (HMGP) planning grants to develop New and Updates of Local, Tribal and/or State Hazard Mitigation Plans.

- *Annually apply for 10 Local and/or Tribal Hazard Mitigation Plan Updates.*
- *Apply for FEMA PDM State Hazard Mitigation Plan Update funding to research and quantify local and tribal HMP data (e.g., changes in land use, development, and the built environment; changing population and potential vulnerabilities.*

- *Optimize use of Pre-Disaster Mitigation (PDM) funding by coordinating with tribes and local jurisdictions on their hazard mitigation planning requirements; work with potential applicants on application and cost share requirements; and collaborate with Department of Commerce Community and Economic Development/Division of Community and Regional Affairs (DCCED/DCRA) State Floodplain Manager and local jurisdictions on potential Flood Mitigation Assistance (FMA) applications.*
- *Support and participate with DCCED/DCRA Risk MAP FEMA public and/or resilience meetings per the Alaska Mapping Business Plan.*
- *Support and assist the DCCED/DCRA State Floodplain Administrator for FEMA FMA Applications.*

Conduct State Hazard Mitigation Advisory Committee (SHMAC) meetings quarterly, or as warranted, to prioritize projects, conduct annual review, and update the State Hazard Mitigation Plan (in accordance with SHMP Plan Maintenance Process).

- *Conduct quarterly SHMAC meetings.*

Work with Operations and Disaster Assistance Sections to include the Mitigation Section Staff in 100% of the Federal or State Disaster Preliminary Damage Assessments (PDA).

- *Engage Mitigation Staff members to participate in all Federal/State PDA's.*

Deploy Volcano, Earthquake, Tsunami, and Siren Programs to all at-risk communities:

In collaboration with Preparedness, continue the community volcano, earthquake, tsunami, and siren program campaign.

- *Assist communities with the planning of sirens, placement, maintenance/technical assistance and installation as requested.*
- *Assist communities with the planning of evacuation routes, maps, sign placement, technical assistance and installation as requested.*
- *Develop and optimize implementation of National Tsunami Hazard Mitigation Program (NTHMP through NOAA) annually; includes tsunami hazard mapping products, warning sirens, NOAA TsunamiReady community recognition, outreach, and planning support.*
- *Implement, review and update the 3-Year Annual NTHMP Grant Program Activities.*
- *Apply for and receive annual NOAA/NTHMP grants to support State, Local and Tribes tsunami hazard mapping products, sirens, NOAA TsunamiReady community recognition, and outreach and planning support.*

Conduct at least one Tsunami Operations Workshop annually.

- *Implement, review and update the 3-Year Annual Tsunami Operations Workshop Schedule.*
- *Conduct annual Tsunami Operations Workshops utilizing annual NOAA/NTHMP grants.*
- *Support local requests for at least one Post Disaster Damage Assessment Course annually.*
- *National Disaster Preparedness Training Center (NDPTC) AWR 217 Tsunami Awareness,*

- *FEMA P-154 Rapid Visual Screening of Buildings for Potential Seismic Hazards,*
- *ATC-20 Post-earthquake Safety Evaluation of Buildings and Rapid Observation of Vulnerability and Estimation of Risk (ROVER) trainings annually.*

Cultivate new projects with partner agencies and academia to support statewide earthquake, tsunami, and volcano preparedness.

- *Attend and participate in the FEMA Volcano Risk Assessment Workshop.*
- *Attend and participate in the Annual Tsunami Warning System Training.*
- *Attend and participate in the Annual National Earthquake Program Managers Training.*

Attend various workshops, meetings and conferences where appropriate.

- *Attend and participate in the DHS&EM Spring Preparedness Conference.*
- *Attend Association of State Floodplain Managers Conference.*
- *Attend FEMA National Annual Mitigation Stakeholders Workshop.*
- *Attend and participate in the FEMA Region X Annual Mitigation Summit.*
- *Attend and participate in the Risk MAP Communities Resilience Workshops and Meetings.*
- *Attend and participate in the USACE Silver Jackets Meetings.*

Source: DHS&EM

9.7.5. INTEGRATING MITIGATION STRATEGY INTO EXISTING PLANNING MECHANISMS

This section describes DHS&EM's efforts to coordinate, implement, and integrate SHMP information into new and existing planning mechanisms, as stipulated by DMA 2000.

Section 3.6.1 lists Alaska's ongoing state agency SHMP integration activities, projects, and programs. DHS&EM focused their attention on engaging SHMAC agencies and other participants in 2018, reviewing and updating their integration strategies during future annual SHMP maintenance activities.

Each SHMAC and planning team member will strive to incorporate pertinent mitigation data and initiatives into existing agency planning mechanisms whenever possible. Each member will strive to undertake the following activities within high hazard threat areas.

- Determine how state and jurisdictional development changes could impact population and demographics.
- Track land-use and new development focused changes.
- Determine how land-use and development changes could impact community vulnerabilities.
- Review agency-specific regulatory tools to assess integrating SHMP components.
- Work with pertinent community departments to increase SHMP awareness and assistance with integrating the mitigation strategy into their relevant planning mechanisms.
- Report integration successes and challenges within their respective "Annual SHMP Review, Evaluation, and Progress Forms" (Appendix 13-5).

Note: *Implementing this philosophy and activities may require updating or amending specific planning mechanisms.*

9.8. STATE LAND USE AND DEVELOPMENT

The SHMP's Alaska agencies and communities continually seek to maintain and upgrade their aging infrastructure.

The Alaska Department of Natural Resources maintains an area and land-use plan repository. (located at: http://dnr.alaska.gov/mlw/planning/). Many state land plans are over ten-years old and need revision to address changing economies, new public use patterns, development proposals, and selection of lands by newly created municipalities. Planning projects under consideration include the revision of the Susitna Recreation River Management Plan, or Prince William Sound Area Plan.

Figure 9-4 displays current area plans as well as those locations that are not currently scheduled for plan development.

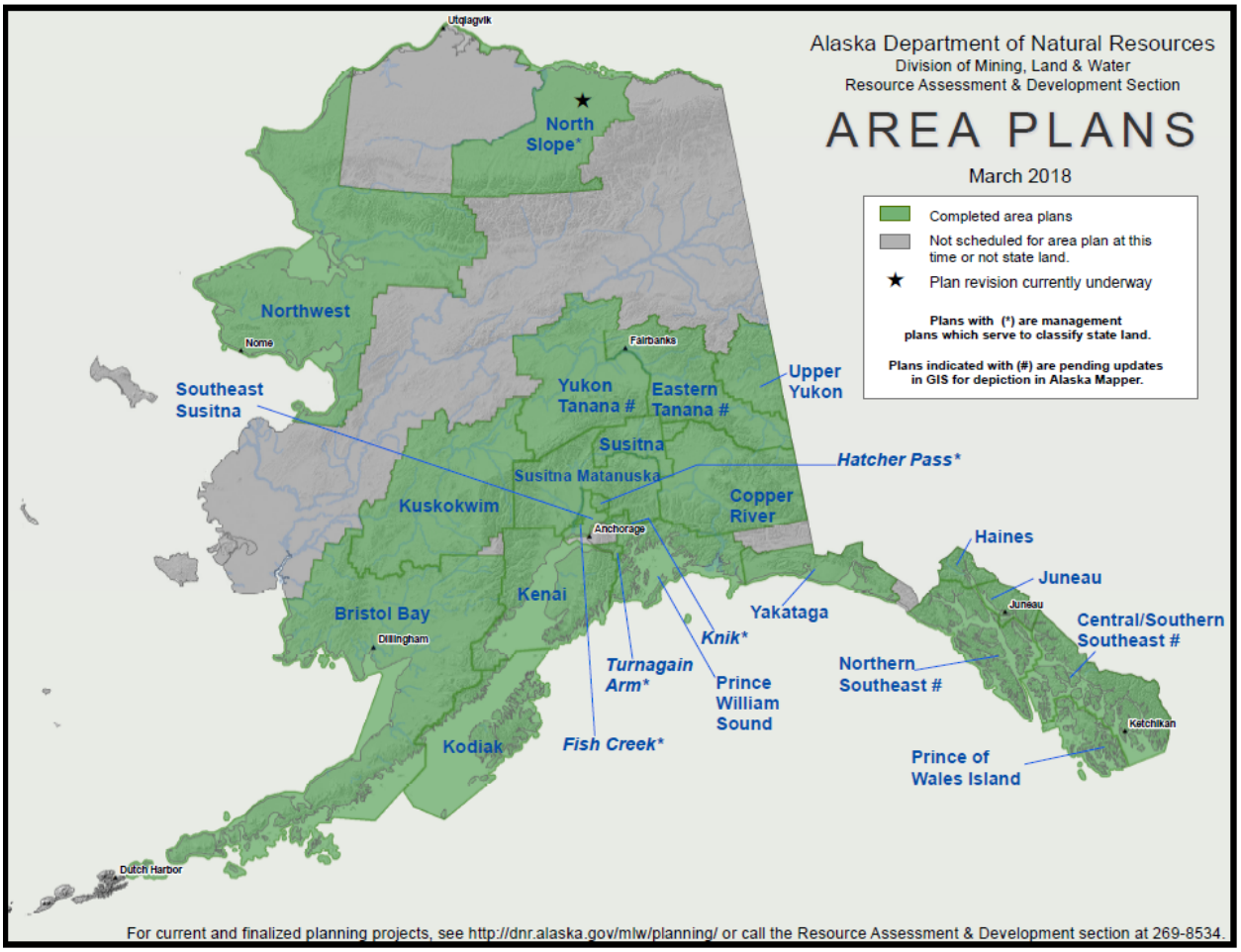


Figure 9-4 Alaska Area Plans Map Source DNR 2018

Area Plans

DNR describes the state's area and management plan's purposes, contents, and development timelines:

- Usually covers large areas (one planning area encompassed 19 million acres of state-owned land), but are also developed for areas of 250,000 acres;
- Establish goals, policies, management intent, and guidelines for the use of state land;
- Allocate the use of state land through plan designations;
- Include recommendations to retain or sell land, open or close areas to mineral entry, establish selection priorities or special land use designations, recommend legislative designations, and;
- Take two to three years to prepare.

Table 9-13 lists Alaska Area Plans and their respective completion dates.

Table 9-13 Alaska Area Plans	
• Bristol Bay Area Plan (2013)	• Prince of Wales Island Area Plan (1983)
• Central / Southern Southeast Area Plan (2000)	• Prince of Wales Island Area Plan Amendment (2008)
• Copper River Basin Area Plan (1996)	• Prince William Sound Area Plan (1988)
• Eastern Tanana Area Plan	• Southeast Susitna Area Plan (2008)
• Juneau State Land Plan (1993)	• Susitna Area Plan (1985)
• Kenai Area Plan (2000)	• Susitna Matanuska Area Plan (2011)
• Kodiak Area Plan (2004)	• Tanana Basin Area Plan (1983)
• Kuskokwim Area Plan (1998)	• Upper Yukon Area Plan (2003)
• Northern Southeast Area Plan (2002)	• Yakataga Area Plan (1995)
• Northwest Area Plan (2008)	• Yukon Tanana Area Plan (2014)

Management Plans

- Provide more detailed guidance for special areas (like recreation river corridors) or for a specific resource (like forestry), and;
- Take one to two years to complete.

Table 9-14 lists Alaska Management Plans and their respective completion dates.

Table 9-14 Alaska Management Plans	
• Dalton Highway Master Plan (1998)	• North Access Visitor Facilities Study (2004)
• Denali to Wrangell - St. Elias (1982)	• North Slope Management Plan (In-progress)
• Fish Creek Management Plan (2010)	• Nushagak and Mulchatna Rivers Recreation Management Plan (2005)
• Haines State Forest Resource Management Plan (2002)	• Scenic Resources Along the Parks Highway (1981)
• Hatcher Pass Management Plan (2010)	• Susitna Basin Recreation Rivers Management Plans (1991)
• Knik River Public Use Area Management Plan (2006)	• Susitna Forestry Guidelines (1991)

Table 9-14 Alaska Management Plans	
• Matanuska Valley Moose Range Management Plan (1986)	• Turnagain Arm Management Plan (1994)

9.8.1. CHANGES IN STRUCTURE AND INFRASTRUCTURE DEVELOPMENT

DMA 2000 Requirements
STANDARD STATE: Mitigation Strategy Implementing Mitigation Actions
S7. Was the risk assessment revised to reflect changes in development? [44CFR §201.4(d)]
Source: FEMA, March 2015

Alaska Administrative Code No. 175 defines siting and construction of state-owned, and state-financed construction projects as:

> *1. It is in the state's best interest to protect the state's capital investments by ensuring that future state-owned, and state-financed, construction projects are sited and constructed in a manner that reduces the potential for flood and erosion damage. The department of Community and Regional Affairs (DCRA) is the appropriate agency to be tasked with coordinating this effort.*
>
> *2. The Federal Emergency Management Agency (FEMA) is responsible for the National Flood Insurance Program and through regulations has developed flood plain management criteria for flood-prone, mudflow-prone, and flood-related erosion-prone area. It is in the state's best interest to site and construct state-owned and state-financed projects using the portions of those regulations pertaining to construction standards as a guide.*

The Administrative Order provides the following directions:

> *Under the authority of Article II, Section 1 of the Alaska Constitution and AS 26.23.150, I, Tony Knowles, Governor of the State of Alaska, hereby order:*
>
> *1. To maximum extent possible, consistent with existing law, all state agencies with construction authority, or that administer grants, loans, or disaster assistance for construction, shall use pertinent portions of the FEMA National Flood Insurance Program regulations, 44 CFR Part 60, as a guide for such construction activities, and shall encourage a broad and united effort to lessen the risk of flood and erosion losses in connection with state lands and installation and state-financed or supported improvements. Specifically, state agencies directly responsible for building structure construction, and other development including grading, paving, and excavation, shall to the maximum extent possible, preclude the uneconomic, hazardous, or unnecessary use of documented flood plains and erosion areas in connection with such development.*
>
> *2. DCRA is the state coordinating agency for the National Flood Insurance Program and shall assist state agencies in complying with this order.*
>
> *3. State agencies responsible for the construction of, or the administration of grant or loan programs involving the construction of buildings, structures, roads, or other facilities shall consider the potential of flood and erosion hazards. Consideration shall be given to setbacks, flood proofing, building elevation, and erosion control measures in flood and erosion-prone areas.*
>
> *4. State agencies responsible for the leasing or disposal of lands or properties shall, to the extent the action is economically feasible, evaluate flood and erosion hazards in*

connection with lands or properties proposed for disposal and, in order to minimize future state expenditures for protection and disaster relief, shall consider including within all new subdivision proposals and other proposed developments greater than 50 lots or 5 acres, whichever is the lesser, base (100) year flood elevation data, or information on approximate flood risks.

5. State agencies responsible for programs that affect land use planning, including state permit programs, shall consistent with existing statutory and regulatory requirements, take flood and erosion hazards into account when evaluating plans and permits and shall encourage land use approximate to the degree of hazard involved.

The DCCED's Alaska Mapping Business Plan, Appendix 2 provides the following data defining Alaska's community government structure that determines their governmental powers, authorities, and responsibilities. (https://www.commerce.alaska.gov/web/Portals/4/pub/AKMBPA2.pdf)

APPENDIX 2: AN OVERVIEW OF COMMUNITIES IN ALASKA

Local Government in Alaska

Most states have complex structures for local government that are comprised of multiple governmental units with narrow functions. For instance, the State of Washington provides for 17 different local government units including counties, cities, port districts, transit districts, cemetery districts, fire protection districts, hospital districts, irrigation and reclamation districts, library districts, parks and recreation districts, school districts, sewer districts, water districts, public utility districts, diking and drainage districts, health districts, and weed control districts. In the Lower 48, the agglomeration of local governments serving a particular area is comprised of units with overlapping boundaries. Each of these units generally has an independent elected government body with authority to levy taxes.

The framers of the Constitution of the State of Alaska the enjoyed great capacity to be innovative when it came to formulating local government structure for the State of Alaska. At the time, Alaska had only a rudimentary system of local government. The framers of Alaska's Constitution endeavored to avoid the complex arrangement of local government and overlapping jurisdictions frequently found in the existing 48 states. Alaska's Constitution recognizes only two types of municipal government – cities and boroughs. The term "municipality" is the generic term encompassing all classes and forms of cities and boroughs. City governments and borough governments in Alaska are municipal corporations and political subdivisions of the State of Alaska.

City governments operate at the community level. By law, the corporate boundaries of new city governments are limited to just that territory encompassing the present local community, plus reasonably predicted growth, development, and public safety needs during the next ten years. In contrast to the limits of city government, an organized borough is a regional government. Borough governments are intended to encompass large natural regions. The Alaska Constitution required all of Alaska to be divided into boroughs – organized or unorganized.

In Alaska, there are three different classifications of city government including home-rule, first-class, and second-class (Figure 1, next page, provides a map with the locations of Alaska's municipalities). Five different classes of borough government are recognized in state law including unified homerule borough, non-unified home-rule borough, first class borough and second-class borough. In total, 145 cities are not located in an organized borough and therefore lack a regional form of government. These cities are located in the "unorganized borough", which represents a large part of Alaska. In

Alaska, 162 communities or places are incorporated as either a city or borough government in Alaska. In total, there are 114 city governments, 18 borough governments, and one community organized under federal law (Annette Island Reserve).

Legal Authority for Planning, Platting and Land Use Regulation

Community size, cultural make-up, and type of local governing structure influence the level and character of local community planning. Only cities and boroughs can have land use powers. Land use regulation, as authorized by adopted municipal planning and zoning powers, is required for only a minority of communities including boroughs, home rule cities, and first class cities. Planning and zoning is elective for second class cities, which are largely located in rural Alaska.

In total, only a minority (19 %) of Alaska's municipalities implement land use regulation. In contrast, the majority of communities (81%) may or may not engage in community planning, but do not regulate land use. *These communities engage in community planning for the purpose of prioritizing grant funding, developing a shared community vision, community development strategy, and improving overall quality of life; however, they are not authorized to implement land use regulation. One of the major motivations for rural communities to engage in community planning has been to fulfill a government requirement in order to receive financial and technical assistance for physical infrastructure projects and local public services.*

Of Alaska's 162 municipalities, nearly half (47%) do not exercise planning and zoning powers. *In contrast, slightly over half (53%) either independently exercise planning and zoning powers (40%) or are part of a borough that has responsibility for area wide planning and zoning (13%).* ***Of noteworthy importance, the wide majority of Alaska's communities and nearly half of Alaska's municipalities do not exercise planning and zoning authority; local residents are without land use regulation services. These communities do not have the authority to regulate development in the floodplain and are not candidates for the NFIP.*** *In short, only 86 Alaska municipalities have planning and zoning authority or are in a borough with planning and zoning authority and are subsequently eligible to join the NFIP.*

Alaska's NFIP participating communities have for the most part, instituted permitting requirements for any construction in known hazard impact areas to assure NFIP compliance. Below is a representative sample of community planning website links provide access to their comprehensive plans with associated land use initiatives. Many larger communities have similar planning capacity. However, many of the small rural-remote communities do not. The following are the NFIP program participant's community planning websites and their respective links:

- Municipality of Anchorage: https://www.muni.org/Departments/OCPD/Planning/Publications/Documents/Anchorage%202040%20Land%20Use%20Plan/Anchorage%202040%20LUP-Section3.pdf
- Aniak: Not available (N/A)
- Bethel: https://www.cityofbethel.org/vertical/sites/%7B86032ACB-92B0-4505-919A-3F45B84FECD9%7D/uploads/Bethel_Comprehensive_Plan_-_2011.pdf
- Cordova: http://www.cityofcordova.net/images/planning/resources/2008%20Cordova%20Comprehensive%20Plan.pdf
- Dillingham: https://www.dillinghamak.us/index.asp?SEC=DB1248ED-369C-4CC4-B8AA-E8A2021C7986&Type=B_BASIC

- Emmonak: N/A
- Fairbanks North Star Borough: http://www.co.fairbanks.ak.us/lm/Documents/Code%20-%20FNSB%20Title%2020%20Land.pdf and http://www.co.fairbanks.ak.us/cp/Pages/Flood-Plain-Management.aspx
- Fort Yukon: https://www.tananachiefs.org/wp-content/uploads/2015/11/Fort-Yukon-Community-Plan-Final.pdf
- Galena: https://www.tananachiefs.org/wp-content/uploads/2015/11/Galena-2012-2017-Final.pdf
- Haines Borough: http://www.hainesalaska.gov/sites/default/files/fileattachments/planning_and_zoning/page/1677/haines_coastal_management_plan_1_28_08.pdf
- Homer: https://www.cityofhomer-ak.gov/planning/comprehensive-plan
- Hoonah: https://www.gpo.gov/fdsys/pkg/CZIC-ht393-a4-h66-1984/html/CZIC-ht393-a4-h66-1984.htm
- City and Borough of Juneau: http://www.juneau.org/cddftp/documents/10_Land_Use.pdf; http://www.juneau.org/cddftp/GeophysicalHazards.php; and http://www.juneau.org/cddftp/permit.php
- Ketchikan Gateway Borough: http://www.borough.ketchikan.ak.us/142/Planning-Community-Development
- Kenai Peninsula Borough: https://library.municode.com/ak/kenai_peninsula_borough/codes/code_of_ordinances?nodeId=TIT21ZO and Land Use Planning: https://www.kpb.us/landmgt/land-use
- Kotzebue: https://www.cityofkotzebue.com/vertical/sites/%7BA001CDF5-7F45-4E0C-9DFC-D296959501D1%7D/uploads/Kotzebue_Comprehensive_Plan_City_Council_Approved_1-17-13.pdf
- Koyukuk: https://www.tananachiefs.org/wp-content/uploads/2015/11/Koyukuk-CP-2008.pdf
- Kwethluk: N/A
- Mat-Su Borough: https://www.matsugov.us/plans/borough-wide-comprehensive-plan
- McGrath: https://www.commerce.alaska.gov/dcra/DCRARepoExt/RepoPubs/Plans/FINAL%20McGrath%20Community%20Plan%202013.pdf
- Nenana: https://www.tananachiefs.org/wp-content/uploads/2015/11/Nenana-2013-Plan.pdf and Tanana Area Lands: http://dnr.alaska.gov/mlw/planning/areaplans/tanana/
- Northwest Arctic Borough: https://www.nwabor.org/departments/planning/
- Petersburg Borough: https://www.ci.petersburg.ak.us/index.asp?SEC=D00B4CC4-8B7F-4BB0-B360-940BCD613657&DE=7B864EBE-4370-47E4-BCEF-39350CE96502 and https://www.ci.petersburg.ak.us/?SEC=32098364-8AB1-4811-87F6-3A565CDD30E0
- Seward, Volume I: http://www.cityofseward.us/DocumentCenter/View/391, volume II: http://www.cityofseward.us/DocumentCenter/View/392 , Code: https://library.municode.com/ak/seward/codes/code_of_ordinances
- Shishmaref: https://www.commerce.alaska.gov/dcra/dcrarepoext/Pages/CommunityInfrastructureLibrary.aspx

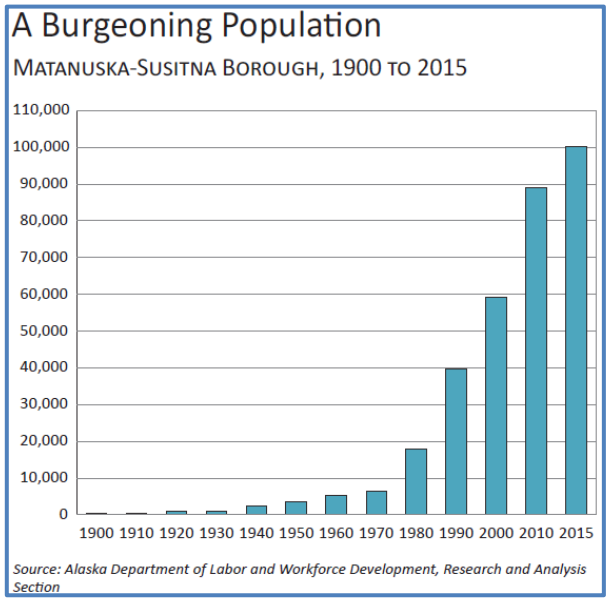
- City and Borough of Sitka: http://www.cityofsitka.com/government/departments/planning/documents/TechnicalPlanDraft8Feb2018.pdf and https://www.codepublishing.com/AK/Sitka/?Sitka22/Sitka2204.html&?f
- Municipality of Skagway: https://www.codepublishing.com/AK/Skagway/ , https://www.skagway.org/ordinances, and https://www.skagway.org/sites/default/files/fileattachments/clerk039s_office/page/28411/complete_skagway_2020_comprehensive_plan.pdf
- Togiak: https://www.bbna.com/wp-content/uploads/Togiak-Comprehensive-Plan-2015-Final.pdf
- Valdez: http://www.ci.valdez.ak.us/DocumentCenter/View/3164,

9.8.1.1. POPULATION, BUILDINGS, AND INFRASTRUCTURE GROWTH

The state's population has grown steadily from 100,00 in 1946 to approximately 737,795 in 2017 spanning 19 boroughs, one unorganized borough, approximately 149 incorporated cities, 4 unified home rule municipalities, 10 home rule cities, 19 first class cities, and 116 second class cities. This growth is expected to continue well into the future due to its close proximity to Anchorage, Alaska's most populous city, the largest airport transportation and cargo hub in the nation.

Alaska's land use as it pertains to population and infrastructure vulnerabilities is not currently available. However, the Alaska Department of Labor and Workforce Development described the Matanuska-Susitna (Mat-Su) Borough as the fastest growing community in Alaska. It has become the State's second largest city. Eric Sandberg stated in Alaska Economic Trends, March 2016, the

> *Mat-Su Borough has averaged 3.5 percent growth per year versus 1.2 percent for the entire state…*
>
> *While the net population gains from Anchorage migration are not at the oil-boom levels of the early '80s, Mat-Su has gained more than 500 people per year from its neighbor since 1990. Through the 1990s and most of the 2000s, this inflow grew steadily as a more measured housing boom brought in more movers…*
>
> *In the areas southwest of Wasilla along Knik-Goose Bay Road, average yearly growth has topped 6 percent. This area, home to around 4,500 people in 2000, has added more than 9,500 people in the last 15 years. Other areas have also topped the borough average, including south and northwest of Wasilla as well as areas near the Glenn-Parks Interchange, which have all grown by over 4 percent a year. Source: DLWD 2018*



The Mat-Su Borough's growth is depicted in the article's "A Burgeoning Population" figure above as well as the information in "Section 8.2.1.4 Population, Table 8.5 Population" and "Table 8.6 2018 Property Values." These data validates the state's various growth challenges,

e.g., population growth requires additional housing and subsequent infrastructure improvements requiring increase community services.

Building inspection and location risk vulnerabilities are directly related. For example, the Mat-Su Borough's City of Palmer building inspectors 'work load increased from previous years for conducting new residential and commercial properties. The work included plan reviews and occasional code questions for 1020 properties in 2015, 905 in 2016 and 865 in 2017. All of these numbers reflect new construction code compliance inspections. They do not take into consideration additional inspection duties.

The state has been continually improving transportation infrastructure since the legacy 2013 SHMP was implemented:

- DOT/PF highway bridge improvements to meet the most current seismic codes,
- Mat-Su Borough highway bridge improvements to meet most current seismic codes,
- Alaska railroad (AKRR) bridge improvements to meet the most current seismic codes.

National and state demands for obtaining additional and more affordable natural gas, created a demand to determine the most affordable and beneficial route for a new 800 mile long natural gas pipeline. The project includes determining how best to deliver product to Alaska communities along the new pipeline's route to the sea. The Alaska Natural Gas Pipeline (AKLNG) project requires extensive environmental impact assessments, terrain route challenges, numerous natural hazard impact location considerations, river crossings, coastal access assessments, and potential design features that need to be considered for the most seismically active region in the nation.

DGGS analyzed how the state's natural hazards could potentially impact our population centers. They collected and analyzed new natural hazard data, developed GIS datasets, and potential locational hazard maps. AECOM used these data to develop a set of new hazard vulnerability maps with a few of Alaska's larger community's locations relative to each hazard (Appendix 13.27). These maps will form the baseline these jurisdiction when deciding how and where to allow new development. However, land use data as it pertains to infrastructure vulnerabilities is not currently available.

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10. ENHANCED STATE MITIGATION PLANNING COMMITMENT REQUIREMENTS

10.1. ENHANCED SHMP COMPONENT CONSIDERATIONS

The 2018 SHMP update activity was unable to support §201.5 *Enhanced State Hazard Mitigation Plan (eSHMP)* compliance. However, future SHMP updates should consider developing this section to "enhance" state mitigation benefits.

> *A State with a FEMA approved Enhanced State Mitigation Plan (eSHMP) at the time of a disaster declaration is eligible to receive increased funds under the HMGP, based on twenty percent of the total estimated eligible Stafford Act disaster assistance [vs current 15 percent]. The Enhanced State Mitigation Plan must demonstrate that a State has developed a comprehensive mitigation program, that the State effectively uses available mitigation funding, and that* ***it is capable of managing the increased funding*** *[emphasis added]. In order for the State to be eligible for the 20 percent HMGP funding, FEMA must have approved the plan within 5 years prior to the disaster declaration.*

3. ENHANCED STATE MITIGATION PLAN REGULATION CHECKLIST
REGULATION CHECKLIST – ENHANCED PLAN *M=MET; NM=NOT MET
ENHANCED (E) STATE MITIGATION PLAN
Meet Standard State Mitigation Plan Elements
E1. Does the Enhanced plan include all elements of the standard state mitigation plan? [44 CFR §201.5(b)]
Integrated Planning
E2. Does the plan demonstrate integration to the extent practicable with other state and/or regional planning initiatives and FEMA mitigation programs and initiatives? [44 CFR §201.5(b)(1)]
State Mitigation Capabilities
E3. Does the state demonstrate commitment to a comprehensive mitigation program? [44 CFR §201.5(b)(4)]
E4. Does the enhanced plan document capability to implement mitigation actions? [44 CFR §§201.5(b)(2)(i), 201.5(b)(2)(ii), and 201.5(b)(2)(iv)]
E5. Is the state effectively using existing mitigation programs to achieve mitigation goals? [44 CFR §201.5(b)(3)]

3. Enhanced State Mitigation Plan Regulation Checklist (Continued)
REGULATION CHECKLIST – ENHANCED PLAN *M=MET; NM=NOT MET

Note: *The following provides considerations as to how the SHMP could fulfill "Enhanced SHMP" criteria.*

Integrated Planning
E2. Does the plan demonstrate integration to the extent practicable with other state and/or regional planning initiatives and FEMA mitigation programs and initiatives? [44 CFR §201.5(b)(1)]

Describe how the SHMP is integrated to the extent practicable with other state and/or regional planning initiatives as well as FEMA mitigation programs and initiatives that provide guidance to state and regional agencies.

Does the State Mitigation Action Plan fulfill these criteria?

Describe how SHMAC agencies "integrate" SHMP precepts into their regulations, policies, and procedures?

State Mitigation Capabilities
E3. Does the state demonstrate commitment to a comprehensive mitigation program? [44 CFR §201.5(b)(4)]

Describe how the SHMP integrates, to the extent practicable, within DHS&EM's as well as other state and/or regional agencies planning initiatives and FEMA mitigation programs and initiatives?

DHS&EM's mitigation staff provides the following; demonstrating their capability to efficiently and effectively manage the State's mitigation program. Their staff's initiatives fulfills federal regulatory funding criteria, ensures mitigation measure cost effectiveness analyzes project Benefit versus Cost (B/C), effectively manages each disaster's mitigation grant programs, prepares and ***submits accurate environmental reviews***, and submits complete, accurate, and timely quarterly progress and financial reports.

DHS&EM:

* PDM coordinator reviews and coordinates potential application reviews with FEMA Region X mitigation staff to confirm cost effectiveness.
* SHMO coordinates B/C verification to ensure projects proposed for FEMA/State submittals fulfill regulatory criteria as defined within the State Hazard Mitigation Assistance Management Plan developed for each disaster declaration.
* Mitigation staff and DHS&EM grants staff coordinate preparing and submitting complete, accurate, and timely quarterly progress and financial reports.
* Complete mitigation grant project financial reconciliations, within established performance periods

State Mitigation Capabilities
E4. Does the enhanced plan document capability to implement mitigation actions? [44 CFR §§201.5(b)(2)(i), 201.5(b)(2)(ii), and 201.5(b)(2)(iv)]

Assess completed mitigation actions, document each mitigation action's or initiative's effectiveness (i.e., its actual avoided cost)

Need support information

Demonstrate the State's commitment to mitigation through legislation initiatives, mitigation councils, review boards, and with private public partnerships.

* The State Hazard Mitigation Advisory Committee (SHMAC) reviews and assists DHS&EM with reviewing and prioritizing hazard mitigation projects and initiatives
* Depending on jurisdiction capability and small and impoverished community status, the State provides the local cost share for HMGP projects and initiatives. However, the State does not currently provide cost sharing for PDM or FMA projects or initiatives.

State Mitigation Capabilities
E5. Is the state effectively using existing mitigation programs to achieve mitigation goals? [44 CFR §201.5(b)(3)]

Describe how the State effectively use existing mitigation programs to achieve its mitigation goals.

* The DHS&EM staff collects potential projects requests from eligible applicants with current FEMA-approved HMPs
* The SHMAC reviews and prioritizes local jurisdictions mitigation grant program ideas and applications to determine whether they fulfill community needs and meet agency area specific mitigation initiatives"

Describe how the State is committed to a comprehensive state mitigation program by providing workshops and training, State planning grants, improving local community capability by training or certifying local officials in Emergency Management and Floodplain Management positions such as:

* DHS&EM organizes a Semi-Annual Emergency Management Conference that invites EMPG communities to a regionally selected location for subject-specific training opportunities

Describe how the State provides a portion of the non-Federal match for mitigation projects.

* The Alaska governor currently authorizes Disaster Fund distributions for approved FEMA HMGP planning and project grant's 25 percent non-federal cost share.
* The DHS&EM director assists small and impoverished community by requesting the FEMA Region 10 administrator authorize a waiver from paying the normal HMGP 25 percent non-federal cost share to a reduced 10 percent cost share.
* To the extent allowed by state law, the State requires or encourages local governments to use a current version of a nationally applicable model building code or standard that addresses natural hazards as a basis for design and construction of State-sponsored mitigation projects.
* The State Fire Marshal's Office enforces State Building Code compliance only in large

jurisdictions There are too few staff to conduct inspections for all remote/rural communities. However, all federally funded projects are required to meet applicable federal building and infrastructure code compliance

* Follows a comprehensive, multi-year plan to mitigate necessary and essential infrastructure for post-disaster response and recovery operations.
* DHS&EM mitigation staff maintains a statewide list of local and tribal mitigation plan status, communication with SHMAC state agency membership, and local jurisdictions to determine mitigation project needs.

Is this statement true? (Need support information)

Provide a comprehensive description of how the State integrates mitigation into its post-disaster recovery operations.

* SHMP defines how state agencies as well as DHS&EM Response, Recovery, and Mitigation projects and initiatives integrate and supports fund expenditures by projecting and reviewing projected cost avoidance.
* DHS&EM reviews and revises its SHMP to reflect changes in plan development, progress in statewide mitigation efforts, and priority changes
* As in the Standard SHMP, identifies agency and jurisdictional development changes and how they fulfill statewide mitigation initiatives, milestones, and priorities.

HMA Grants Management Performance
E6. With regard to HMA, is the state maintaining the capability to meet application timeframes and submitting complete project applications? [44 CFR §201.5(b)(2)(iii)(A)]

HMA Grants Management Performance
E7. With regard to HMA, is the state maintaining the capability to prepare and submit accurate environmental reviews and benefit-cost analyses? [44 CFR §201.5(b)(2)(iii)(B)]

How will the State accomplish the environmental review processes in lieu of Region X?

- Project applicants work concurrently with State and FEMA Region 10 to accomplish relevant environmental assessments.
- Will the State contract hire contractors similar to their current hazard mitigation plan development contracts to assure the EAs fulfill FEMA criteria.

* The state does not currently prepare and submit environmental reviews but is seeking to prepare project RFPs to select contractors with this specific capability and capacity. Selected contractor(s) will them receive task orders to complete selected projects' environmental assessments, review for FEMA compliance, and ensure that associated projects will comply with environmental guidelines and criteria.
* The DHS&EM currently assists communities with project benefit-cost analysis (B/CA).

HMA Grants Management Performance
E8. With regard to HMA, is the state maintaining the capability to submit complete and accurate quarterly progress and financial reports on time? [44 CFR §201.5(b)(2)(iii)(C)]

* Mitigation staff and DHS&EM grants staff coordinate preparing and submitting complete, accurate, and timely quarterly progress and financial reports.
* Complete mitigation grant project financial reconciliations, within established performance periods.

HMA Grants Management Performance
E9. With regard to HMA, is the state maintaining the capability to complete HMA projects within established performance periods, including financial reconciliation? [44 CFR §201.5(b)(2)(iii)(D)]

Mitigation Policies, Programs, and Capabilities regarding compliance, monitoring and audits:

Internal Division

DHS&EM Mitigation Section and Grants Section staff monitors each HMGP and PDM project award along with the HMGP disaster or PDM funding cycle funding the projects. This is done through the following:

Division quarterly project reports.

Program check lists, funding and performance data-base tracking within the division and with the Division of Administrative Services.

The Division also provides a Sub-grantees Handbook via the division website.

State

The State of Alaska, Inspector General's Office auditors perform annual or as-needed program and grant audits to ensure compliance and Single Audit Act reporting.

Federal Funding Accountability and Transparency Act (FFATA) – The division, through the Division of Administrative Services reports all federal funding awards into the FFATA website for public visibility of federal funds.

Federal

FEMA, Region 10 Grants Program Division conducts annual monitoring visits on each HMGP and PDM project award along with the HMGP disaster or PDM funding cycle funding the projects. FEMA audits are conducted on an as-needed basis. FEMA compliance and audit reports are provided to the division following each monitoring or audit.

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11. References (located in Appendix 13.26)

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12. Attachments

2018 SHMP Appendices

Attachment No.	Title
Attachment 12.1	2013 Legacy State Hazard Mitigation Plan
Attachment 12.2	Other Hazards
	12.2.1 Dam Failure
	12.2.2 Public Health
Attachment 12.3	

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ATTACHMENT 12.2.1 Legacy 2013 SHMP

The 2013 SHMP is too large to attach to this plan. The legacy plan is located at:

http://ready.alaska.gov/Plans/mitigationplan

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Attachment 12.2 Other Hazards

12.2.1 Dam Failure

12.2.2 Public Health

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12.2.1 Dam Failure

12.2.1.1 Hazard Characteristics

Alaska Statute 46.17.900(3) defines a dam as, "an artificial barrier and its appurtenant works, which may impound or divert water." To be regulated as a dam under state jurisdiction, a barrier must meet at least one of the following three descriptions listed in the statute:

1. Have an impounding capacity at maximum water storage elevation of 50 acre-feet and be at least 10 feet tall measured from the lowest point at either the upstream or downstream toe of the dam to the crest of the dam
2. Be at least 20 feet tall measured from the lowest point at either upstream or downstream toe of the dam to the crest of the dam regardless of its storage capacity
3. Pose a threat to lives and property in the event of a failure or improper operation of the dam or barrier

Dams owned or operated by the federal government or regulated by the Federal Energy Regulatory Commission are exempt from state jurisdiction, in addition to artificial barriers that fail to meet the statutory definition of a dam.

Dams in Alaska

At present, there are 180 dams listed on the Alaska Dam Inventory database at the Alaska Department of Natural Resources (ADNR), including state, federal and non-jurisdictional dams (Figure 12-1). Some non-jurisdictional and federal jurisdictional dams, constructed since the original inventory was compiled in the early 1980s, are not listed or represented on the graph.

Alaska dams exist for many purposes that include:

- Hydroelectric
- Water supply
- Flood control and storm water management
- Recreation
- Fish and wildlife habitat
- Fire protection
- Mine tailings and contact water storage

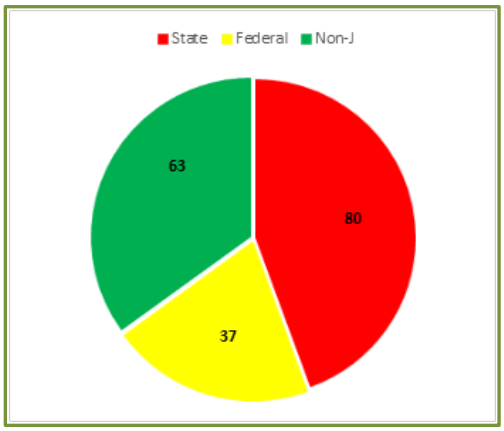

Figure 12-1 Alaska Dam Inventory Jurisdictions

The Alaska Dam Safety Program (ADSP) is responsible for supervising the safety of the 80 dams under state jurisdiction, which includes issuing *Certificates of Approval* for new dam construction and for existing dams' operation, repair, modification, removal or abandonment.

Dam Hazard Potential Classification

All dams are classified according to their potential impacts from catastrophic failure; referred to as their "hazard potential" classification. The hazard potential only describes dam failure consequences, but provides no information on the condition of a dam or its failure likelihood. The hazard potential classification assigned to a structure in Alaska is based on one of three categories (Table 12-1) described in the current dam safety regulations (11 AAC 93.157):

Table 12-1 Hazard Potential Classification Consequences

Classification	Threat Level	Defined
Class I	High	If the department determines that the failure or improper operation of the barrier will result in probable loss of human life
Class II	Significant	If the department determines that the failure or improper operation of the barrier will result in
		(A) A significant danger to public health
		(B) The probable loss or significant damage to homes, occupied structures, commercial property, high-value property, major highways, primary roads, railroads, or public utilities, other than losses or damage limited to the owner of the barrier or
		(C) Other probable significant property losses or damage, other than losses or damage limited to the owner of the barrier; or
		(D) Probable loss of or significant damage to waters identified under 11 AAC 195.010(a) as important for the spawning, rearing, or migration of anadromous fish; or
Class III	Low	If the department determines that the failure or improper operation of the barrier will result in
		(A) Limited impacts to rural or undeveloped land, rural or secondary roads, and structures;
		(B) Property losses or damage limited to the owner of the barrier; or

Table 12-1 Hazard Potential Classification Consequences

Classification	Threat Level	Defined
		(C) Insignificant danger to public health.

An artificial barrier that is assigned a Class I (high) or Class II (significant) hazard potential is considered to "pose a threat to lives or property" and meet the statutory definition of a dam regardless of its geometry.

Alaska dam's hazard potential classification is based on jurisdictional status as shown in Figure 12-2. In general, the Class I dams are located in major urban areas of Alaska such as Anchorage, Juneau, Ketchikan, and Kodiak. Class II dams are located across the state and include the major tailings storage facilities at the Fort Knox and Red Dog mines.

The Alaska dam safety regulations require Class I and Class II dams to have an emergency action plan (EAP), which should include a map of the potential inundation zone in the case of a dam breach. Because of the cost of developing these maps, many of the dams do not have dam breach inundation area maps. In practice, the inundation map is only required for Class I dams in Alaska; however, existing inundation map quality is limited.

Table 12-2 lists Alaska's federal, state, and other owner managed and regulated dams.

Table 12-2 Agency Regulated Dam's Hazard Classifications

Regulating Jurisdiction	Class I High Hazard	Class II Significant Hazard	Class III Low Hazard	*Total Each Jurisdiction*
State	17	40	23	***80***
Federal	7	5	25	***37***
Non-Jurisdictional	--	--	62	***62***
Unknown	--	--	1	***1***
Total	**24**	**45**	**111**	***180***

Source: DNR, Alaska Dam Safety Office

12.2.1.2 Dam Failure History

There have been several dam failures in Alaska's history, but no catastrophic failures since the legacy 2013 SHMP was implemented. Table 12-3 provides a short representative sample list.

Table 12-3 Alaska's Historical Dam Failure Events

Date	Location	Structure Name / Type	Damage Description
2018	Hydaburg, Prince of Wales Island	Hydaburg Water Supply Dam	Currently experiencing progressive failure and is at risk of total collapse. Efforts to mitigate this situation are in progress.
2014 - 2017	Ouizinkie 's Spruce Island (water supply reservoir)	Mahoona Dam Wooden Timber	Structure became degraded to the point that an emergency replacement occurred in 2014
			Ice damaged the new dam's low-level outlet causing the reservoir to drain completely, and additional emergency repairs were completed in 2017.

Table 12-3 Alaska's Historical Dam Failure Events

Date	Location	Structure Name / Type	Damage Description
2000 - 2007	Kake	Gunnuk Creek Dam	Structural failure caused reservoir drainage and severe economic impact to the community.
1972	Anchorage	Lake o' the Hills Dam	Dam failed. Possibly resulting in the death of a child who was swept into a culvert.

The most recent dam failure event occurred in July 2000 when the city of Kake's main water supply dam failed. After the dam failed, the small reservoir drained quickly and the town became acutely aware of the importance of the dam.

Significantly impacted, Kake was forced to find a temporary and long-term solution to provide water to the 800-person village. The water supply loss was the most apparent impact. The local processor lost production for the next 2 weeks occurring at the peak of the fishing season. The hatchery experienced an increased egg and fry mortality rate due to water quality problems. No one was injured when the dam failed, but the hatchery experienced some damage to their access road. After the dam failure, a child was severely scalded by boiling water in a kitchen accident later in the week, while trying to make the water safe to use.

The city of Kake's Dam failure had a truly significant impact on the entire community. The response to this disaster included local residents and government entities, businesses, state agencies, and the federal government. The initial economic impact to the community was estimated at approximately $2 million, not including dam replacement. The budget for a new, replacement dam planned by the Army Corps of Engineers was approximately $10 million. Construction of the new dam was completed and operations began in April of 2007.

Only one dam failure in Alaska has resulted in a fatality. Anchorage's Lake o' the Hills dam failed in 1972. The inundation map for this dam includes the grounds adjacent to O'Malley Elementary School.

12.2.1.3 Location, Extent, Impact, and Recurrence Probability

Location, extent, and recurrence probability

Due to security concerns this information is not available for these categories. However, *"An informal population risk estimate for State and Federal, Class I (high) hazard potential dams in Alaska is 4,000 people"* (Dams 2018).

Impacts

Future potential impacts from a dam failure event can be dramatic incident that results in a major catastrophe with substantial economic impacts and loss of life. There are varying degrees of failure that can contribute to uncontrolled water release from the reservoir, ranging from improper gated spillway operation to the partial or full breach of the dam's main structural components. Lesser degrees of failure often occur in advance of a catastrophic failure and are generally amenable to mitigation if detected and properly addressed. Dam failures can occur wherever the structures are located from several general causes, including:

- Inadequate spillway capacity which results in dam overtopping during extreme rainfall-runoff events
- Internal erosion or piping caused by seepage through the embankment or foundation or along conduits
- Improper or insufficient maintenance leading to decay and deterioration
- Inadequate design, improper construction materials, and poor workmanship
- Operation issues
- Failure of upstream dams on the same river system
- Landslides into a dam's reservoir creating a wave that overtops the dam
- Seismic instability

The Dam Safety Officer states that Alaska's informal population risk estimate for state and federal, Class I (high) hazard potential dams in Alaska is 4,000 people.

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12.2.2 Public Health

12.2.2.1 Hazard Characteristics

The Public Health section addresses infectious disease events and impacts that could potentially impact Alaska. Pandemic influenza is highlighted as an example.

Infectious diseases are disorders caused by bacteria, viruses, fungi, and parasites entering the human body and multiplying. Infections range from mild to deadly depending on the organism and the host. Organisms enter the body through: skin contact; inhalation; ingestion; blood (intravenous contact, bites, or punctures); sexual contact; and transmission from mothers to unborn children.

While infectious diseases pose a threat to people of any age and health condition, they are often a greater hazard to very young children, older adults, or people with compromised health. Vaccines and other advances in medical technology have reduced risks of some infectious diseases; however, new diseases emerge, new strains of existing diseases appear, and diseases that have been previously eliminated may re-emerge.

Viruses and bacteria are of particular concern in epidemics due to potential rapid mutation. Mutations can increase communicability, virulency, and resistance to medical treatment. A new strain of disease previously passed from animals to humans may mutate and become communicable between humans causing a rapid increase in the spread of infection. Due to the rapidly changing nature of infectious disease, public health officials carefully monitor and track communicable diseases and potential epidemic outbreaks. The challenge for infectious disease surveillance is to detect serious infections and the early stages of outbreaks in sufficient time to be able to prevent further spread.

Climate change is projected to adversely impact public health due to injuries and illnesses from severe weather events; increases in allergic, respiratory, vector-borne, and waterborne diseases; and threats to food and water supplies. While addressing these threats to public health is a challenge, developing adaptive public health capacities, integrating climate change impacts into current institutional learning, and improving resilience of local public health systems to climate change is essential to preventing injuries and illnesses, enhancing public health preparedness, and reducing risk.

12.2.2.2 History

The Alaska Department of Health and Human Services, Section of Epidemiology tracks annual disease outbreak trends. There have been no epidemics in recent history.

Table 7-4 2013 to 2017 Statewide Disease Event Summary

Causal agent	Number of Cases per Year				
	2013	2014	2015	2016	2017
Botulism	6	12	7	2	9
Campylobacteriosis (Campylobacter)	107	91	98	117	126
Chlamydial Infection (Chlamydia)	5792	5726	5653	5698	5935

Table 7-4 2013 to 2017 Statewide Disease Event Summary

Causal agent	Number of Cases per Year				
	2013	2014	2015	2016	2017
Giardiasis (Giardia)	82	89	94	86	90
Gonococcal Infection (Gonorrhea)	1135	1323	1115	1454	2190
Invasive Haemophilus Influenzae (H Influenzae)	21	23	22	18	23
Hepatitis C Virus (HCV)	1044	1260	1240	1193	1214
Human Immunodeficiency Virus (HIV)	59	76	64	76	75
Paralytic Shellfish Poisoning (PSP)	5	3	2	4	6
Pertussis	308	165	110	159	60
Rabies (Animal)	9	3	8	11	12
Salmonellosis (Salmonella)	83	83	83	83	83
Syphilis	68	68	68	68	68
Tuberculosis (TB)	78	78	78	78	78
Varicella	66	66	66	66	66

2016 Annual (January–December) Infectious Disease Report and 2017 Annual (January–December) Infectious Disease Report
Source: DHSS 2018

12.2.2.3 Location, Extent, Impact, and Recurrence Probability

Location

Characteristics of Alaska potentially impact the likelihood and impact of infectious disease events. Alaska has many remote communities which potentially makes effective implementation of control measures challenging. The state is also a temporary home to large numbers of guest workers who may have increased risk for certain infectious diseases. Disease transmission is often greatest in high density situations such as airports, nursing homes, dormitories, schools, and restaurants.

Extent

This section takes the example of an influenza epidemic or pandemic to illustrate the extent of a highly contagious disease. Planning for an influenza pandemic, whether “avian flu” or another especially virulent influenza variant, would be the same for any community in the nation. Determining which cross section of the population would be most affected and susceptible cannot be known in advance. A vaccine for a novel influenza virus would likely take many months to develop and distribute.

Impact

When a disease affects a greater portion of the population than would normally be expected, it is called either an outbreak (if limited in geography) or an epidemic. An epidemic that spreads across countries or continents is called a pandemic. Depending on the organism, outbreaks, epidemics, or pandemics may be considered public health emergencies, which require timely implementation of appropriate control measures. Such emergencies are commonly addressed through quarantine and immunization.

Recurrence Probability

Based on historical events, Alaska can expect that outbreaks of infectious diseases will occur each year, including food-borne viral and bacterial pathogens, pertussis, hepatitis, and influenza.

If another influenza pandemic occurs, Alaska is very likely to be affected. In the past century, there have been four influenza pandemics: 1918, 1957, 1968, and 2009. The 1918 influenza, a virus that killed an estimated 50 million people worldwide; killed at a higher rate in western Alaska than anywhere else in the United States. The 1918 disease devastated parts of Alaska. It caused one of the highest mortality rates in the world, entire Alaska village populations died during the pandemic.1

It is critical that pandemic recurrence be considered as part of Alaska's preparedness activities. Alaska has an active influenza surveillance program. During a pandemic, maintaining or strengthening existing surveillance activities and developing new surveillance strategies (e.g., expanding the number of existing sentinel surveillance sites, improving school absenteeism reporting, and the use of syndromic surveillance for rapid identification of infected persons) will be critical to launching an appropriate response. Surveillance strategies may need to change over the course of the pandemic and Department of Public Health staff should work with federal partners to identify and implement specific strategies. Epidemiologists at the state should use surveillance data to characterize the pandemic in the state which can help to inform response activities.

Implementation of Nonpharmaceutical interventions (NPIs) to decrease the spread of influenza may reduce the number of people infected early in the course of the outbreak, before vaccines are available for prevention. Nonpharmaceutical interventions include: personal, community, and environmental actions; examples of such interventions include social distancing, disseminating travel advisories, screening persons arriving from affected areas, closing schools, restricting public gatherings, using alternate care sites, and voluntary isolation and quarantine. The application of these interventions may be layered and will be guided by the evolving authorities.

In a pandemic, recommended NPIs may include recommendations that exceed everyday suggestions for minimizing influenza transmission; they could include social distancing strategies, voluntary quarantine, and a recommendation that ill individuals use a face mask in public. Use of these and other interventions in Alaska will be based upon the epidemiology of the pandemic and recommendations from federal and international authorities.

It is critical that pandemic recurrence be considered as part of Alaska's preparedness activities.

Note: *[1] 1918 Influenza Pandemic: (https://www.smithsonianmag.com/history/journal-plague-year-180965222/)*

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13. Appendices

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Appendix 13.2	2018 Governor's SHMP Adoption / Promulgation Letter
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APPENDIX 13.1 FEMA STATE HAZARD MITIGATION PLAN (SHMP) APPROVAL LETTER AND REVIEW TOOL

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APPENDIX 13.2 GOVERNOR'S SHMP ADOPTION

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APPENDIX 13.3 SHMP CHANGE SCHEDULE

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SHMP Change Schedule

Assignment	Reviewer	Agency	Assigned (Date)	Notes
Project set-up				
Introduction				
Background Information				
Planning Process				
SHMP Adoption				
Hazard Analysis Process				
Hazard Profiles				
Cryosphere				
Earthquake				
Flood & Erosion				
Ground Failure				
Tsunami				
Volcano				
Weather				
Wildland & Conflagration Fire				
Risk Analysis / Vulnerability Assessment				

SHMP Change Schedule

Assignment	Reviewer	Agency	Assigned (Date)	Notes
Mitigation Strategy				
Enhanced SHMP				
Attachments				
Appendices				
Appendix 13.1	2018 FEMA SHMP Approval Letter and Review Tool			
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SHMP Change Schedule

Assignment	Reviewer	Agency	Assigned (Date)	Notes
Appendix 13.23	2017 AK Distressed Communities Report - Denali Commission			
Appendix 13.24	Potential Agency Mitigation Funding Sources			
Appendix 13.25	SHMP References			
Appendix 13.26	Legacy 2013 SHMP Medium and Low Priority Projects (Not included in MAP)			
Appendix 13.27	2018 Alaska Hazard Risk Location Figures			

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APPENDIX 13.4 SHMP ACRONYM LIST

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SHMP Acronyms or Abbreviations and their Respective Meanings

Acronyms/Abbreviations	
°F	Degrees Fahrenheit
AAA	American Avalanche Association
AAIC	Alaska Avalanche Information Center
AAS	Alaska Avalanche School
ACCIMP	Alaska Climate Change Impact Mitigation Program
ACIA	Arctic Climate Impact Assessment
ACWF	Alaska Clean Water Fund
ADF&G	Department of Fish and Game
ADWF	Alaska Drinking Water Fund
AEA	Alaska Energy Authority
AECOM	AECOM, Technical Services
AEEE	Alternative Energy and Energy Efficiency
AEC	Alaska Earthquake Center
AET	Alaska Economic Trends
AFS	Alaska Fire Service
AFG	Assistance to Firefighters Grant
AGDC	Alaska Geospatial Data Committee
AHFC	Alaska Housing Finance Corporation
AICC	Alaska Interagency Coordination Center
AIDEA	Alaska Industrial Development and Export Authority
AMF	Airport Maintenance Facility
ANA	Administration for Native Americans
ANSS	Alaska National Seismic System
AONAP	Alaska Office of Native American Programs
ARC	American Red Cross
ARRC	Alaska Railroad Corporation
ARTA	Alaska Railroad Transfer Act
ARW	Airport Runway
AS	Alaska Statute
ASHSC	Alaska Seismic Hazard Safety Commission
ASPHL	Alaska State Public Health Laboratories
ATAACA	Anti-Terrorism All-Hazard Advisory Council of Alaska
AVCP	Association of Village Council of Presidents
AVEC	Alaska Village Electric Cooperative
AVO	Alaska Volcano Observatory
B/C	Benefit/Cost
BCA	Benefit Cost Analysis
BEA	Baseline Erosion Assessment
BFE	Base Flood Elevation
BIA	US Bureau of Indian Affairs

SHMP Acronym List

Acronyms/Abbreviations	
BLM	Bureau of Land Management
CBO	Communications Building-Other
CCP	Citizen Corps Program
CDBG	Community Development Block Grant
CDC	Center for Disease Control
CEHHWG	Climate, Ecosystems & Human Health Work Group
CFR	Code of Federal Regulations
CFP	Community Forestry Program
CGP	Comprehensive Grant Program
CIG	Conservation Innovation Grant
CIP	Capital Improvement Plan
C2ER	Council for Community and Economic Research
COLI	Cost of Living Index
CP	Comprehensive Plan
CPD	Community Planning and Development (also known as Comprehensive Development Plan)
CRS	Community Rating System
CTA	Conservation Technical Assistance
CVRF	Coastal Villages Region Fund
CWSRF	Clean Water State Revolving Fund
DART	Deep-ocean Assessment and Reporting of Tsunamis
DAS	Department of Administration
DSC	Dam Safety and Construction
DCCED	Department of Commerce, Community, and Economic Development
DCI	Disaster Cost Index
DCRA	Division of Community and Regional Affairs
DEC	Department of Environmental Conservation
DEED	Department of Education and Early Development
Denali	Denali Commission
DGGS	Alaska Division of Geological and Geophysical Survey
DHS	U.S. Department of Homeland Security
DHS&EM	Division of Homeland Security and Emergency Management
DHSS	Department of Health and Social Services
DMA 2000	Disaster Mitigation Act Of 2000
DMVA	Department of Military and Veterans Affairs
DNR	Department of Natural Resources
DOE	U.S. Department of Energy
DOF	Division of Forestry
DOI	Division of Insurance
DOL	Department of Labor
DOT/PF	Department of Transportation and Public Facilities
DPC	Disaster Policy Cabinet

Acronyms/Abbreviations	
DPS	Department of Public Safety
DR	Disaster Relief (FEMA)
DRU	Disaster Resilient University
DSS	Division of Senior Services
EAP	Emergency Action Plan
EAS	Emergency Alert System
EH	Environmental Health
EHS	Extremely Hazardous Substances
EMPG	Emergency Management Performance Grant
ENSO	El Niño/La Niña Southern Oscillation
EOC	Emergency Operations Center
EOP	Emergency Operations Plan
EPA	U.S. Environmental Protection Agency
EPPS	Energy Production Plant-Small
EQ	Earthquake
EQIP	Environmental Quality Incentives Program
ETC	Environmentally Threatened Communities
EWP	Emergency Watershed Protection (Program)
°C	Degrees Celsius
°F	Degrees Fahrenheit
FAA	Federal Aviation Administration
FEMA	Federal Emergency Management Agency
FGDC	Federal Geospatial Data Clearinghouse
FHA	Federal Housing Administration
FHWA	Federal Highway Administration
FIRM	Flood Insurance Rate Map
FL	Flood
FMA	Flood Mitigation Assistance
FPM	Floodplain Manager (or FDC Coordinator)
FP&S	Fire Prevention and Safety
FRA	Federal Railroad Administration
ft	Feet
FY	Fiscal Year
g	Gravity
GAR	Governor's Authorized Representative
GF	Ground Failure
GIS	Geographic Information System
Hazus	Hazards U.S. – Multi-Hazard Software
HMA	Hazard Mitigation Assistance
HMGP	Hazard Mitigation Grant Program
HMP	Hazard Mitigation Plan
HRD1	Highway/Road - One Lane

SHMP Acronym List

Acronyms/Abbreviations	
HRD2	Highway/Road - Two Lane
HS	Hazardous Substances
HSGP	Homeland Security Grant Program
HUD	Department of Housing and Urban Development
HWBO	Highway Bridge-Other (includes wood)
HVA	Hazard and Vulnerability Assessment
IA	Individual Assistance
IBC	International Building Code
IBHS	Institute for Business And Home Safety
ICC	Increased Cost of Compliance
ICDBG	Indian Community Development Block Grant
IGAP	Indian General Assistance Program
IHBG	Indian Housing Block Grant
IHBG-IT	Indian Housing Block Grant-Imminent Threat
IHLGP	Indian Home Loan Guarantee Program
INAP	Indian and Native American Programs
IRA	Indian Reorganization Act
IRRP	Indian Reservation Road Program
IRS	Internal Revenue Service
ISER	Institute of Social and Economic Research
JFO	Joint Field Office
Kt(s)	Knot(s)
KIB	Kodiak Island Borough
KPB	Kenai Peninsula Borough
LEG	Legislative Energy Grant
LEPC	Local Emergency Planning Committee
LHMP	Local Hazard Mitigation Plan
M	Magnitude
MAP	Mitigation Action Plan
MGL	Municipal Grants And Loans
MMI	Modified Mercalli Intensity
MOA	Municipality of Anchorage
mph	Miles Per Hour
MSB	Matanuska-Susitna Borough
msl	Mean Sea Level
SHMP	Multi-Jurisdictional Hazard Mitigation Plan
NAHASDA	Native American Housing Assistance and Self Determination Act
NFIP	National Flood Insurance Program
NIMS	National Incident Management System
NOAA	National Oceanic and Atmospheric Administration
NPS	National Park Service
NRF	National Response Framework

Acronyms/Abbreviations	
NRCS	Natural Resources Conservation Service
NTHMP	National Tsunami Hazard Mitigation Program
NTWC	National Tsunami Warning Center
NWS	National Weather Service
OTF	Oil Tank Farm
OSWER	Office of Solid Waste and Emergency Response
PDM	Pre-Disaster Mitigation (Program)
PGA	Peak Ground Acceleration
PHN	Public Health Nurse
PMEL	Pacific Marine Environmental Laboratory
PNP	Private Non-Profits
PPSB	Potable Water Pumping Station
PSTS	Water Storage Tank-Steel
PTWC	Pacific Tsunami Warning Center
PWE	Potable Water Well
PWPB	Potable Water Pipelines-Buried
PWS	Port Waterfront Structures (Harbor)
PWTS	Potable Water Treatment (Plant)-Small
RCASP	Remote Community Alert Systems
RD	Rural Development
REAA	Rural Educational Attendance Area
RFC (FEMA)	Repetitive Flood Claim
RFC (NWS)	River Forecast Center
RL	Repetitive Loss
RurALCAP	Rural Alaska Community Action Program
SAFER	Staffing For Adequate Fire and Emergency Response
SARA	Superfund Amendments and Reauthorization Act
SBA	U.S. Small Business Administration
SEOC	State Emergency Operations Center
SHMAC	State Hazard Mitigation Advisory Committee
SHMO	State Hazard Mitigation Officer
SHMP	State Hazard Mitigation Plan
SHSP	State Homeland Security Program
SIFT	Short-term Inundation Forecasting for Tsunami
SOE	State of Alaska Epidemiology
SPAR	Spill Prevention and Response
SPCC	Spill Prevention and Control Countermeasure
SRL	Severe Repetitive Loss
Stafford Act	Robert T. Stafford Disaster Relief and Emergency Assistance Act
STAPLEE	Social, Technical, Administrative, Political, Legal, Economic, and Environmental
SVA	Security and Vulnerability Assessment
TCC	Tanana Chiefs Conference

SHMP Acronym List

Acronyms/Abbreviations	
T/F	Technical/Feasibility
THMP	Tribal Hazard Mitigation Plan
TIME	Tsunami Inundation Mapping Effort
TP	Transportation Plan
TTP	Tribal Transportation Program
UAA	University of Alaska, Anchorage
UAF	University of Alaska, Fairbanks
UAF/GI	UAF/Geophysical Institute
DOD	U.S. Department of Defense
DOI	U.S. Department of Interior
U.S.	United States
USACE	U.S. Army Corps of Engineers
USC	U.S. Code
USDA	U.S. Department of Agriculture
USDOF	U.S. Department of Forestry
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
VFA-RFA	Volunteer Fire Assistance and Rural Fire Assistance Grant
VSW	Village Safe Water
WARN	Warning, Alert, and Response Network
WTF	Water Treatment Facility
WUI	Wildland Urban Interface (Fire)
WWTS	Wastewater Treatment (Plant)-Small

APPENDIX 13.5 SHMP DEFINITIONS

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An Alphabetical listing of SHMP Terms and Definitions

Term	Definition / Usage
Aufeis	When new ice continues to form on top of older ice. Ice-forming situations occur wherever there are continuous sources of water and freezing temperatures.
Alluvial Fan	Area of deposition where steep mountain drainages empty into valley floors. Flooding in these areas often includes characteristics that differ from those in riverine or coastal areas.
Alluvial Fan Flooding	Flooding that occurs on the surface of an alluvial fan (or similar landform) that originates at the apex of the fan and is characterized by high-velocity flows; active processes of erosion, sediment transport, and deposition; and unpredictable flow paths.
Anabatic Wind	Any wind blowing up an incline; the opposite to katabatic wind.
Avalanche	Mass of snow and ice falling suddenly down a mountain slope and often taking with it earth, rocks and rubble of every description.
Borough	The basic large unit of local government in Alaska in the organized boroughs. Large land areas of Alaska are not in organized boroughs and therefore fall under State jurisdiction as the Unorganized Borough
Caldera	A caldera is a large, usually circular depression at the summit of a volcano formed when magma is withdrawn or erupted from a shallow underground magma reservoir.
Chinook	A warm down-slope wind.
Community Rating System	An NFIP program that provides incentives for NFIP communities to complete activities that reduce flood hazard risk. When the community completes specified activities, the insurance premiums of policyholders in these communities are reduced.
Community	Any state, area or political subdivision thereof, or any Indian tribe or tribal entity that has the authority to adopt and enforce statutes for areas within its jurisdiction.
Critical Facility	Facilities that are critical to the health and welfare of the population and are especially important during and after a hazard event. Critical facilities include, but are not limited to, shelters, hospitals, and fire stations.
Daylight	The exposure of strata by a cut whose angle is steeper than that of the underlying beds. Such exposure increases the likelihood of landslides.
Dam	A structure built across a waterway to impound water.
Development	Any manmade change to improved or unimproved real estate including, but not limited to, buildings or other structures, mining, dredging, filling, grading, paving, excavation or drilling operations, or storage of equipment or materials.

SHMP Definitions

Term	Definition / Usage
Economic Disaster	State definition used: "When the annual income to workers in the designated area drops below the average annual income for the base period for workers in the designated area and the drop in income is of such magnitude that the average family income of all residents of the designated area as determined by the DCCED is below the poverty guidelines issued by the Federal Department of Health and Human Services, adjusted by the DCCED to reflect subsistence economic patterns and appropriate cost-of-living differentials; the availability of alternate employment shall be considered in determining whether an economic disaster has occurred under this paragraph."
Earthquake	A sudden motion or trembling that is caused by a release of strain accumulated within or along the edge of the earth's tectonic plates.
Earthquake Swarm	A collection of earthquakes that occur in the same area in a relatively short amount of time. There is no identifiable main shock.
Elevation	The raising of a structure to place it above flood waters on an extended support structure.
Emergency Operations Plan	A document that describes how people and property will be protected in disaster and disaster threat situations; details who is responsible for carrying out specific actions; identifies the personnel, equipment, facilities, supplies, and other resources available for use in the disaster; and outlines how all actions will be coordinated.
Erosion	The wearing away of the land surface by running water, wind, ice, or other geological agents.
Federal Disaster Declaration	See Presidential Disaster Declaration
Federal Emergency Management Agency (FEMA)	A federal agency created in 1979 to provide a single point of accountability for all federal activities related to hazard mitigation, preparedness, response, and recovery.
Flash Flood	A flood event occurring with little or no warning where water levels rise at an extremely fast rate.
Floeberg	A massive piece of sea ice, composed of pressure ridges or hummocks, which has separated from the ice pack and become lodged in shallow water.
Flood	A general and temporary condition of partial or complete inundation of normally dry land areas from 1) the overflow of inland or tidal waters, 2) the unusual and rapid accumulation or runoff of surface waters from any source, or 3) mudflows or the sudden collapse of shoreline land.
Floodplain	A "floodplain" is the floodable lowland adjacent to a river, lake, or ocean. Floodplains are designated by how frequently a flood occurs that is large enough to cover that location. For example, the 10-year floodplain will be covered by the 10-year flood. The 100-year floodplain by the 100-year flood. (See Flood Frequency)
Flood frequencies	Frequencies are determined by plotting a graph of all known floods for an area and determining how often floods of a particular size occur. The flood frequency is the chance of a flood occurring during a given timeframe. For example, the 100-year flood has a 1percent chance, and the 10-year flood has a 10 percent chance, of occurring in any given year.

Term	Definition / Usage
Fumarole	Fumaroles are vents from which volcanic gas escapes into the atmosphere. Fumaroles may occur along tiny cracks or long fissures, in chaotic clusters or fields, and on the surfaces of lava flows and thick deposits of pyroclastic flows. They may persist for decades or centuries if they are above a persistent heat source or disappear within weeks to months if they occur atop a fresh volcanic deposit that quickly cools.
Geographic Information System	A computer software application that relates physical features of the earth to a database that can be used for mapping and analysis.
Governing Body	The legislative body of a governmental unit including an assembly of a borough or the council of a city.
Groin	A narrow, elongated coastal engineering structure built on the beach perpendicular to the trend of the beach.
Hazard	A source of potential danger or adverse condition.
Hazard Mitigation	Any action taken to reduce or eliminate the long-term risk to human life and property from natural hazards. (44 CFR Subpart M 206.401)
Hazard Mitigation Grant Program	The program authorized under section 404 of the Stafford Act, which may provide funding for mitigation measures identified through the evaluation of natural hazards conducted under §322 of the Disaster Mitigation Act 2000.
Hazard and Vulnerability Analysis	The identification and evaluation of all the hazards that potentially threaten a jurisdiction and analyzing them in the context of the jurisdiction to determine the degree of threat that is posed by each.
Infrastructure	The public services of a community that have a direct impact to the quality of life. Infrastructure refers to communication technology such as phone lines or Internet access, vital services such as public water supply and sewer treatment facilities, and includes an area's transportation system, regional dams or bridges, etc.
Interferometry	A method employing the interference of electromagnetic radiation to make highly precise measurements of the angle between the two rays of light.
Inundation	In reference to tsunami, the maximum horizontal distance inland reached by the wave.
Ivu	Ivu or Ice Push is a surge of ice from an ocean or large lake onto the shore.
Jökulhlaup	A sudden flood-like release of water from a glacier. (Glacier outburst flooding)
Katabatic wind	Any wind blowing down an incline; the opposite to anabatic wind.
Knot	A unit of measurement equally 1 nautical mile per hour. This is roughly 1.15 statute miles per hour or 1.852 kilometers per hour.
Lahar	Lahar is an Indonesian word for a rapidly flowing mixture of rock debris and water that originates on the slopes of a volcano. Lahars are also referred to as volcanic mudflows or debris flows. They form in a variety of ways, chiefly by the rapid melting of snow and ice by pyroclastic flows, intense rainfall on loose volcanic rock deposits, breakout of a lake dammed by volcanic deposits, and as a consequence of debris avalanches.
Landslide	Downward movement of a slope and materials under the force of gravity.

SHMP Definitions

Term	Definition / Usage
Lava dome	Lava domes are rounded, steep-sided mounds built by very viscous magma. Such magmas are typically too viscous (resistant to flow) to move far from the vent before cooling and crystallizing. Domes may consist of one or more individual lava flows.
Littoral	Of or pertaining to the shore, especially of the sea.
Local Government	Any borough, municipality, city, township, public authority, school district, intrastate district, council of governments (regardless of whether the council of governments is incorporated as a nonprofit corporation under state law), regional or interstate government entity, or agency, or instrumentality of a local government; any Indian tribe or authorized tribal organization, or Alaska Native village or organization; and any rural community, unincorporated town or village, or other public entity, for which an application for assistance is made by a State or political subdivision of a state.
Magma	Molten rock originating from the Earth's interior.
Municipality	A political subdivision incorporated under the laws of the state that is a home rule or general law city, a home rule or general law borough, or a unified municipality.
Natural Disaster	Any natural catastrophe, including any hurricane, tornado, storm, high water, wind, driven water, tsunami, earthquake, volcanic eruption, landslide, snowstorm, fire, or drought. (44 CFR Subpart M 206.401)
Orthophoto	An aerial photo that has been corrected to eliminate the effects of camera tilt and relief displacement. The ground geometry is recreated as it would appear from directly above each and every point.
Overlay Zone	Overlay zones (overlay districts) create a framework for conservation or development of special geographical areas. In a special resource overlay district, overlay provisions typically impose greater restrictions on the development of land, but only regarding those parcels whose development, as permitted under the zoning, may threaten the viability of the natural resource. In a development area overlay district, the provisions may impose restrictions as well, but also may provide zoning incentives and waivers to encourage certain types and styles of development. Overlay zone provisions are often complemented by the adoption of other innovative zoning techniques, such as floating zones, special permits, incentive zoning, cluster development and special site plan, or subdivision regulations, to name a few.
Period	In reference to tsunami, the length of time between two successive peaks or troughs. May vary due to complex interference of waves. Tsunami periods generally range from 5 to 60 minutes.
Planning	The act or process of making or carrying out plans; the establishment of goals, policies and procedures for a social or economic unit.
Preparedness	The steps taken to decide what to do if essential services break down, developing a plan for contingencies, and practicing the plan. Preparedness ensures people are ready for a disaster and will respond to it effectively.
Presidential Disaster Declaration	The formal action by the president to make a State eligible for major disaster or emergency assistance under the Robert T. Stafford Relief and Emergency Assistance Act, Public Law 93-288, as amended.

Term	Definition / Usage
Pyroclastic	Pertaining to fragmented rock material formed by a volcanic explosion or ejection from a volcanic vent.
Pyroclastic Flow	Lateral flow of a turbulent mixture of hot gases and unsorted pyroclastic material (volcanic fragments, ash, etc.) that can move at high speeds.
Recovery	The long-term activities beyond the initial crisis period and emergency response phase of disaster operations that focus on returning all systems in the community to a normal status or to reconstitute these systems to a new, less vulnerable condition.
Response	Those activities and programs designed to address the immediate and short-term effects of the onset of an emergency or disaster.
Retrofit	The strengthening or changing of structures or facilities to mitigate disaster risks.
Rift Zone	A rift zone is an elongate system of crustal fractures associated with an area that has undergone extension (the ground has spread apart).
Risk	The estimated impact that a hazard would have on people, services, facilities, and structures in a community; the likelihood of a hazard event resulting in an adverse condition causing injury or damage. Risk is often expressed in relative terms such as a high, moderate or low likelihood of sustaining damage above a particular threshold due to a specific type of hazard event. It can also be expressed in terms of potential monetary losses associated with the intensity of the hazard.
Riverine	Relating to, formed by, or resembling rivers (including tributaries), streams, creeks, brooks, etc.
Riverine Flooding	Flooding related to or caused by a river, stream, or tributary overflowing its banks due to excessive rainfall, snowmelt, or ice.
Run-up	In reference to tsunami, the maximum vertical height of a tsunami in relation to sea level.
Seiche	An oscillating wave (also referred to as a seismic sea wave) in a partially or fully enclosed body of water. May be initiated by long period seismic waves, wind and water waves, or a tsunami.
Slush Ice	A mixture of snow and ice crystals floating on the surface of the ocean. The ice crystals, called frazil, represent the first stages of sea ice growth. Slush ice can build up on vessels and equipment, and clog intake valves.
Stafford Act	1) The Robert T. Stafford Disaster Relief and Emergency Assistance Act, Public Law 93-288, as amended. 2) The Stafford Act provides an orderly and continuing means of assistance by the federal government to state, local, and tribal governments in carrying out their responsibilities to alleviate the suffering and damage which result from disaster.

SHMP Definitions

Term	Definition / Usage
State Disaster Declaration	A disaster emergency shall be declared by executive order or proclamation of the governor upon finding that a disaster has occurred or that the occurrence or the threat of a disaster is imminent. The state of disaster emergency shall continue until the governor finds that the threat or danger has passed or the disaster has been dealt with to the extent emergency conditions no longer exist and terminates the state of disaster emergency by executive order or proclamation. Along with other provisions, this declaration allows the governor to utilize all available resources of the state as reasonably necessary, direct and compel the evacuation of all or part of the population from any stricken or threatened area if necessary, prescribe routes, modes of transportation, and destinations in connection with evacuation and control ingress and egress to and from disaster area. It is required before a Presidential Disaster Declaration can be requested.
State Hazard Mitigation Officer (SHMO)	The SHMO is the representative of state government who is the primary point of contact with FEMA, other state and federal agencies, and local units of government in the planning and implementation of pre- and post-disaster mitigation activities.
Storm Surge	Rise in the water surface above normal water level on open coast due to the action of wind stress and atmospheric pressure on the water surface.
Tectonic Plate	Rigid, thin segments of the earth's lithosphere may be assumed to move horizontally and adjoin other plates. It is the friction between plate boundaries cause seismic activity.
Tephra	Tephra is a general term for fragments of volcanic rock and lava regardless of size are blasted into the air by explosions or carried upward by hot gases in eruption columns or lava fountains. Tephra includes large dense blocks and bombs, and small light rock debris.
Topography	The contour of the land surface. The technique of graphically representing the exact physical features of a place or region on a map.
Tribal Government	A federally recognized governing body of an Indian or Alaska Native tribe, band, nation, pueblo, village, or community the secretary of the interior acknowledges to exist as an Indian tribe under the Federally Recognized Tribe List Act of 1994, 25 U.S.C. 479a. This does not include Alaska Native corporations, the ownership of which is vested in private individuals.
Tsunami	A sea wave produced by submarine earth movement or volcanic eruption with a sudden rise or fall of a section of the earth's crust under or near the ocean. A seismic disturbance or land slide can displace the water column, creating a rise or fall in the level of the ocean above. This rise or fall in sea level is the initial formation of a tsunami wave.
Usteq	A catastrophic form of permafrost thaw collapse that occurs when frozen ground disintegrates under the compounding influences of thawing permafrost, flooding, and erosion
Vent	Vents are openings in the Earth's crust from which molten rock and volcanic gases escape onto the ground or into the atmosphere. Vents may consist of a single circular-shaped structure, a large elongated fissure and fracture, or a tiny ground crack.

Term	Definition / Usage
Vulnerability	Describes how exposed or susceptible to damage an asset it. Vulnerability depends on an asset's construction, contents, and the economic value of its functions. The vulnerability of one element of the community is often related to the vulnerability of another. For example, many businesses depend on uninterrupted electrical power; if an electrical substation is flooded, it will affect not only the substation itself, but a number of businesses as well. Other, indirect effects can be much more widespread and damaging than direct ones.
Wildfire / Wildland Fire	Used interchangeably. An uncontrolled fire that spreads though vegetative fuels, exposing and possibly consuming structures.
Yedoma	Permafrost composition is highly variable, ranging from solid rock to soils that are composed almost entirely of ice.
Zoning Ordinance	An ordinance under the state or local government's police powers divides an area into districts and, within each district, regulates the use of land and buildings, height, and bulk of buildings or other structures, and the density of population.

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APPENDIX 13.6 ANNUAL SHMP REVIEW TOOLS AND FORMS

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Annual Review Questionnaire

PLAN SECTION	QUESTIONS	YES	NO	COMMENTS
PLANNING PROCESS	Are there internal or external organizations and agencies that have been invaluable to the planning process or to mitigation action			
	Are there procedures (e.g. meeting announcements, plan updates) that can be done more efficiently?			
	Has the planning team undertaken any SHMAC or SHMP meetings or activities regarding the SHMP or mitigation action implementation?			
HAZARD PROFILES	Has a natural and/or manmade/ technologically caused disaster occurred during this reporting period?			
	Are there natural and/or manmade/ technologically caused hazards that have not been addressed in this SHMP and should be?			
	Are additional maps or new hazard studies available? If so, what have they revealed?			
VULNERABILITY ANALYSIS	Do any critical facilities or infrastructure need to be added to the asset lists?			
	Have there been development pattern changes that could influence the hazard impacts or that create additional risks?			
MITIGATION STRATEGY	Are there different or additional resources (financial, programmatic, human, or technical) that are now available for mitigation planning within the State, Cities or Tribal communities? Define.			
	Are the SHMP's goals still applicable?			
	Should new mitigation actions be added to the Mitigation Strategies' Mitigation Action Plan (MAP)?			
	Do existing MAP mitigation actions need to be reprioritized			
	Are the MAP mitigation actions appropriate for available resources?			

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Mitigation Action Progress Report

Progress Report Period: _____ To _____
(Date) (Date)

Project Title: _____ Project ID#: _____

Responsible Agency: _____

Address: _____

: _____

Contact Person: Title:

Phone #(s): _____ email Address(s): _____

_____ _____

List Supporting Agencies and Contacts:

Total Project Cost: _____

Anticipated Cost Overrun/Underrun: _____

Project Approval Date: _____ Project Start Date: _____

Anticipated Completion Date: _____

Description of project (describe each phase, if applicable, and the time frame for completing each phase:

Milestones	Complete	Projected Completion Date

Mitigation Action Progress Report *(Continued)*

Plan Goal(s) Addressed: _____

Goal: _____

Success Indicators: _____

Project Status

☐ On Schedule

☐ Completed

☐ Delayed*

* Explain: _____

☐ Canceled

Project Cost Status

☐ Cost Unchanged

☐ Cost Overrun**

** Explain:

☐ Cost Underrun***

*** Explain: _____

Summary of progress on project for this report:

A. What was accomplished during this reporting period? _____

B. What obstacles, problems, or delays did you encounter, if any? _____

C. How was each problem resolved? _____

Next Steps: What is/are the next step(s) to accomplish over the next reporting period?

Other Comments: _____

APPENDIX 13.7 2018 SHMAC MEMBERSHIP

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State Hazard Mitigation Advisory Committee (SHMAC) and SHMP Planning Team

State Agencies	
Department of Military an d Veterans Affairs (DMVA)	
Division of Homeland Security and Emergency Management (DHS&EM)	
DHS&EM	Division Director
DHSEM	Planning Program Manager
DHSEM	State Hazard Mitigation Officer (SHMO)
DHSEM	Pre-Disaster Mitigation (PDM) Manager
DHSEM	State Hazard Mitigation Planning (SHMP) Lead
DHSEM	Primary Security Vulnerability Assessment (SVA) Project Coordinator
DHSEM	Mapping and Geographic Information Systems (GIS) Support
Department of Commerce, Community and Economic Development (DCCED)	
DCCED	Local Government Specialist, Risk MAP, ACCIMP
DCCED	Local Government Specialist, Alaska Floodplain Coordinator
Department of Environmental Conservation (DEC)	
DEC	Environmental Program Specialist III
DEC	Spill, Prevention, and Response (SPR)-Prevention-Preparedness Representative
Department of Health and Social Services (DHSS)	**DIR, Office of Substance Misuse & Addiction Prevention**
DHSS	Health Emergency Response Operations, Planner II
Department of Natural Resources (DNR)	
DNR/Mining, Land, Water (MLW)	
DNR-Mining, Land, Water	*Division Dir (SHMAC Member)*
DNR-Mining, Land, Water	Division Operations Manager (Director's SHMAC Representative)
DNR-Mining, Land, Water	Dam Safety Engineer
DNR-Mining, Land, Water	Assistant Dam Safety
DNR/Division of Geophysical and Geographical Surveys (DGGS)	
DNR/DGGS	Chief, Engineering Geology Section
DNR/DGGS	Coastal Hazards Program Manager
DNR/Division of Forestry (DOF)	
DNR/DOF	State Forester and Director
DNR/DOF	Forester V
DNR/DOF	Forester IV
Department of Administration (DOA)	
DOA/DSS/DGS Mgmt	State Leasing & Facility Manager
DOA/Risk Management (RM)	Division Director
DOA/RM	Division Risk Manager
Department of Transportation and Public Facilities (DOT/PF)	
DOT/PF, Southcoast Region	DIR, Southcoast Region
DOT/PF, Southcoast Region	DOT/PF Safety Officer
DOT/PF, Central Region	Central Region Director
DOT/PF	Statewide Safety Coordinator
DOT/PF, Northern Region	Northern Region Director
DOT/PF, Northern Region	Northern Region Safety Officer

Department of Public Safety (DPS)	
DPS	Assistant State Fire Marshall and Code Compliance Officer
University of Alaska (UA)	
University of Alaska Anchorage	Office of Emergency Management
University of Alaska Fairbanks (UAF), Geophysical Institute (GI)	State Seismologist, Alaska Earthquake Center (AEC)
UAF/GI/AEC	Seismic Network Manager/ Seismologist
UAF/GI-Tsunami Modeler	Research Assistant Professor
UAF, School of Mgmt	Health and Safety (HS) Emergency Program Director (EM)
Federal Agencies	
Bureau of Land Management (BLM)	Coordination Center Manager
Denali Commission	**Federal Co-Chairman**
Denali Commission, PM	Project Manager-Transportation & Energy
Denali Commission/ PM	Project Manager
National Ocean and Atmospheric Administration (NOAA), National Weather Service (NWS)	
NOAA-Nat'l Tsunami Warning Center (NTWC)	Ex-Oficio Director
NOAA-NWS	Acting Warning Coordinating Meteorologist/Fire PM
NOAA-NWS	Regional Coordinator
NOAA-NWS	Climatologist
NOAA)/NWS	WCM
NOAA-NWS	Acting Chief Environmental-Scientific Service Division
NOAA-NWS	Acting Deputy Chief
US Army Corp of Engineers (USACE)-Alaska Region	
USACE	Chief-Hydraulics & Hydrology
USACE	P.E. PMP-AK
US Department of Housing and Urban Development (HUD)	
HUD-Field Office Director	Dir, Field Office
HUD	Senior Mgmt Analyst
US Department of Agriculture (USDA), Natural Resource Conservation Service (NRCS)	
USDA-NRCS	State Resource Conservationist (SRC)
USDA-NRCS	State Conservation Engineer (SCE)
US Geological Survey (USGS)	
USGS	Alaska Regional Dir
USGS	Center Director
USGS-Water	USGS Water-Hydrologist
USGS-AVO	Center Dir Volcano Science Center
USGS-AVO	Scientist-in-Charge
USGS	Research Geologist
Borough and City Government Representatives	
Municipality of Anchorage (MOA)	
MOA	Watershed Manager, Floodplain Manager
MOA	Flood Hazard Administrator
MOA	Director Project Management and Engineering

Matanuska Susitna Borough (MSB)	
MSB	Development Services Manager
MSB	Planning & Land Use Department, Development Services Division, Planner II, Floodplain Manager
MSB	Emergency Manager
City and Borough of Juneau (CBJ)	
CBJ	Emergency Programs Manager
Kenai Peninsula Borough (KPB)	
KPB	Mayor's Community and Fiscal Project Manager
City of Seward	
City of Seward	Director Community Development
City of Seward	City Fire Chief, & Building Official
City of Seward	City Planner
Non-Government Organizations	
Alaska Railroad (AKRR)	*Director of Grants*
AKRR	Environmental Analyst II
AKRR	Chief Operating Officer
Alaska Municipal League (AML), Joint Insurance Arrangement (JIA)	Deputy Director
AK Institute for Justice (AIJ)	Exec Director
AIJ	Research Assistant
Chugach Electric	Senior Manager District Engineering
Tanana Chiefs Conference (TCC)	Sanitation Survey

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APPENDIX 13.8 2018 SHMP PARTICIPANT MEETING AGENDAS

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Meeting Minutes

Anchorage, AK 99501
Phone: 907.261.9706
Fax: 907.562.1297

SUBJECT: DHSEM State Hazard Mitigation Plan (SHMP) –Project Kick-off Meeting

Community: Statewide Agencies and Participants

Date/Time: January 18, 2018/10:00 to 11:00

From: R. Scott Simmons

Attendees:

- AECOM: Scott Simmons, Jessica Evans
- DHSEM: Kim Stuart, Daniel Belanger
- Agencies: Participants List

Comments:

- **Project Description:**
  - Update the legacy 2013 SHMP to fulfill current FEMA criteria
  - June 23, 2018 completion date
- **Participant Involvement Necessity**
  - Include diverse participants with mitigation capabilities including agencies and stakeholders with responsibility for:
    - Hazard data
    - Climate projections and data
    - Emergency management
    - Economic development
    - Land use and development
    - Housing
    - Health and social services
    - Infrastructure and
    - Natural and cultural resources.
- **Consequences**
  - Not having a "current" FEMA-approved mitigation plan will negatively impact eligibility for the following FEMA programs:
    - Public Assistance Categories C-G (PA C-G)
    - Fire Management Assistance Grants (FMAG)
    - Hazard Mitigation Grant Program (HMGP)
    - Pre-Disaster Mitigation (PDM)
    - Flood Mitigation Assistance (FMA)
  - Only mitigation planning technical assistance will be available.
- **Project Description:**
  - DHS&EM contract
  - 2018 State Hazard Mitigation Plan Update Process
    - FEMA requirements
    - FEMA/State compliance
    - Agency knowledge centric
  - Planning Process
    - Team Development/member selection: In-Progress
    - Legacy HMP project and initiative integration into other State planning and project processes

    - Have they been integrated
    - Identify what has been accomplished-details needed
        - Describe progress in statewide mitigation efforts
        - Describe changes in agency priorities
- Data Gathering
    - Collect new data from all agencies
    - For example: DGGS is updating all natural hazard profiles
    - Need: Manmade, technological, infectious disease, and infestation profile language review and potential statewide impacts
- Plan Writing
    - Agency centric – do to agency subject specificity, responsibilities, and regulatory requirements
    - Contractor formatting for SHMP consistency
- Hazard identification
    - Provide geographic specific profile description
    - Public risk, and infrastructure vulnerability assessment:

        "Due to the inherent uncertainties with projections of future hazard events, states are expected to look across the whole community of partners (for example, public, private, academic, non-governmental, etc.) to identify the most relevant data and select the most appropriate methodologies to assess risks and vulnerability.
- Mitigation Strategy review and update

    "The mitigation strategy serves as the long-term blueprint for reducing the potential losses identified in the risk assessment, or in other words the mitigation strategy represents risk based decisions."
    - Current project status, what worked, and roadblocks
    - Legacy project status review, reason for any changes
    - New project development
- State Mitigation Capabilities
    - Describe how the state's existing capabilities aids our mitigation efforts
    - How do they strengthen Alaska's capabilities
        - Define existing capabilities that demonstrate the state's commitment to mitigation
        - Identify a wide range of resources used to implement mitigation activities
        - Provide actions that reveals improvement initiatives or areas that need improvement.
- Local Coordination and Mitigation Capabilities
    - Contractor will explain how the State supports local and tribal governments with mitigation planning through training, technical assistance, and funding.
- FEMA Plan Review, Evaluation, and Implementation
    - Does it reflect current and projected statewide conditions, trends and anticipated growth and development
    - Does the SHMP:
        - Assess previous goals and action plan,
        - Evaluate SHMP implementation progress
        - Contain a mechanism to adjust from current to projected changing conditions and environments
        - Still fit the State's priorities and reflect current conditions
- Repetitive Loss Property Strategy
    - Repetitive Loss Properties are defined as:

        "Single or multifamily residential properties that are covered under an NFIP flood insurance policy and;

        1. Have incurred flood-related damage for which 4 or more separate claims payments have been made, with the amount of each claim exceeding $5,000, with the cumulative amount of such claims payments exceeding $20,000; or

2. For which at least 2 separate claims payments have been made under such coverage, with cumulative amount that exceeding the market value of the property.
3. At least 2 of the claims must be within 10 years of each other, (claims made within 10 days of each other will be counted as 1 claim."

- Required actions include:
  - Identifying specific actions the State has taken to reduce the number of repetitive loss properties (which must include severe repetitive loss properties),
  - Specifying how the State reduces or, intends to reduce, the number of repetitive loss properties,
  - Describing the strategy the State ensures that local jurisdictions with severe repetitive loss properties take actions to reduce the number of these properties, including local mitigation plan development requirements.

- **Teleconference Discussion Points**
  - Scott Simmons, AECOM presented the agenda to the teleconference attendees stating the agenda contents is more extensive than normally presented because it forms the basis for SHMP updating activities. Therefore, only the gray shaded areas were covered during today's teleconference as essential to completing the SHMP update and to focus agency specific needs.
  - Participants discussed the consequences for not having a "current" FEMA-approved mitigation plan, how it would negatively impact FEMA disaster assistance support during a disaster event.
    - FEMA regulations limits their support to emergency response Therefore recovery programs such as: PA Categories C-G, FMAG, HMCP, PDM, and FMA would not be available unless the State had a current FEMA approved SHMP.
  - Participants discussed the need to analyze infrastructure vulnerabilities for Repetitive Flood Loss area, specifically needing to fulfill FEMA's "Required Actions" focused on either removing facilities and infrastructure away from or above (elevate) to prevent future or repetitive damages and losses.
    - Mr. Monteleone, AK DOT/PF stated that FHWA funding limited what could be constructed/ reconstructed even in known Repetitive Flood Damaged areas. This prevented agency staff from repairing beyond existing conditions. He questioned how they can fulfill mitigation requirements if the FHWA or PA funding does not allow or provide additional work to protect the facility?
    - Scott explained that FEMA has a 406 Mitigation program beyond strictly repairing back to pre-existing conditions (PA and FHWA). 406 Mitigation is used within the PA project allowing construction beyond pre-existing conditions if analysis showed the additional construction would prevent future damages from similar events. He stated he would send the applicable documents to Mr. Monteleone for his review and consideration.
  - Ms. Stevens, DNR/DGGS, asked AECOM to define our project completion date.
    - Scott explained our completion date is from providing a FEMA approvable SHMP by the project completion date. This allowed for State and FEMA time (30-day and 45-day respectively) for their review processes.
  - Ms. Brown, DNR/DOF, explained she is a member of the State Emergency Response Commission (SERC). She asked if the SHMP was going to be presented to the SERC for review and ultimately be housed under the SERC's charter or purview.
    - Scott explained the SERC typically focuses on Hazardous Materials accidents, response, storage, and transportation. DHS&EM will most likely present the SHMP update to the SERC as a courtesy but it does not have to be reviewed and approved by them because the SHMP focuses on natural hazard mitigation efforts or activities; not response actions.

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Memo for Record

700 G Street, Suite 500
Anchorage, AK 99501
Phone: 907.261.9706
Fax: 907.562.1297

SUBJECT: DHSEM State Hazard Mitigation Plan (SHMP) – Teleconference #2

Community: Statewide Agencies and Participants

Date/Time: January 31, 2018/10:00 to 11:00

From: R. Scott Simmons

Attendees:

- AECOM: Scott Simmons, Jessica Evans
- DHSEM Planning Section Staff

Comments:

- **Project Description:**
  - Update the legacy 2013 SHMP to fulfill current FEMA criteria
  - June 23, 2018 completion date
- **Participant Involvement Necessity**
  - Please review as this list has changed
  - Include diverse participants with agency and stakeholder mitigation capability, responsibility, and authority for determining infrastructure and agency programmatic impacts from:
    - Hazard data
    - Climate projections and data
    - Emergency response and recovery efforts
    - Economic development
    - Land use and development trends and initiatives
    - Housing successes and roadblocks
    - Health and social services issues
    - Natural and cultural resource limitations, expectations, and coordination
- **This Meeting's Focus (Black Text Only):**
  - Planning Process
    - Team Development/member selection: In-Progress
    - Legacy HMP project and initiative integration into other State planning and project processes
      - Have they been integrated
      - Identify what has been accomplished-details needed
        - Describe progress in statewide mitigation efforts
        - Describe changes in agency priorities
  - Data Gathering
    - Collect new data from all agencies
    - For example: DGGS is updating all natural hazard profiles
    - Need: Manmade, technological, infectious disease, and infestation profile language review and potential statewide impacts
  - Hazard identification
    - Provide geographic specific profile description
    - Public risk, and infrastructure vulnerability assessment:

      "Due to the inherent uncertainties with projections of future hazard events, states are expected to look across the whole community of partners (for example, public, private, academic, non-governmental, etc.) to identify the most relevant

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data and select the most appropriate methodologies to assess risks and vulnerability.

- Mitigation Strategy review and update

  "The mitigation strategy serves as the long-term blueprint for reducing the potential losses identified in the risk assessment, or in other words the mitigation strategy represents risk based decisions."

  - Current project status, what worked, and roadblocks
  - Legacy project status review, reason for any changes
  - New project development
- State Mitigation Capabilities
  - Describe how the state's existing capabilities aids our mitigation efforts
  - How do they strengthen Alaska's capabilities
    - Define existing capabilities that demonstrate the state's commitment to mitigation
    - Identify a wide range of resources used to implement mitigation activities
    - Provide actions that reveals improvement initiatives or areas that need improvement.
- Local Coordination and Mitigation Capabilities
  - Contractor will explain how the State supports local and tribal governments with mitigation planning through training, technical assistance, and funding.
- FEMA Plan Review, Evaluation, and Implementation
  - Does it reflect current and projected statewide conditions, trends and anticipated growth and development
  - Update the legacy 2013 SHMP to:
    - Assess goals and action plan
      - Are they still accurate?
      - How should the be rewritten?
    - Evaluate SHMP implementation progress
    - Contain a mechanism to adjust from current to projected changing conditions and environments
    - Still fit the State's priorities and reflect current conditions
- Repetitive Loss Property Strategy
  - Repetitive Loss Properties are defined as:

    "Single or multifamily residential properties that are covered under an NFIP flood insurance policy and;

    1. Have incurred flood-related damage for which 4 or more separate claims payments have been made, with the amount of each claim exceeding $5,000, with the cumulative amount of such claims payments exceeding $20,000; or

    2. For which at least 2 separate claims payments have been made under such coverage, with cumulative amount that exceeding the market value of the property.

    3. At least 2 of the claims must be within 10 years of each other, (claims made within 10 days of each other will be counted as 1 claim."
  - Required actions include:
    - Identifying specific actions the State has taken to reduce the number of repetitive loss properties (which must include severe repetitive loss properties),
    - Specifying how the State reduces or, intends to reduce, the number of repetitive loss properties,
    - Describing the strategy the State ensures that local jurisdictions with severe repetitive loss properties take actions to reduce the number of these properties, including local mitigation plan development requirements.

Memo for Record

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SUBJECT: DHSEM State Hazard Mitigation Plan (SHMP) Update – Teleconference #3

Date/Time: February 21, 2018/10:00 to 11:00

From: R. Scott Simmons

Attendees:

- AECOM: Scott Simmons, Jessica Evans
- DHSEM Planning Section Staff
- Statewide Agencies and Participants

Comments:

- **Project Description:**
  - Update the legacy 2013 SHMP to fulfill current FEMA criteria
  - June 23, 2018 completion date
- **Participant Involvement Necessity**
  - Include diverse participants with agency and stakeholder mitigation capability, responsibility, and authority for determining infrastructure and agency programmatic impacts from:
    - Hazard data-Agency Reviews:
      - Sent legacy plan to everyone for review – let me know the sections you need
        - Sent out DeAnne Stevens, DGGS Hazard Analysis project description
        - Sent DOT hazard analysis for editing
        - Sent DNR-Dams hazard analysis for editing
    - Climate projections and data
    - Emergency response and recovery efforts
    - Economic development
    - Land use and development trends and initiatives
    - Housing successes and roadblocks
    - Health and social services issues
    - Natural and cultural resource limitations, expectations, and coordination
- **This Meeting's Focus (Black Text Only):**
  - Please review as this list has changed
  - Planning Process Discussion how are you coming along with:
    - Team Development/member selection
    - Legacy HMP project and initiative integration into your State agencies' planning and project processes?
      - What portion of the SHMP has been integrated
      - What has been accomplished – details needed
        - Describe progress in statewide mitigation efforts
        - Describe changes in agency priorities
  - Data Gathering
    - Collect new data from all agencies
    - For example: DGGS is updating all natural hazard profiles
  - Hazard identification
    - Provide geographic specific profile description
    - Public risk, and infrastructure vulnerability assessment:
    - Need to know who is working on these:
      - Manmade, technological: DNR-dams, USACE & DGGS-water-levies, DOT/PF: DOT/roads, DOT/airports, AKRR, Utility & Communication companies

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    - Infectious disease: DHSS, DEC
    - Infestation profile language review and potential statewide impacts: DEC , DNR, DOF, DF&G
    - Others?:

- Mitigation Strategy review and update

  "The mitigation strategy serves as the long-term blueprint for reducing the potential losses identified in the risk assessment, or in other words the mitigation strategy represents risk based decisions."

  - Current project status, what worked, and roadblocks
  - Legacy project status review, reason for any changes
  - New project development
- State Mitigation Capabilities
  - Describe how the state's existing capabilities aids our mitigation efforts
  - How do they strengthen Alaska's capabilities
    - Define existing capabilities that demonstrate the state's commitment to mitigation
    - Identify a wide range of resources used to implement mitigation activities
    - Provide actions that reveals improvement initiatives or areas that need improvement.
- Local Coordination and Mitigation Capabilities
  - Contractor will explain how the State supports local and tribal governments with mitigation planning through training, technical assistance, and funding.
- FEMA Plan Review, Evaluation, and Implementation
  - Does it reflect current and projected statewide conditions, trends and anticipated growth and development
  - Update the legacy 2013 SHMP to:
    - Assess goals and action plan
      - Are they still accurate?
      - How should the be rewritten?
    - Evaluate SHMP implementation progress
    - Explain how the SHMP is a mechanism to adjust from current to projected changing conditions and environments
    - Explain how the SHMP fulfills the State's priorities and reflect current conditions
- Repetitive Loss Property Strategy
  - Repetitive Loss Properties are defined as:

    "Single or multifamily residential properties that are covered under an NFIP flood insurance policy and;

    1. Have incurred flood-related damage for which 4 or more separate claims payments have been made, with the amount of each claim exceeding $5,000, with the cumulative amount of such claims payments exceeding $20,000; or

    2. For which at least 2 separate claims payments have been made under such coverage, with cumulative amount that exceeding the market value of the property.

    3. At least 2 of the claims must be within 10 years of each other, (claims made within 10 days of each other will be counted as 1 claim."
  - Required actions include:
    - Identifying specific actions the State has taken to reduce the number of repetitive loss properties (which must include severe repetitive loss properties),
    - Specifying how the State reduces or, intends to reduce, the number of repetitive loss properties,
    - Describing the strategy the State ensures that local jurisdictions with severe repetitive loss properties take actions to reduce the number of these properties, including local mitigation plan development requirements.

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SUBJECT: DHSEM State Hazard Mitigation Plan (SHMP) Update – Teleconference #4

Date/Time: March 7, 2018/10:00 to 11:00

From: R. Scott Simmons

Attendees:

- AECOM: Scott Simmons, Jessica Evans
- DHSEM Planning Section Staff
- Statewide Agencies and Participants

Comments:

- **Project Description:**
  - Update the legacy 2013 SHMP to fulfill current FEMA criteria
  - June 23, 2018 completion date
- **Participant Involvement Necessity**
  - Include diverse participants with agency and stakeholder mitigation capability, responsibility, and authority for determining infrastructure and agency programmatic impacts from:
    - Hazard data-Agency Reviews:
      - Sent legacy plan to everyone for review – let me know the sections you need
        - Sent out DeAnne Stevens, DGGS Hazard Analysis project description
        - Sent DOT hazard analysis for editing
        - Sent DNR-Dams hazard analysis for editing
    - Climate projections and data
    - Emergency response and recovery efforts
    - Economic development
    - Land use and development trends and initiatives
    - Housing successes and roadblocks
    - Health and social services issues
    - Natural and cultural resource limitations, expectations, and coordination
- **This Meeting's Focus (Black Text Only):**
  - Please review as this list has changed
  - Planning Process Discussion how are you coming along with:
    - Team Development/member selection
    - Legacy HMP project and initiative integration into your State agencies' planning and project processes?
      - What portion of the SHMP has been integrated
      - What has been accomplished – details needed
        - Describe progress in statewide mitigation efforts
        - Describe changes in agency priorities
  - Data Gathering
    - Collect new data from all agencies
    - For example: DGGS is updating all natural hazard profiles
  - Hazard identification
    - Provide geographic specific profile description
    - Public risk, and infrastructure vulnerability assessment:
    - Need to know who is working on these:
      - Manmade, technological: DNR-dams, USACE & DGGS-water-levies, DOT/PF: DOT/roads, DOT/airports, AKRR, Utility & Communication companies

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- Infectious disease: DHSS, DEC
- Infestation profile language review and potential statewide impacts: DEC , DNR, DOF, DF&G
- Others?:

- Mitigation Strategy review and update

  "The mitigation strategy serves as the long-term blueprint for reducing the potential losses identified in the risk assessment, or in other words the mitigation strategy represents risk based decisions."

  - Current project status, what worked, and roadblocks
  - Legacy project status review, reason for any changes
  - New project development
- State Mitigation Capabilities
  - Describe how the state's existing capabilities aids our mitigation efforts
  - How do they strengthen Alaska's capabilities
    - Define existing capabilities that demonstrate the state's commitment to mitigation
    - Identify a wide range of resources used to implement mitigation activities
    - Provide actions that reveals improvement initiatives or areas that need improvement.
- Local Coordination and Mitigation Capabilities
  - Contractor will explain how the State supports local and tribal governments with mitigation planning through training, technical assistance, and funding.
- FEMA Plan Review, Evaluation, and Implementation
  - Does the SHMP reflect current and projected statewide conditions, trends and anticipated growth and development
  - Update the legacy 2013 SHMP to:
    - Assess goals and action plan
      - Are they still accurate?
      - How should the be rewritten?
    - Evaluate SHMP implementation progress
    - Explain how the SHMP is a mechanism to adjust from current to projected changing conditions and environments
    - Explain how the SHMP fulfills the State's priorities and reflect current conditions
- Repetitive Loss Property Strategy
  - Repetitive Loss Properties are defined as:

    "Single or multifamily residential properties that are covered under an NFIP flood insurance policy and;

    1. Have incurred flood-related damage for which 4 or more separate claims payments have been made, with the amount of each claim exceeding $5,000, with the cumulative amount of such claims payments exceeding $20,000; or

    2. For which at least 2 separate claims payments have been made under such coverage, with cumulative amount that exceeding the market value of the property.

    3. At least 2 of the claims must be within 10 years of each other, (claims made within 10 days of each other will be counted as 1 claim."
  - Required actions include:
    - Identifying specific actions the State has taken to reduce the number of repetitive loss properties (which must include severe repetitive loss properties),
    - Specifying how the State reduces or, intends to reduce, the number of repetitive loss properties,
    - Describing the strategy the State ensures that local jurisdictions with severe repetitive loss properties take actions to reduce the number of these properties, including local mitigation plan development requirements.

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SUBJECT: DHSEM State Hazard Mitigation Plan (SHMP) Update – Teleconference #5

Date/Time: March 28, 2018/10:00 to 11:00

From: R. Scott Simmons

Attendees:

- AECOM: Scott Simmons, Jessica Evans
- DHSEM Planning Section Staff
- Statewide Agencies and Participants

Comments:

- **Project Description:**
  - Update the legacy 2013 SHMP to fulfill current FEMA criteria
  - June 23, 2018 completion date
- **Participant Involvement Necessity**
  - Include diverse participants with agency and stakeholder mitigation capability, responsibility, and authority for determining infrastructure and agency programmatic impacts from:
    - Hazard data-Agency Reviews:
      - Sent legacy plan to everyone for review – let me know the sections you need
        - Sent out DeAnne Stevens, DGGS Hazard Analysis project description
        - Sent DOT hazard analysis for editing
        - Sent DNR-Dams hazard analysis for editing
    - Climate projections and data
    - Emergency response and recovery efforts
    - Economic development
    - Land use and development trends and initiatives
    - Housing successes and roadblocks
    - Health and social services issues
    - Natural and cultural resource limitations, expectations, and coordination
- **This Meeting's Focus (Black & Red Text):**
  - Please review as this list has changed
  - Planning Process Discussion how are you coming along with:
    - Team Development/member selection
    - Legacy HMP project and initiative integration into your State agencies' planning and project processes?
      - What portion of the SHMP has been integrated
      - What has been accomplished – details needed
        - Describe progress in statewide mitigation efforts
        - Describe changes in agency priorities
  - Data Gathering
    - Collect new data from all agencies
    - DGGS is updating nearly all natural hazard profiles
      - Project Categories list available upon request
  - Hazard identification
    - Provide geographic specific profile description
    - Public risk, and infrastructure vulnerability assessment:
    - Need to know who is working on these:

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- Manmade, technological: DNR-dams, USACE & DGGS-water-levies, DOT/PF: DOT/roads, DOT/airports, AKRR, Utility, Communication companies
- Infectious disease: DHSS, DEC
- Infestation profile language review and potential statewide impacts: DEC , DNR, DOF, DF&G
- Others?:

- Mitigation Strategy review and update

  "The mitigation strategy serves as the long-term blueprint for reducing the potential losses identified in the risk assessment, or in other words the mitigation strategy represents risk based decisions."

  - Current project status, what worked, and roadblocks
    - All agencies
  - Legacy project status review, reason for any changes
    - All agencies
  - New project development
    - All agencies
- State Mitigation Capabilities
  - Describe how the state's existing capabilities aids our mitigation efforts
    - All agencies
  - How do they strengthen Alaska's capabilities
    - All agencies
      - Define existing capabilities that demonstrate the state's commitment to mitigation
      - Identify a wide range of resources used to implement mitigation activities
      - Provide actions that reveals improvement initiatives or areas that need improvement.
- Local Coordination and Mitigation Capabilities
  - Contractor will explain how the State supports local and tribal governments with mitigation planning through training, technical assistance, and funding.
- FEMA Plan Review, Evaluation, and Implementation
  - Does the SHMP reflect current and projected statewide conditions, trends and anticipated growth and development
  - Update the legacy 2013 SHMP to:
    - Assess goals and action plan
      - Are they still accurate?
      - How should the be rewritten?
    - Evaluate SHMP implementation progress
    - Explain how the SHMP is a mechanism to adjust from current to projected changing conditions and environments
    - Explain how the SHMP fulfills the State's priorities and reflect current conditions
- Repetitive Loss Property Strategy
  - Repetitive Loss Properties are defined as:

    "Single or multifamily residential properties that are covered under an NFIP flood insurance policy and;

    1. Have incurred flood-related damage for which 4 or more separate claims payments have been made, with the amount of each claim exceeding $5,000, with the cumulative amount of such claims payments exceeding $20,000; or

    2. For which at least 2 separate claims payments have been made under such coverage, with cumulative amount that exceeding the market value of the property.

    3. At least 2 of the claims must be within 10 years of each other, (claims made within 10 days of each other will be counted as 1 claim."

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- Required actions include:
  - Identifying specific actions the State has taken to reduce the number of repetitive loss properties (which must include severe repetitive loss properties),
  - Specifying how the State reduces or, intends to reduce, the number of repetitive loss properties,
  - Describing the strategy the State ensures that local jurisdictions with severe repetitive loss properties take actions to reduce the number of these properties, including local mitigation plan development requirements.

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SUBJECT: DHSEM State Hazard Mitigation Plan (SHMP) Update – Teleconference #6

Date/Time: April 18,, 2018/10:00 a.m. to 11:00 a.m.

From: Scott Simmons

Attendees:

- AECOM: Scott Simmons, Jessica Evans
- DHSEM Planning Section Staff
- Statewide Agencies and Participants

Comments:

- **Project Description:**
  - Update the legacy 2013 SHMP

I sent the attached four legacy Mitigation Strategy components for everyone's review and discussion for this week's teleconference.

- 2013 Legacy HM Goals replaced
- 2013 Legacy MH Actions Status
- 2013 Legacy HM Programs
- 2013 Legacy HM Success

Please follow the instructions provided at the top of each attachment

- Review the **legacy Goals**. I believe each legacy "goal" was more of a proposed action rather than an actual "global goal". Hence the very abbreviated "Goal" table that provides for three **new "Multi-Hazard"** categories that allows similar actions to address not only a primary hazard, but subsequent (secondary, tertiary, etc.) impacts
- Review and edit the "**MH Actions Status**" to reflect
  - any activity that your agency either "Leads" or "Supports"
  - state whether the project was
    - completed (include the completion date)
    - deferred (provide a reason it was deferred i.e. No funding, staffing, other resources)
    - deleted (no longer needed or feasible due to new technologies, etc.)
    - edited or combined with other actions (to better reflect agency needs, combined similar projects to reduce redundancy, reworded for clarity, etc.)
- Review, edit, and update the "**HM Programs**" to include any new programs initiated since the legacy 2013 SHMP was developed and implemented. (spanning 2012 to present).
- Review, edit, and update the "**HM Success**" to include any new action related initiatives that proved to be successful since the legacy 2013 SHMP was developed and implemented. (spanning 2012 to present)

Please don't forget to complete your "**Agency Capability Questionnaire**" and forward to me. The earlier the better to assure 2018 SHMP FEMA review compliance.

Please feel free to call or email to discuss or clarify my intent

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SUBJECT: DHSEM State Hazard Mitigation Plan (SHMP) Update – Teleconference #7

Date/Time: May 2, 2018/10:00 a.m. to 11:00 a.m.

From: Scott Simmons

Attendees:

- AECOM: Scott Simmons, Jessica Evans
- DHSEM Planning Section Staff
- Statewide Agencies and Participants

Comments:

- **Project Description:**
  - Update the legacy 2013 SHMP

I sent the attached four legacy Mitigation Strategy components for everyone's review and discussion for this week's teleconference.

- 2013 Legacy HM Goals replaced
- 2013 Legacy MH Actions Status
- 2013 Legacy HM Programs
- 2013 Legacy HM Success

Please follow the instructions provided at the top of each attachment

- Review the **legacy Goals**. I believe each legacy "goal" was more of a proposed action rather than an actual "global goal". Hence the very abbreviated "Goal" table that provides for three **new "Multi-Hazard"** categories that allows similar actions to address not only a primary hazard, but subsequent (secondary, tertiary, etc.) impacts

SS Comment: I received (*and agree with*) a few suggestions to even further trim the goals. The three I suggested would also fulfill the following suggested samples:

"Scott,

Below, please find our inputs for the 2013 Legacy Goals:

I agree with you that the Goals should be reduced. According to the FEMA guidance on preparing mitigation goals and objectives, goals are usually "general guidelines on what you want to achieve" and "they are usually broad policy-type statements, long term and represent global visions." In that light below are a few suggestions for Goals:

1. *Unless there's a priority or need, I think all the goals and objectives should be Multi-Hazard, incorporating both natural and man-made hazards. I think the actions should refer down the hazard and program levels, but maybe not down to the project level (project level should be local/tribal level)*
2. *Suggested Goals:*
   a. *Minimize/eliminate statewide infrastructure, private property and business losses to natural and man-made hazard events through mitigation*
   b. *Minimize/eliminate statewide injuries and loss of life due to natural and man-made hazard events through mitigation*

SS Comment to consider: The SHMP is not required to address manmade hazards as these are typically addressed in emergency response and homeland security as well as other infrastructure plans

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Objectives: From the guidance, objectives define strategies or implementation steps to attain goals. I interpret these as the "How" from the State perspective

1. *Suggested multi-hazard objectives*

   a. *Plan: Work with tribal, local, state. PNP and business entities and interagency partners to identify and characterize their hazards and risks, define their potential mitigation projects, priorities, and strategies through mitigation outreach and planning.*

   b. *Protect: Work with tribal, local, state. PNP and business entities and interagency partners to fund their mitigation projects through project technical assistance, outreach and training*

   c. *Educate: Work with tribal, local, state. PNP and business entities and interagency partners to educate themselves and their communities on hazards, disaster preparedness and mitigation*

   d. *Recover with resilience: Work with tribal, local, state. PNP and business entities and interagency partners to include mitigation in disaster recovery efforts*

2. *You might consider whether you want measurable objectives such as*

   a. *Having a certain number or percentage of active local/tribal hazard mitigation plans in the State*

   b. *A certain percentage of available HMGP dollars obligated to projects and plans within a certain time frame; a certain percentage of available State PDM (share) projects submitted to FEMA*

   c. *A certain number of local planning engagements and /or technical assistance (trainings, meetings, teleconferences, conference sessions) conducted annually*

   d. *A certain percentage of eligible disaster project worksheets with mitigation included*

This document identifies priority goals (many of which are actions) by hazard. I'll address those in the response to the Mitigation Actions document.

SS comment:-I also heartily agree with this opinion as I expressed it within the legacy actions attachment.

SS comment: I think that Deanne Stevens and her team can provide an approach to accomplishing this suggestion:

Finally, I think it would be useful to have an analysis-based perspective of which hazards have the highest programmatic (mitigation) priority in this section. The analysis might be based upon assessed dollar amount damage and lives lost from state and federal level disasters by hazard type; programmatic funding available for mitigation by hazard type; or other. The State's priorities should be an important part of its mitigation strategy at the "high-level" perspective i.e., at the Goals and Objectives perspective.

Please don't forget to complete your "**Agency Capability Questionnaire**" and forward to me. The earlier the better to assure 2018 SHMP FEMA review compliance.

Please feel free to call or email to discuss or clarify my intent

Agenda

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SUBJECT: DHSEM State Hazard Mitigation Plan (SHMP) Update – Teleconference #8

Date/Time: May 16, 2018/10:00 a.m. to 11:00 a.m.

From: Scott Simmons

Attendees:

- AECOM: Jessica Evans, Laura Young
- DHSEM Planning Section Staff
- Statewide Agencies and Participants

Comments:

Project Description: Update the legacy 2013 SHMP

I sent four legacy Mitigation Strategy components for everyone's review and additional discussion for ongoing teleconference discussions.

- 2013 Legacy HM Goals
- 2013 Legacy MH Actions status
- 2013 Legacy HM Programs status or changes
- 2013 mitigation project or action successes

Please follow the instructions provided at the top of each attachment

- Review the **legacy Goals**. I believe each legacy "goal" was more of a proposed action rather than an actual "global goal". Hence the very abbreviated "Goal" table that provides for new "Multi-Hazard" categories that allows similar actions to address not only a primary hazard, but subsequent (secondary, tertiary, etc.) impacts

SHMP Goals and Objectives:

Goals provide general guidelines on what the State (borough, community, or tribe) seeks to achieve. They are typically broad, policy statements with a long-term focus that represent a jurisdiction's global visions.

Unless there's a priority or need, goals and objectives should be Multi-Hazard focused to reduce redundancy, incorporating both natural and manmade hazards as applicable to their threat and impact. Actions should refer through hazard, program and even the project level to assure the overarching goal is fulfilled. There are two options to abbreviate the SHMP Goals.

Option 1: Abbreviated to focus on three categories:

Education/Outreach, Planning, and Active Mitigation (Construction)

No.	SHMP Goal Description
Multi-Hazards (MH)	
MH 1 Outreach	Provide outreach activities to educate and promote recognizing and mitigating natural and Other hazards that affect Alaska
MH 2 Planning	Cross-reference mitigation goals and actions throughout Alaska agency planning mechanisms and projects
MH 3 Construction	Develop construction activities that reduce potential natural and manmade hazard damages and losses

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Option 2: *Slightly expanded to focus on four categories*

No.	Goal Description
Multi-Hazards (MH)	
MH 1	Maximize coordinated agency educational and outreach efforts and activities to promote recognizing and mitigation natural and manmade hazard impacts or threats.
MH 2	Encourage jurisdictions to minimize, eliminate, or avoid statewide natural and man-made hazard damage or loss to infrastructure, private property, and businesses by implementing focused mitigation initiatives.
MH 3	Encourage jurisdictions to minimize, eliminate or avoid statewide risks, injuries, and loss of life due to natural and manmade hazard events through focused mitigation initiatives.
MH 4	Maximize statewide agency efforts to coordinate and integrate hazard mitigation planning precepts and hazard vulnerability analysis within agency planning, funding, and construction initiatives and projects.

Objectives include or define strategies or implementation steps to attain goals. These are the "How-to" achieve identified goals from a high-level State (borough, community, tribal) perspective. Objectives are typical categorized as Planning, Protecting, Educating, and Recovering from hazard impacts

Suggested 2018 Multi-Hazard (MH) Objectives (three options) to replace 30 pages of agency hazard mitigation projects.

Option 1: No Mitigation Objectives

Option 2: Non-measurable MH objectives

1.1. Plan: Work with tribal, local, state. Public Non-Profits (PNPs), business entities, and interagency partners to identify and characterize their natural and manmade hazards and risks, define their potential mitigation projects, priorities, and strategies through mitigation outreach and planning.

1.2. Protect: Work with tribal, local, state. PNP and business entities and interagency partners to fund their mitigation projects through project technical assistance, outreach and training

1.3. Educate: Work with tribal, local, state. PNP and business entities and interagency partners to educate themselves and their communities on hazards, disaster preparedness and mitigation

1.4. Recover with resilience: Work with tribal, local, state. PNP and business entities and interagency partners to include mitigation in disaster recovery efforts

Option 3: Measurable MH objectives

1.1. Track multi-jurisdictional, local, and tribal hazard mitigation plans that are active, expired, or in-progress within Alaska.

1.2. Annually determine and track statewide HMGP and PDM obligated funding expenditures compared to actual agency and jurisdictional funding requests to determine future project funding needs and to focus future project prioritization.

1.3. Annually determine and track mitigation focused planning engagements and technical assistance activities (trainings, meetings, teleconferences, conference sessions, and community visits) were conducted annually

1.4. Annually review, and track eligible disaster project worksheets (PWs) with 406 mitigation program funding were reviewed and included

1.5. Finally, I think it would be useful to have an analysis-based perspective of which hazards have the highest programmatic (mitigation) priority in this section. The analysis might be based upon assessed dollar amount damage and lives lost from state and federal level disasters by hazard type; programmatic

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funding available for mitigation by hazard type; or other. The State's priorities should be an important part of its mitigation strategy at the "high-level" perspective i.e., at the Goals and Objectives perspective.

2. Agency GIS data critically needed:

Please provide your agency's GIS lead to assist us with obtaining your facilities data to identify their relative threat to each natural hazard classification. These data will assure we have accurately analyzed potential infrastructure threats to better enable the SHMAC and planning team members to guide education and funding to protect existing and site new future infrastructure.

Please don't forget to complete your "**Agency Capability Questionnaire**" and forward to AECOM for SHMP inclusion.

Please feel free to call or email to discuss or clarify questions

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SUBJECT: DHSEM State Hazard Mitigation Plan (SHMP) Update – Teleconference #9

Date/Time: July 13, 2018/10:00 a.m. to 11:00 a.m.

From: Scott Simmons

Attendees:

- AECOM: Scott Simmons, Kelly Isham, Laura Young
- DHSEM Planning Section Staff
- Statewide Agencies and Participants

Comments:

1. Urgent: Please return your edited documents

Please forward to AECOM by July 14 for SHMP inclusion.

- Agency Capability Questionnaire required for FEMA regulatory compliance.
- 2013 Legacy HM Programs: current status, edits, changes, (complete, deleted, were they successful etc.)

2. Discuss DNR's Natural Hazard Research, Hazard Profiling, GIS data development status

3. 2018 SHMP Goals

Goals provide general guidelines on what the State (borough, community, or tribe) seeks to achieve. They are typically broad, policy statements with a long-term focus that represent a jurisdiction's global visions.

Unless there's a priority or need, goals and objectives should be Multi-Hazard focused to reduce redundancy, incorporating both natural and manmade hazards as applicable to their threat and impact. Actions should refer through hazard, program and even the project level to assure the overarching goal is fulfilled. There are two options to abbreviate the SHMP Goals.

Abbreviated to focus on four "objective" categories: Education/Outreach, Planning, Active Mitigation (Construction), and Funding

Goal Title	SHMP Goal Description
Multi-Hazards (MH)	
MH 1 Outreach	Coordinate agency **outreach activities to educate** and promote recognizing and mitigating natural and Other hazards that affect Alaska
MH 2 Planning	Coordinate agency efforts **integrate hazard mitigation planning precepts** and hazard vulnerability analysis within agency planning, funding, and construction initiatives and projects.
MH 3 Construction	Develop construction activities that **reduce potential natural and manmade hazard damages and losses**
MH 4 Mitigation Funding	**Increase funding opportunities for hazard** mitigation actions and initiatives

4. Economic, health, human-caused, technological, and terrorism-related hazards are beyond the scope of this plan. Any non-natural hazards (such as Dam Failure) will be contained within the SHMP appendices as non-natural hazards are typical subsequent to complicated natural hazard events.

5. Agency GIS data critically needed:

Please provide your agency's GIS lead to assist us with obtaining your facilities data to identify their relative threat to each natural hazard classification. These data will assure we have accurately analyzed potential infrastructure threats to better enable the SHMAC and planning team members to guide education and funding to protect existing and site new future infrastructure.

Please feel free to call or email to discuss or clarify questions

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Agenda

700 G Street, Suite 500
Anchorage, AK 99501
Phone: 907.261.9706
Fax: 907.562.1297

SUBJECT: DHSEM State Hazard Mitigation Plan (SHMP) Update – Teleconference #10

Date/Time: July 19, 2018/10:00 a.m. to 11:00 a.m.

From: Scott Simmons

Attendees:

- AECOM: Scott Simmons, Kelly Isham
- DHSEM Planning Section Staff
- Statewide Agencies and Participants

Comments:

1. Urgent: Please return your edited documents

Please forward to AECOM

- Agency Capability Questionnaire required for FEMA regulatory compliance.
- Legacy 2013 HMP integration
- Mitigation successes, and
- Implementation challenges.

2. DNR's Natural Hazard Research, Hazard Profiling, GIS data development status

- Received draft and final hazard profiles and GIS data sets
- Being integrated within 2018 draft SHMP

3. Agency GIS data critically needed:

Please provide your agency's facilities' as well as any critical infrastructure (roads, bridges, power generation, sanitation, water works, etc.) GIS data to enable us to identify their relative threat from each natural hazard threat.

These data will assure we have accurately analyzed potential infrastructure threats to better enable the SHMAC and planning team members to guide education and funding to protect existing and future infrastructure.

Please feel free to call or email to discuss or clarify questions

R. Scott Simmons, CFM, CPM
Senior Emergency Management Planner

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Personal Cell: 907.841.1832

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APPENDIX 13.9 STATE EMERGENCY RESPONSE COMMISSION (SERC) MEMBERSHIP

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The State Emergency Response Commission (SERC) comprises 21 seated members:
Nine state department members

Seven public members

Six ex–officio members

State Department Members

Department of Military and Veterans Affairs (DMVA)

Commissioner Laurie Hummel, Chairperson
P.O. Box 5800
Fort Richardson, AK 99505-5800
Phone: (907) 428-6003
laurie.hummel@alaska.gov, or designees

Mr. Bob Doehl, Deputy Commissioner
Phone: (907) 428-6003
bob.doehl@alaska.gov, or

Mr. Michael Sutton, Director
Division of Homeland Security and Emergency Management (DHS&EM)
Phone: (907) 428-7000
mike.sutton@alaska.gov

Department of Environmental Conservation (DEC)

Commissioner Larry Hartig
410 Willoughby Avenue, Suite 303
Juneau, AK 99801-1795
Phone: (907) 465-5066
larry.hartig@alaska.gov or designee

Kristin Ryan, Director
Division of Spill Prevention and Response

Department of Commerce, Community and Economic Development (DCCED)

Commissioner Chris Hladick
P.O. Box 110800
Juneau, AK 99811-0800
Phone: (907) 465-2500
chris.hladick@alaska.gov or designee

Mr. Fred Parady
Phone: (907) 465-2500

Department of Fish and Game

Commissioner Sam Cotten
P.O. Box 25526
Juneau, AK 99802-5526
Phone: (907) 465-6141
sam.cotten@alaska.gov, or designee

Ms. Jill Klein
Phone: (907) 267-2228
jill.klein@alaska.gov

SERC Members

Department of Health and Social Services
Commissioner Valerie Davidson P.O. Box 110601 Juneau, AK 99811-0601 Phone: (907) 465-3030 val.davidson@alaska.gov, or designee
Dr. Jay Butler Phone: (907) 269-6680 jay.butler@alaska.gov
Department of Labor and Workforce Development
Commissioner Heidi Drygas P.O. Box 111149 Juneau, AK 99811-1149 Phone: (907) 465-2700 heidi.drygas@alaska.gov, or designee
Ms. Heather Beaty Phone: (907) 269-3569 heather.beaty@alaska.gov
Department of Natural Resources
Commissioner Andy Mack 550 W. 7th Ave Ste 1400 Anchorage, AK 99501-3561 Phone: (907) 269-8431 andy.mack@alaska.gov, or designee
Tim Dabney Phone: (907) 269-8476 tim.dabney@alaska.gov
Department of Public Safety
Commissioner Walt Monegan 5700 E. Tudor Road Anchorage, AK 99507-1225 Phone: (907) 269-5086 walt.monegan@alaska.gov
Department of Transportation and Public Facilities
Commissioner Marc Luiken 3132 Channel Drive, Suite 300 Juneau, AK 99801-7898 Phone: (907) 465-3900 Marc.luiken@alaska.gov, or designee
Mr. Steve Hatter Phone: (907) 465-3900 steve.hatter@alaska.gov

SERC Members

Public Members
LEPC/Urban (2 Seats)
Mr. George Vakalis 6311 Habicht Court Anchorage, AK 99507 Phone: (907) 223-5014 george.vakalis755@hotmail.com
Mr. Clint Brooks 1650 Cowles Street Fairbanks, AK 99701 Phone: (907) 452-8181 clint.brooks@bannerhealth.com
LEPC/Rural (2 Seats)
Mr. Tom Vaden P.O. Box 1506 Nome, AK 99762 Phone: (907) 443-3404 thvaden@gci.net
Mr. Chris Noel P. O. Box 480 Healy, Alaska 99743 Phone: (907) 683-1330 chris_noel@denaliborough.com
Local Government Representative (2 Seats)
Mr. Abner Hoage 70 Bawden Street Ketchikan, AK 99901 Phone: (907) 225-9616 abnerh@city.ketchikan.ak.us
Mr. Casey Cook 680 North Seward Meridian Parkway Wasilla, AK 99654 Phone: (907) 373-8800 casey.cook@matsugov.us
Public Member-at-Large
Mr. James Butler III 125 North Willow Street, Suite 100 Kenai, AK 99611 Phone: (907) 283-7167 jim@baldwinandbutler.com

Ex-Officio Members
Department of Administration
Commissioner Sheldon Fisher P.O. Box 110200 Juneau, AK 99811-0200 Phone: (907) 465-2200 sheldon.fisher@alaska.gov, or designees
Mr. Scott Jordan Phone: (907) 465-5723 scott.jordan@alaska.gov
Department of Education and Early Development
Commissioner Michael Johnson P.O. Box 110500 Juneau, AK 99801-1894 Phone: (907) 465-2802 susan.mccauley@alaska.gov, or designee
Ms. Sana Efird Phone: (907) 465-8691 Sana.efird@alaska.gov
Federal Emergency Management Agency
Mr. Scott Jordan Phone: (907) 465-5723 scott.jordan@alaska.gov
Alaskan Command
Col Richard T. Koch Alaskan Command 9480 Pease Avenue, Suite 301 Joint Base Elmendorf-Richardson, AK 99506 Phone: (907) 552-2280 richard.koch@us.af.mil, or Alternate
Mr. Don Jurewicz donald.jurewicz.1@us.af.mil
U.S. Coast Guard
Commander James Binniker US Coast Guard Sector Anchorage P.O. Box 5800 JBER, AK 99505-0800 Phone: (907) 428-4148 james.a.binniker@uscg.mil
Environmental Protection Agency
Mr. Robert Whittier Alaska Operations Office Room 537 Federal Building 222 West 7th Avenue, Suite 19 Anchorage, AK 99513-7588 Phone: (907) 271-3247 whittier.robert@epa.gov

Source: https://www.ready.alaska.gov/SERC/SERC_membership

APPENDIX 13.10 LOCAL EMERGENCY PLANNING COMMITTEE (LEPC) AND LOCAL EMERGENCY PLANNING DISTRICT (LEPD) MEMBERSHIP LOCATION MAP

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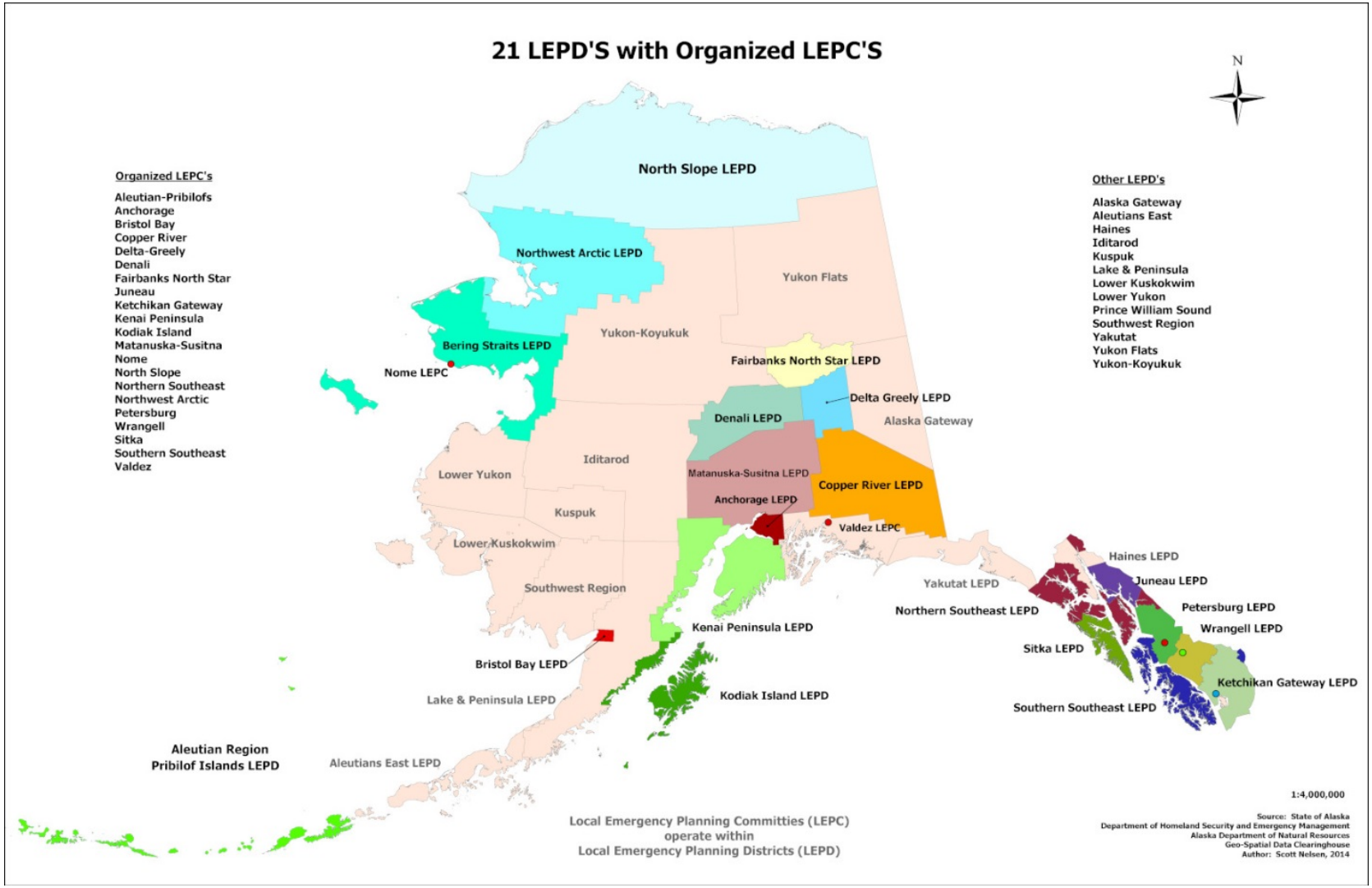
LEPC and LEPD Location Map

Local Emergency Planning Committee (LEPC) and Local Emergency Planning District (LEPD) Membership Locations



Source: https://www.ready.alaska.gov/SERC/documents/LEPC%20map.pdf

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APPENDIX 13.11 SEISMIC HAZARD SAFETY COMMISSION (SHSC) MEMBERSHIP

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SHSC Membership

Alaska Seismic Hazards Safety Commission

NAME	APPOINTED	REAPPOINTED	EXPIRES
Athey, Edward (Seward) Local Governments Representative	07/07/2017		06/30/2020
Gibbs, David (Fairbanks) Local Government Representative/Seismically Active Regions	04/05/2016	07/12/2018	06/30/2021
Gladsjo, Garret (Juneau) Public/Restricted	07/12/2018		06/30/2021
Kelly, Laura (Juneau) Federal Agency Representative	05/26/2005	07/07/2017	06/30/2020
Ruppert, Natalia (Fairbanks) University of Alaska Representative	07/12/2018		06/30/2021
Scher, Robert (Anchorage) Public/Restricted	10/26/2010	07/01/2016	06/30/2019
Shockley, Jennifer (Dutch Harbor) Local Government Representative/Seismically Active Regions	07/12/2018		06/30/2021
Stevens, De Anne (Fairbanks) DNR Representative	11/01/2015	07/01/2016	06/30/2019
Strait, Sterling (Anchorage) Public/Restricted	01/04/2017	07/07/2017	06/30/2020
Stuart, Kimberly (JBER) DMVA Representative	01/04/2017		06/30/2019
Vacant () Insurance Industry Representative			06/30/2018

Source: https://gov.alaska.gov/services/boards-and-commissions/roster/?board=208

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APPENDIX 13.12 ALASKA PARTNERSHIP FOR INFRASTRUCTURE PROTECTION (APIP)

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APIP

Mission

The Alaska Partnership for Infrastructure Protection (APIP) works to integrate the private and public sector critical infrastructure owners into the municipal, state, and federal emergency framework, participating in all stages of the disaster cycle, from preparedness and mitigation through to response and recovery. APIP's purpose is to improve Alaska's emergency management capabilities through the following:

- Resource identification, management, and sharing
- Information sharing and management
- Emergency planning and response process improvement
- Infrastructure sector characterization to understand and address vulnerabilities, dependencies, and single points of failure
- Provide awareness of physical security, cyber security, law enforcement, and antiterrorism threats
- Strengthen individual business's response capacity
- Team building and partnering for exercises
- Make recommendations for priorities of protection, support, and recovery of critical infrastructure
- Provide a safe partnership environment for Critical Infrastructure owners/operators to increase resiliency statewide

To accomplish these broad mission areas, APIP may:

- Establish infrastructure maps
- Share infrastructure information with APIP partners and other parties, as required
- Foster a planning and response environment for critical infrastructure resource holders
- Develop internal communications procedures
- Conduct various types of internal exercises and training opportunities

Schedule:

- The first meeting of the 2018-2019 Season is scheduled for Thursday, September 20, 2018

Source: https://ready.alaska.gov/APIP

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APPENDIX 13.13 BENEFIT-COST ANALYSIS (BCA) PROCESS AND SAMPLE FACT SHEET

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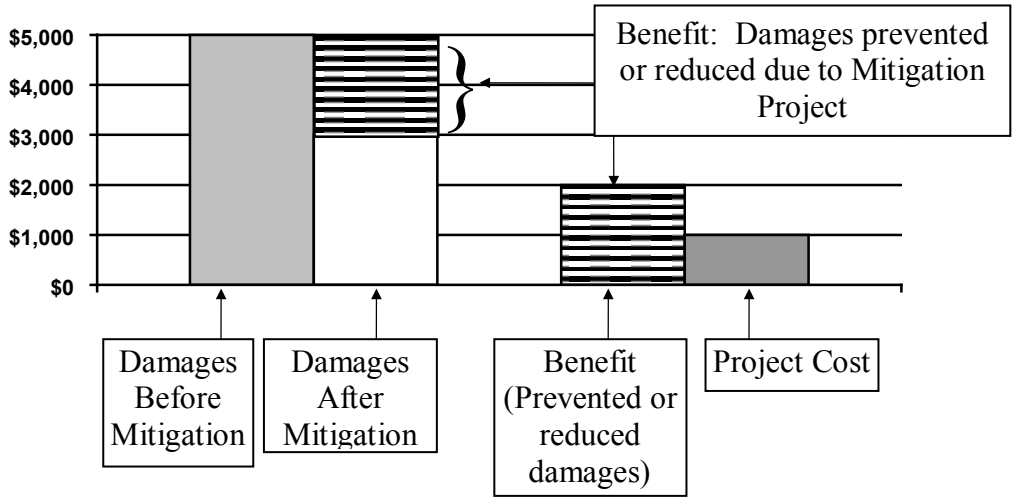
Benefit Cost Analysis Process

How to Determine Cost-Effectiveness of Mitigation Projects

When Congress enacted the Stafford Act's mitigation provisions, one of the criteria to determine priorities for mitigation funding was cost effectiveness. This cost effective provision was in response to the recognition that there would never be enough funding to completely mitigate against every hazard. To determine the cost effectiveness of proposed mitigation projects, FEMA implemented a benefit cost analysis (BCA) requirement to mitigation grant funding applications. The basic requirement of the BCA is that the benefit of the mitigation project must equal or exceed the cost, a benefit cost ratio (BCR) of 1:1 or greater. Over several years, FEMA developed a set standard values for use in BCA and custom software that establishes mitigation benefits and calculates the BCR. Benefit cost analysis submitted to FEMA to justify mitigation funding requires substantial documentation of project costs and benefits. FEMA provides the custom BCA software and training online at https://www.fema.gov/benefit-cost-analysis. An overview of the BCA process for a mitigation projects follows.



FEMA Basic Benefit-Cost Model. For more information about FEMA's Benefit-Cost Modules, please contact the FEMA Region X Mitigation Division at 425-487-4600.

It is important to understand that benefit-cost analysis is basically the same for each type of hazard mitigation project. The only differences are the types of data that are used in the calculations, depending on whether the project is for floods, earthquakes, or other natural hazards. For example, whereas the depth of flooding is used to estimate damage for flood mitigation projects, the severity of ground shaking is used to estimate damage for earthquake mitigation projects.

Calculating the Benefit – Cost Ratio

In the graph above, cost-effectiveness is determined by comparing the project cost of $1,000, to the value of damages prevented after the mitigation measure, which is $2,000. Because the dollar value of benefits exceeds the costs of funding the project, the project is cost-effective. This relationship is depicted numerically by dividing the benefits by the costs, resulting in a benefit-cost ratio (BCR). The BCR is simply a way of stating whether benefits exceed project costs, and

by how much. To derive the BCR, divide the benefits by the cost ($2,000 ÷ $1,000); if the result is 1.0 or greater, then the project is cost-effective. In this instance, the BCR is 2.0, which far exceeds the 1.0 level. On the other hand, if the cost of the project is $2,000 and the benefits are only $1,000, the project would have a BCR of 0.50 ($1,000 ÷ $2,000) and would not be cost-effective.

Conducting a benefit-cost analysis determines one of two things: either the project is cost-effective (BCR > 1.0), or it is not (BCR < 1.0). If the project is cost-effective, then no further work or analysis needs to be done, there is no third step other than to move the project to the next phase in the approval process. However, if the project is not cost-effective, then it is generally not eligible for FEMA mitigation grant funding.

There are four key elements to all benefit-cost analyses of hazard mitigation projects:

1. An estimate of damages and losses before mitigation
2. An estimate of damages and losses after mitigation
3. An estimate of the frequency and severity of the hazard causing damages (e.g., floods), and
4. The economic factors of the analysis (e.g., discount rate and mitigation project's useful lifetime)

These four key elements and their relationships to one another are detailed in the following example.

Consider a 1,500 square foot, one-story, single family residence located in the Acorn Park subdivision along Squirrel Creek. A proposed mitigation project will elevate the structure four feet at a cost of $20,000. Whether this project is cost-effective depends on the damages and losses from flooding without the mitigation project, the effectiveness of the mitigation project in reducing those damages and losses, the frequency that the house is flooded and the depth of the flood water, and the mitigation project's useful lifetime.

If the pre-mitigation damages are frequent and/or severe, then the project is more likely to be cost-effective. Even minor damage that occurs frequently can, over the life of a project, exceed the up-front costs of implementing a mitigation measure. On the other hand, if the building in the example above only flooded once, then it may not be cost-effective to elevate, unless the damages were significant in relation to the value of the structure and its contents.

Benefit Cost Analysis Fact Sheet

Hazard mitigation projects are specifically aimed at reducing or eliminating future damages. Although hazard mitigation projects may sometimes be implemented in conjunction with the repair of damages from a declared disaster, the focus of hazard mitigation projects is on strengthening, elevating, relocating, or otherwise improving buildings, infrastructure, or other facilities to enhance their ability to withstand the damaging impacts of future disasters. In some cases, hazard mitigation projects may also include training or public education programs if such programs can be demonstrated to reduce future expected damages.

A Benefit-Cost Analysis (BCA) provides an estimate of the "benefits" and "costs" of a proposed hazard mitigation project. The "benefits" considered are avoided future damages and losses that are expected to accrue as a result of the mitigation project. In other words, benefits are the reduction in expected future damages and losses (i.e., the difference in expected future damages before and after the mitigation project). The costs considered are those necessary to implement the specific mitigation project under evaluation. Costs are generally well-determined for specific projects for which engineering design studies have been completed. The timing and severity of benefits, however, must be estimated probabilistically because they depend on the improved performance of the building or facility in future hazard events.

All benefit-costs must be:

- Credible and well documented
- Prepared in accordance with accepted BCA practices
- Cost-effective (BCR $\geq$ 1.0)

General Data Requirements:

- All data entries (other than FEMA) standard or default values) <u>must</u> be documented in the application.
- Data <u>must</u> be from a credible source.
- Provide complete copies of reports and engineering analyses.
- Detailed cost estimate.
- Identify the hazard (e.g., flood, wind, seismic).
- Discuss how the proposed measure will mitigate against future damages.
- Document the project's useful life.
- Document the proposed Level of Protection.
- The Very Limited Data (VLD) BCA module cannot be used to support cost-effectiveness (screening purposes only).
- Alternative BCA software <u>must</u> be approved in writing by FEMA HQ and FEMA Region 10 staff prior to submittal of the application.

Damage and Benefit Data

- Well documented for each damage event.
- Include estimated frequency and method of determination per damage event.
- Data used in place of FEMA standard or default values <u>must</u> be documented and justified.
- The Level of Protection <u>must</u> be documented and readily apparent.

- When using the Limited Data (LD) BCA module, users cannot extrapolate data for higher frequency events for unknown lower frequency events.

Building Data

- Should include FEMA Elevation Certificates for elevation projects or projects using First Floor Elevations (FFEs).
- Include data for building type (tax records or photos).
- Contents claims that exceed 30 percent of building replacement value (BRV) must be fully documented.
- Method for determining BRVs must be documented. BRVs based on tax records must include the multiplier from the County Tax Assessor.
- Identify the amount of damage that will result in demolition of the structure (FEMA standard is 50 percent of pre-damage structure value).
- Include the site location (e.g., miles inland) for the hurricane module.

Use Correct Occupancy Data

- Design occupancy for hurricane shelter portion of tornado module.
- Average occupancy per hour for the tornado shelter portion of the tornado module.
- Average occupancy for seismic modules.

Questions to Be Answered

- Has the level of risk been identified?
- Are all hazards identified?
- Is the BCA fully documented and accompanied by technical support data?
- Will residual risk occur after the mitigation project is implemented?

Common Shortcomings

- Incomplete documentation.
- Inconsistencies among data in the application, BCA module runs, and the technical support data.
- Lack of technical support data.
- Lack of a detailed cost estimate.
- Use of discount rate other than FEMA-required amount of 7 percent.
- Overriding FEMA default values without providing documentation and justification.
- Lack of information on building type, size, number of stories, and value.
- Lack of documentation and credibility for FFEs.
- Use of incorrect project useful life (not every mitigation measure equals 100 years).

APPENDIX 13.14 DHS&EM STANDARD OPERATING PROCEDURES

Disaster Mitigation Administrative Plan
Grants Management
Progress Reporting
Financial Reporting
Project:

- Advertisement
- Intent to Apply
- Selection
- Prioritization,
- Project monitoring,
- Follow-up
- Corrective actions, etc.

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DHS&EM Disaster Mitigation Standard Operating Procedures

Introduction

This appendix captures the following DHS&EM hazard mitigation section's operational policies and procedures

1. Alaska mitigation goals and project management
2. Local hazard mitigation planning 5-year plan
3. Mitigation planning and project selection processes
4. Community warning system selection criteria
5. HMGP procedural SOPs
6. Federal disaster Joint Field Office (JFO) Mitigation Strategies

Alaska Mitigation Initiatives

Primary Hazard Focus

1. Minimize loss of life and injuries
2. Eliminate or minimize potential damages from identified hazards
3. Restore public services
4. Seek Alaska appropriate mitigation solutions

Life-Safety Focus

1. Strive to maintain or improve quality of life
2. Identify potential hazard damages or impacts
3. Protect and maintain critical facilities in functional order
4. Assist local and tribal jurisdictions with preparing an effective Hazard Mitigation Plan
5. Minimize social dislocation and post disaster stress
6. Protect government and public official from legal liability
7. Reduce economic losses

Mitigation Measures

1. Protection

To protect or minimize facility structural damage during a hazard event

- Structural/Community Protective Works
- Retrofitting or rehabilitation
- Elevation, proofing
- Critical facilities protection

2. **Prevention**

   DHS&EM encourages communities to reduce their hazard exposure by applying effective hazard reducing methods through removing threatened structures from hazard areas using:

   - Land-use planning
   - Zoning
   - Subdivision regulations
   - Building codes
   - Open space preservation
   - Acquisition, relocation, or elevation
   - Capital improvement programs
   - NFIP participation

3. **Educational**

   Educating Alaska's population concerning hazards and what can be done to protect themselves and their property using:

   - Education outreach and presentations
   - Technical assistance
   - Disclosure requirements
   - Understanding hazard warning systems
   - Hazard mapping
   - Hazard mitigation planning

Local Hazard Mitigation Planning 5 Year

State Planning Projections and Policy

Considerations / Rationale / Criteria for Selection

- History or risk of disaster damage (Disaster Cost Index, hazard and risk assessments, State Hazard Mitigation Plan, DHS&EM experience)
- Full time residents / population (threshold for inclusion approximately 100)
- Level of government: (borough, first class city, second class city, etc.)
- Community interest in mitigation planning and projects
- Significant infrastructure
- Plan will address multiple hazards which may include seismic, flood, wildland fire, coastal storms, avalanche, etc.
- Location in state (geographical grouping for contract efficient/value)
- Unplanned communities in a federally declared disaster area will be considered for immediate planning through the HMGP (7 percent for planning) program.

2018	2019	2020	2021	2022	2023
New	**New**	**New**	**New**	**New**	**New**
Seldovia Tribal	Aniak Tribal-New				
Update	**Update**	**Update**	**Update**	**Update**	**Update**
Angoon	Hydaburg	Akiakchak	Municipality of Anchorage	Petersburgh MJHMP	TBD
Gambell	Quinhagak	Akiak City	Hughes MJHMPe	Matanuska-Susitna Borough MJHMP	TBD
North Slope Borough	Kake	Tanana City	Kongignak MJHMP	Kenai	TBD
Holy Cross	New Stuyahok	Sleetmute	Nome	Tyonek MJHMP	TBD
Stebbins MJHMP	Lower Kalskag	Marhsall	White Mountain	Goodnews Bay	TBD
Eagle MJHMP	Thorne Bay	Koyuk	Point Hope MJHMP	State of Alaska SHMP	TBD
Toksook Bay	Russian Mission	Brevig Mission	Dillingham	Northwest Arctic Borough MJHMP	TBD
Whittier	Tuluksak CDP	Bettles/Evansville MJHMP	Haines Borough MJHMP	Valdez	TBD
Klawock	Scammon Bay	Chitna MJHMP	Kasaan MJHMP	Cordova MJHMP	TBD
		Copper Center MJHMP	Ketchikan MJHMP	Wasilla	TBD

Tribal Entities and Local Hazard Mitigation Planning

Funding Priorities and Policy for Mitigation Planning:

4. **Planning Initiatives**

   Mitigation planning will be done primarily through PDM

   - State managed will be funded through a state contract paid for through PDM (75 percent FEMA and 25 percent State match). This will follow the 5-year list for community planning.

   Focus of HMGP funds will be projects. Planning will be funded through HMGP on a "case-by-case" basis including:

   - Recent disaster experience makes mitigation planning a priority
   - Special community circumstances which make immediate planning advisable.

School districts in the organized boroughs will be included within their borough mitigation plan for eligibility and planning

School Districts within the Unorganized Borough will be included in the State Hazard Mitigation Plan for eligibility and planning:

5. **Plan Updates**

   Updates will ordinarily be funded through PDM or local funds not HMGP

   - Communities should show engagement ("buy in") with the planning update process through local funding, PDM 25 percent (10 percent rural and impoverished) match, local funds, direct legislative appropriations or soliciting other funds.

6. **Grant Funding for Mitigation Plan Studies**

   Studies the lead to specific, identified "brick and mortar" mitigation projects and improve the communities hazard mitigation plans will be prioritized for grant funding.

State LEPC's and Mitigation Planning:

State Local Emergency Planning Committees (LEPC's) assist with local hazard mitigation planning through:

- Providing a forum for the annual reviews of local mitigation plans within their jurisdictions
- Providing a forum for review and input when communities within their jurisdictions are undertaking hazard mitigation planning.
- Providing a forum for review and input when communities within their jurisdictions are undertaking their required 5-year hazard mitigation plan update.

Governor's Disaster Policy Cabinet

The Governor's Disaster Policy Cabinet (DPC) originated in the State Emergency Operations Plan on May 6, 1994, and was activated September 20, 1995. Its mission is to advise the Governor on topics involving the State's Emergency Management System. The members of the DPC are the Commissioners of the following departments, or as noted:

- Department of Military and Veterans Affairs (Chair)
- Department of Environmental Conservation
- Department of Natural Resources
- Department of Public Safety
- Department of Transportation and Public Facilities
- Department of Administration
- Department of Community and Economic Development
- Department of Health and Social Services
- Department of Law
- Office of Management and Budget (Director)
- Governor's Office (or GAR)
- Other departments or agencies participate as required based on the nature of event.

State Reviews of Local Mitigation Plans

Community hazard mitigation plans submitted to DHS&EM, will be reviewed within 2 weeks of receipt. Following DHS&EM review, the plan will either be returned to the community for revision or forwarded to FEMA for their review.

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Hazard Mitigation Assistance (HMA) Application Selection and Prioritization Process

General Selection Criteria

The following general criteria are used by the State Hazard Mitigation Officer (SHMO) in selecting and prioritizing applications for hazard mitigation financial assistance.

- Consistency with the goals and priorities established in the State Hazard Mitigation Plan
- Consistency with the goals and priorities established in the applicant's local Hazard Mitigation Plan
- History or risk of disaster losses in the community based upon the Alaska Disaster Cost Index, hazard and risk assessments, the State Hazard Mitigation Plan, and DHS&EM experience
- The project's role in mitigating losses to critical facilities and infrastructure
- The community's interest in mitigation planning and long-term mitigation actions
- The jurisdiction's grant compliance history
- The community's population, level of government, and ability to take independent mitigation actions

Grant Specific Selection Processes

Disaster Funded, Hazard Mitigation Grant Program (HMGP)

State mitigation team members will travel to disaster areas and search for appropriate mitigation opportunities (Public Assistance 406 Mitigation and Robert T. Stafford Disaster Relief and Emergency Assistance Act 404 Mitigation).

Following a federal disaster declaration, DHS&EM announces that HMGP funding opportunity is available statewide to local jurisdictions, IRA tribes, and state agencies. The announcement explains HMGP eligibility criteria, necessity of submitting an "Intent to Apply" form, application submittal instructions and content, and the disaster period's application submittal deadlines.

HMGP applicant briefings are held in the most appropriate declared disaster area in conjunction with FEMA and State Public Assistance (PA) briefings. HMGP briefings are provided to other potential applicants around the state as requested. Potential applicants with formally adopted and approved hazard mitigation plans and those with previously identified mitigation projects in their local hazard mitigation plans are recruited to produce HMGP applications. DHS&EM staff provide technical assistance to applicants developing their project applications.

Submitted "Intent to Apply" forms are screened by the State mitigation staff for applicant and project eligibility and feasibility. State mitigation staff assist each eligible applicant with project development while ineligible projects are guided to other resources.

Complete HMGP applications are forwarded SHMAC review. The DHS&EM guides the SHMAC with determining the merit as to how each project application's mitigation approach meets the SHMP's mitigation goals. The SHMAC then jointly ranks each project application for funding priority.

Note: *This ranking system is most needed when the number of eligible project applications exceeds available funds. Those that are not selected are filed and potentially funded when previous selected applications cannot be implemented, or when subsequent disaster grants become available.*

The SHMO submits the SHMAC's prioritized project application list to the GAR. The GAR then reviews applications and their respective ranking against State priorities and available funding, and subsequently approves for FEMA submittal.

The SHMO then submits the approved applications to FEMA for review and funding.

Non-Disaster Hazard Mitigation Assistance (HMA) Grants Including the Pre-Disaster Mitigation (PDM) Grant Program

Following the opening of FEMA's HMA Pre-Disaster Mitigation (PDM) application period, DHS&EM announces the nationally competitive PDM funding opportunity statewide to agencies, local governments, and IRA tribes. The announcement explains PDM eligibility criteria, the necessity of submitting an "Intent to Apply" form, application submittal instructions and content, and disaster period's application submittal deadlines.

The State conducts PDM briefings upon request. DHS&EM submits a State application for potential construction project applicants with previously identified mitigation projects in their local hazard mitigation plans. These applicants are recruited to produce PDM applications. PDM project applications must include as appropriate all required engineering drawings, plans, maps, and photos as well as an environmental impact statements. Applicants are provided with technical assistance throughout application development.

Submitted "Intent to Apply" forms are screened by the State mitigation staff for applicant and project eligibility, and feasibility. State mitigation staff assist each eligible applicant with project development while ineligible projects are guided to other resources.

The SHMO then submits each of the PDM sub-grant applications within the State's PDM grant application to FEMA for funding under the HMA program. FEMA reviews planning and project applications for eligibility and completeness. FEMA subsequently makes funding decisions based on the agency's priorities for the most effective use of available grant funds posted on Grants.gov and its Notice of Funds Opportunity announcement. The PDM program is a highly competitive grant program.

NOAA (Department of Commerce) Funded Grants

NOAA grant funding applications are evaluated based upon similar, general selection criteria listed above as they pertain to NOAA's specific grant programs' guidance.

State Hazard Mitigation Grants

Applications for State hazard mitigation grants are evaluated based upon the general selection criteria listed above as well as the State's specific grant program guidance. Priority is given to projects that are deemed to be effective mitigation by the SHMO and selected mitigation staff panel; potential agencies determine their viability and the project's mitigation effectiveness. The project would not be eligible for funding under FEMA grant requirements.

State Mitigation Prioritization Process

The DHS&EM's Resilience Section provides a thorough analysis of all communities based on vulnerability. The data used to assign a ranking is derived from outside sources and is not

influenced by the DHS&EM. Using "Community Score Methodology," the data base assigns a numerical value that contains 12 areas as well as the associated risk values (Figure 9-2). Those values translate to a numerical value that ranks each city and factors in the overall priority of effort for mitigation and outreach. The cities are divided into categories for priority of effort. In the highest category are those cities deemed to have significant risk. The lowest category a city can achieve is minimal risk. The ranking system provides the State with an overall picture of where to address needs within the state based on community metrics.

Prior to the database being developed the state held a State Hazard Mitigation Advisory Committee (SHMAC) meeting quarterly, as warranted, to prioritize projects. Moving forward the SHMAC will be given the priorities and asked to vote on them.

Alaska Remote Community Challenges:

DHS&EM strives to address Alaska's remote community challenges during grant application development by ensuring communities:

- Describe their specific challenges associated with shipping goods to their location such as severe weather conditions, barging, port availability, community access, river navigability, distance, materials costs, experienced labor costs, outside area payroll rate requirements etc.
- Address geographical separation, minimal road access combined with bridges (they allow safe travel across large rivers, but also create barriers if they are destroyed by hazard impacts such as earthquakes or flooding damages).
- Describe as appropriate how the community is distressed or located in an imperiled area of the state.
- Describe any language barriers, need for translation into native languages, or any limiting capacity such as qualified office staffing, office staff or leadership turn-over, or an extremely transient population.
- Describe if the jurisdiction, tribe, and/or impoverished community is unable to generate funds to enable them to meet project cost (25 percent) matching.

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Alaska Local Community Warning Siren System Plan
August 2018

Tsunami Community Selection Criteria

Distant Tsunami Threat as determined by UAF/GI and NTWC

Rationale: The greatest need for a warning system exists in the event of a distant/off-shore seismic event which creates a wave that travels from a distance to inundate on-shore (distant tsunami). In this case the earthquake generating the tsunami may be felt lightly or not at all. In this case the only warning of an impending tsunami will be from NTWC. In contrast, in a locally produced tsunami, the earthquake is felt in the community and that earthquake must serve as the primary tsunami warning as the time to wave impact can be very short.

Order of Community Selection

- High distant tsunami threat
- Medium distant tsunami threat
- Low distant tsunami threat

Population at risk - density and profiles

*Rationale: C*ommunicating the warning is critical to effective tsunami evacuation and communities that are spread out and/or have significant numbers of tourists have greater difficulty in communicating warnings. "Spread out" communities are determined by using available community maps and DCCED data. "Significant numbers of tourists" are determined by using DCCED data, community data and DHS&EM staff knowledge.

System type: While cohesive communities, rural, isolated communities may be served by a simple siren warning system, communities with significant tourist populations are best served by a warning system that enables voice and multi-tone alerts.

Current warning system – operational and effectiveness

Rationale: Communities in high threat areas, which have warning systems that do not work or do not provide community coverage.

Non –Tsunami "Remote Community" Selection Criteria

Community threat would be diminished by installation of a warning system:

Purpose: The greatest need for a warning system exists in the event of a no-notice or short-notice community hazard.

Hazards for Community Selection

- Community fire
- Ice jam release flooding
- Wildland fire
- Dam burst or rapid inundation flooding
- Hazardous materials (HAZMAT) release

Funding for warning system unlikely through another source and community size makes local funding unrealistic

> ***Note:*** *an annual community warning system survey was initiated in the winter of 2009. Survey results are used to assess community siren system needs.*

Warning Siren System Status and Future Plan

Community	Primary Tsunami Hazard	Status	Installation Date	Funded by
Chignik Bay	Distant	Complete	Installed 2006	NTHMP
Perryville	Distant	Complete	Installed 2006	NTHMP
KPB/Homer (5 sites)	Distant	Complete	Installed 2008	HMGP
KPB/Nanwalek	Distant	Complete	Installed 2008	HMGP
KPB/Port Graham	Distant	Complete	Installed 2008	HMGP
KPB/Seldovia	Distant	Complete	Installed 2008	HMGP
KPB/Seward (6 sites)	Distant/Local	Complete	Installed 2008	HMGP
Valdez (2 sites)	Distant/Local	Complete	Installed 2007	NTHMP
Valdez (7 sites)	Distant/Local	Complete	Installed 2009	SHSP
Kenai Pen Borough	Tsunami	Complete	Installed 2009	NTHMP
Cordova (2 sites)	Distant	Complete	Installed 2014	NTHMP
Sand Point	Distant	Complete	Installed 2009	NTHMP
Sitka	Distant	Complete	Installed 2009	NTHMP
Sitka (9 sites)	Distant	Complete	Installed 2009	SHSP
Yakutat	Distant	Complete	Installed 2009	NTHMP
Whittier	Distant	Complete	Installed 2009	NTHMP
St. Paul	Distant	Complete	Installed 2010	RCASP
King Cove	Distant	Complete	Installed 2010	NTHMP
Port Alsworth – L&P	All Hazard	Complete	Installed 2010	RCASP
Akutan	Distant	Complete	Installed 2010	NTHMP
Cold Bay	Distant	Complete	Installed 2010	NTHMP
Atka	Distant	Complete	Installed 2010	RCASP
Nikolski	Distant	Complete	Installed 2010	RCASP
Adak	Distant	Complete	Installed 2010	RCASP
Savoonga	All Hazard	Complete	Installed 2010	RCASP
KIB/Old Harbor	Distant	Complete	Installed 2010	NTHMP
KIB/Akhiok	Distant	Complete	Installed 2010	RCASP
KIB/Ouzinkie	Distant	Complete	Installed 2010	RCASP
KIB/Larsen Bay	Distant	Complete	Installed 2011	RCASP
KIB/Karluk	Distant	Complete	Installed 2011	NTHMP
Kake	Tsunami	Complete	Installed 2010	NTHMP
Port Lions	Distant	Complete	Installed 2012	NTHMP
Saint George	Distant	Complete	Installed 2011	NTHMP
Petersburg	Local	Complete	Installed 2016	NTHMP
Craig	Distant	Complete	Installed 2014	NTHMP
Kassan	Distant	Complete	Installed 2017	NTHMP
Ketchikan	Distant	Complete	Installed 2014	NTHMP
Klawock	Distant	Complete	Installed 2013	NTHMP
Tatitlek	Distant	Complete	Installed 2011	NTHMP
Chenega	Distant	Complete	Installed 2011	NTHMP
Port Alexander	Distant	TBD		
Elfin Cove	Distant	TBD		

HMGP Procedure & Schedule after a Disaster

Schedule

HMGP Application Development Timeline

Timeline Post Declaration	Description
60 Days After	Organize a SHMAC teleconference to provide a disaster declaration "overview" that covers the disaster, HMGP dates, and overall State priorities
4 months after	DHS&EM publicizes HMGP funding availability
6 months	HMGP "Intent to Apply" forms are due
Within 1 month following "Intent to Apply" form due date	DHS&EM offers FEMA BCA training to potential applicants
7 months	SHMAC reviews the HMGP funding available under the disaster and the funding "Lock-in Report"
9 months	Final HMGP applications are due
3 weeks following the HMGP application deadline	Organize a SHMAC teleconference to review and prioritize final HMGP applications
3 weeks following the SHMAC	DHS&EM present SHMAC prioritized applications to GAR for review and authorization for FEMA submittal
11 months	Submit HMGP applications to FEMA

Community affected by disaster

- Fund new hazard mitigation plan or plan update for community: (HMGP 7 percent for planning)
- Develop 2-5 hazard mitigation projects for the community: (FEMA)
- Apply HMGP funds to incomplete PA and 406 mitigation projects.

Federally Declared Disaster JFO Mitigation Strategies

Future Mitigation Strategies for Federally Declared Disasters

7. State Mitigation Planning and Hazard Analysis

1. Produce Level 2 or above HAZUS studies for the disaster area including seismic, flood, etc.
2. Capture spatial data and attributes from disaster sites including:
   - High water marks
   - Seismic faulting
   - First floor elevation determination
   - Ownership of infrastructure and facilities
3. Review and assess any previous mitigation projects in the affected communities:
   - Project location (address, GPS lat/long)
   - Project description
   - Project funding mechanism
   - Project effectiveness

8. Community Outreach

1. With the Preliminary Damage Assessment (PDA) and all IA and PA teams, send appropriate education and outreach materials including:
   - Fact sheets appropriate to the disaster including:
     - Flood – mold mitigation instructions
     - Power interruption – CO and generator safety
   - Success stories
     - Rebuilding/ mitigation instructions specific to the disaster hazard.
     - Hazard mitigation guides including Flood, Seismic and Landslide
2. Seek JFO reproduction of:
   - "Spencer and the Volcano" book
   - "James and the Wildfire" book
3. Produce radio, TV, multimedia, and web-based Public Service Announcements (PSAs) and mitigation materials for Alaska communities in the disaster area:
   - "How to rebuild your damaged home to prevent future damage from a similar event."
   - Mitigation success stories

9. Mitigation Training and Education

1. Request training for the State mitigation team and communities (as appropriate) in the following mitigation tools:
   - NEMIS
   - Benefit Cost Analysis (BCA)
   - Mitigation planning workshop for updating mitigation plans

2. Request a "Flood Management 101" course for State staff and community participants that includes:

   Basics of flood plain terminology

   Flood plain map reading

   Basics of flood plain management

   Basics of hydraulics and hydrology (H&H) including what is needed in the scope of work for an effective H&H study

10. Coordination with FEMA PA

1. Require a copy of all FEMA PA project worksheets with actual or potential 406 mitigation, to be provided to the State mitigation team.
2. Require that FEMA PA 406 mitigation projects be written up with enough detail to produce a 404 (HMGP) mitigation project if the 406 portion is not funded.
3. Capture data on facilities and infrastructure in the disaster area including:

   Ownership: (e.g., who owns the road: state, community, BIA)

   Location: (address and GPS Lat/long)

   Damaged facility photos

   Descriptions
4. Require FEMA PA staff to be alert for potential 404 mitigation project opportunities and when found to write them up fully for project application including:

   Scope of work

   Cost estimate

   Photos labeled with exactly what the damage in the area was and what mitigation is needed.

   GPS (Lat/Long)

   Measurements

   Project details, description, etc.
5. Develop a report sheet for instructions and to capture the information
6. Ask that FEMA JFO mitigation staff produce a binder and electronic files, prior to the JFO closing, with all the information relating to and requested by mitigation from PA including:

   Each actual and potential 406 and 404 mitigation project listed

   - Each project listing should include the full details equal to the items listed in # 3 above

   Critical facility and infrastructure data

11. Mitigation Project Development

1. Ask that FEMA JFO produce a mitigation project handbook / CDs / MS Word forms and training customized for Alaska that includes:

   Project templates for specific hazards

   Sample applications

   Procedures and resources for developing:

- The scope of work
- The project budget
- The required project and BCA documentation
- Environmental and historical permitting and clearances
- Project engineering

2. Ask that the JFO develop a customized Alaskan boardwalk mitigation strategy that includes:

   The best methods for boardwalk mitigation (new wood-like materials, etc.)

   Methods for clearing the environmental and historical requirement
3. Ask that the JFO research and document potential methods for FEMA mitigation funding of seismic assessments lead to mitigation projects in public schools.
4. Ask that the FEMA JFO provide for the full HMA grant application development for any repetitive loss properties in the declared disaster areas including:

   Completing AW-501 forms

   All items listed under #1
5. Ask that the JFO update and produce current project applications for any community mitigation projects that were previously studied and developed but not funded.

12. Severe Weather Related Disaster

1. Request a JFO produced "point paper" on avalanche that covers the following topics:

   What other states are doing to mitigate against avalanche risk including:

   - Avalanche mitigation projects
   - Outreach and training
   - Forecasting

   How HMGP funding has been used for avalanche mitigation projects.

APPENDIX 13.15 2008 FEMA HMP GUIDANCE FOR THE UNORGANIZED BOROUGH

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U.S. Department of Homeland Security
500 C Street, SW
Washington, DC 20472

FEMA

November 17, 2006

MEMORANDUM FOR: Carl L. Cook, Jr.
Director
Flood Insurance and Mitigation Division

FROM: for David I. Maurstad
Director
Mitigation Division

SUBJECT: Clarification of 44 CFR Part 201 Mitigation Plan requirements for communities within the unorganized Borough in Alaska

RE: Carl L. Cook, Jr letter dated October 12, 2006, same subject

Per your request, I am providing clarification on the hazard mitigation plan requirements for the unincorporated communities and Alaskan Indian Reorganization Act villages located within Alaska's Unorganized Borough. Since these communities do not have governing nor adoption authority as required by 44 CFR Part 201, the State of Alaska may act on their behalf for the purposes of this regulation.

By State statute, the State of Alaska is the governing body for these communities and native villages. Therefore, the unincorporated entities in the Unorganized Borough may be included in the adopted State Hazard Mitigation Plan as entities of the State. The State must develop an annex to their State Mitigation Plan that specifically covers these communities and villages. The State of Alaska may use the concept of "other State agencies" and "multi-jurisdictional plans" in developing this annex. At a minimum the annex must: 1) include all entities covered by the plan, 2) demonstrate local participation, 3) identify any risks unique to each entity, and 4) propose mitigation actions applicable to each entity.

To summarize this clarification of policy:

- It applies to the unincorporated communities and villages located in the Unorganized Borough in Alaska.
- The communities must be specifically addressed in the State plan. The State may assist or take leadership in the development of the hazard assessments and mitigation strategies to be included in the state plan annex.
- The annex for communities in unorganized boroughs must be updated every three years along with the State Hazard Mitigation Plan.

- The State must be both the Grantee and Sub-grantee for any mitigation grants to these named villages.

Please note that the inclusion of these communities in the approved State mitigation plan, as outlined above, would provide eligibility to apply for mitigation project grants and does not indicate eligibility of the specific action identified within the plan for FEMA grant funding. Project grant applications must be evaluated individually by the State and FEMA according to the specific eligibility and other requirements of the particular hazard mitigation grant program.

Please communicate this clarification with the State of Alaska. If you or the State of Alaska have any questions, please contact Karen Helbrecht of my staff by telephone at (202) 646-3358.

U.S. Department of Homeland Security
500 C Street, SW
Washington, DC 20472

mc

FEMA

July 8, 2008

MEMORANDUM FOR: Mark Carey
Director
Mitigation Division
FEMA Region X

FROM: David I. Maurstad
Director
Mitigation Division

SUBJECT: Clarification of 44 CRF Part 201 Mitigation Plan requirements for communities within the unorganized Borough in Alaska

This memorandum provides clarification on the hazard mitigation plan requirements for the unincorporated communities and Alaskan Indian Reorganization Act villages located within Alaska's Unorganized Borough. This supersedes the November 17, 2006 memorandum "Clarification of 44 CFR Part 201 Mitigation Plan requirements for communities within the unorganized Borough in Alaska."

Since these communities do not have governing nor adoption authority as required by 44 CFR Part 201, the State of Alaska may act on their behalf for the purposes of this regulation. By State statute, the State of Alaska is the governing body for these communities and native villages. Therefore, the unincorporated entities in the Unorganized Borough may be included in the adopted State Mitigation Plan as entities of the State or may participant in a Local Mitigation Plan, which is adopted by the State.

In the first option, the State must develop an annex to their State Mitigation Plan that specifically covers these communities and villages. The State of Alaska may use the concept of "other State agencies" and "multi-jurisdictional plans" in developing this annex. At a minimum the annex must: 1) include all entities covered by the plan, 2) demonstrate local participation, 3) identify any risks unique to each entity, and 4) propose mitigation actions applicable to each entity.

In the second option, an unincorporated entity in the Unorganized Borough may participate in a single jurisdictional or multi-jurisdictional Local Mitigation Plan, which must be adopted by the State of Alaska. In this case, the plan must: 1) demonstrate local

participation, 2) meet all requirements of 44 CFR §201.6, and 3) be adopted by the State of Alaska.

To summarize this clarification of policy:

- It applies to the unincorporated communities and villages located in the Unorganized Borough in Alaska.
- The communities must be specifically addressed in the State Mitigation Plan or in a Local Mitigation Plan, either single or multi jurisdictional.
- The State may assist or take leadership in the development of the hazard assessments and mitigation strategies to be included in the State Mitigation Plan annex or Local Mitigation Plan.
- The State of Alaska is recognized as the adopting authority for an annex to the State Mitigation Plan and any Local Mitigation Plans for these communities.
- The State Mitigation Plan annex for communities in the Unorganized Borough must be updated every three years along with the State Mitigation Plan, whereas Local Mitigation Plans must be updated every 5 years based upon the plan's approval date.
- The State must be both the Grantee and Sub-grantee for any mitigation grants to these named villages.

Please note that the inclusion of these communities in the approved State Mitigation Plan or Local Mitigation Plans, as outlined above, would provide eligibility to apply for mitigation project grants and does not indicate eligibility of the specific actions identified within the plans for FEMA grant funding. Project grant applications must be evaluated individually by the State and FEMA according to the specific eligibility and other requirements of the particular hazard mitigation grant program.

Please communicate this clarification with the State of Alaska. If you or the State of Alaska have any questions, please contact Karen Helbrecht of my staff by telephone at (202) 646-3358

APPENDIX 13.16 2018 SMALL AND IMPOVERISHED COMMUNITY DETERMINATION

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Alaska's Small and Impoverished Community Determination Qualification Process

HMA Cost Share Guide (FEMA 2016): https://www.fema.gov/media-library-data/1463766664964-4e6dd22652cb7c8a6162904f3b1b2022/FinalHMACostShareGuide508.pdf

The Federal Emergency Management Agency (FEMA) offers three Hazard Mitigation Assistance (HMA) grant programs: the Hazard Mitigation Grant Program (HMGP), the Pre-Disaster Mitigation (PDM) Program, and the Flood Mitigation Assistance (FMA) Program. All share the common goal of reducing the risk of loss of life and property due to natural hazards. However, they have different funding authorization conditions, application time periods, and non-Federal cost share contribution requirements. In general, HMA funds may be used to pay up to 75 percent of eligible costs. The remaining 25 percent of eligible costs is derived from non-Federal sources. The non-Federal contribution must be used for an eligible cost in direct support of eligible mitigation activities under the applicable regulations (Title 44 of the Code of Federal Regulations [CFR] Sections 79.6 and 206.434), HMA Guidance, and the Federal award. Contributions of cash and donated resources, or any combination thereof, can be used for the non-Federal cost share. Table 1 provides an overview of Federal and non-Federal cost share requirements for the HMA programs.

Table 1: HMA Project Cost Share Requirements by Program

HMA Programs	Percent of Share Federal/Non-Federal
Hazard Mitigation Grant Program (HMGP) provides funds to States, territories, federally-recognized tribes, local governments, and eligible private nonprofits following a Presidential major disaster declaration.	75/25
Pre-Disaster Mitigation (PDM) is a competitive grant program with an annual Congressional appropriation. PDM provides funds to States, territories, federally-recognized tribes, and local governments.	75/25
*PDM – if the subapplicant or Applicant fits the definition of a **small impoverished community***	*90/10*
Flood Mitigation Assistance (FMA) provides funds to mitigate National Flood Insurance Program–insured properties and has an annual appropriation from the National Flood Insurance Fund. FMA provides funds to States, territories, federally-recognized tribes, and local governments.	75/25
*FMA – if the project mitigates a **repetitive loss property***	*90/10*
*FMA – if the project mitigates a **severe repetitive loss property***	*100/0*

Typically, the Applicant or subapplicant requires those who would benefit from the mitigation project (homeowners, businesses, nonprofit organizations, or local communities) to provide the non-Federal cost share of the mitigation activity. However, in some cases, Applicants (the States or tribes) or subapplicants will provide some or all of the non-Federal cost share. Ultimately, it is the Applicant's responsibility to ensure that all cost share contributions are met…

Small and Impoverished Community (for the PDM program only): *Small and impoverished communities may receive a Federal cost share of up to 90 percent of the total amount approved under the Federal award to implement eligible approved mitigation activities in accordance with the Stafford Act. A small impoverished community must:*

Be a community of 3,000 or fewer individuals identified by the Applicant as a rural community that is not a remote area within the corporate boundaries of a larger city or jurisdictional area or boundary
Be economically disadvantaged, with residents having an average per capita annual income not exceeding 80 percent of the national per capita income, based on best available data. For the most current information on the national income, see http://www.bea.gov/.
Have a local unemployment rate that exceeds by 1 percentage point or more the most recently reported, average yearly national unemployment rate. For the most current unemployment information, see https://www.bls.gov/eag/eag.us.htm " (FEMA 2016).

Note: *DHS&EM uses the U.S. Census Factfinder's Census data and interim estimates and compares these data against the Alaska's Department of Labor's and the Department of Community, Commerce and Education Development's (DCCED) most recent certified or estimated population data. The most current data is then submitted to FEMA Region Ten's Regional Administrator for review. The RA then determines how applicants will meet non-federal cost share requirements.*

Sample HMP Small and Impoverished Community Determination
(Community Comparisons to National Criteria)

Community	Plan Type	Population	Population =/<3,000	Community Per Capita Income	Per Capita Income < 80% Nat'l Income = $xx,xxx	Community Unemployment %	Community Unemployment Rate (%) = >1% of Nat'l Rate (Yes/No)	Qualifies as S&I (Yes/No)
National Average:		>3,000	(Yes/No)	N/A	$29,829*.8<= **$23,863** Comm =< $23,863 (Yes/No)	201x Nat'l 9.2%	**7.4*1.01=7.474%** Comm.=>7.474% (Yes/No)	
Community 1	MJHMP	558	Yes	36,746	No	12%	Yes	No
Community 2	THMP	496	Yes	23,018	Yes	11.20%	Yes	Yes
Community 3	MJHMP	140	Yes	33,518	No	0%	No	No
Etc.								

APPENDIX 13.17 EXISTING LOCAL AND TRIBAL HAZARD MITIGATION PLAN LIST (UPDATED ANNUALLY)

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Local and Tribal HMP Summary

Local or Multi-Jurisdictional Hazard Mitigation Plans

Approved	*Pending Adoption*	*Awaiting Revision*	*In-Progress*	*Expired*	*Total*
134	25	10	8	58	235

Tribal HMPs Hazard Mitigation Plans

Approved	*Pending Adoption*	*Awaiting Revision*	*In-Progress*	*Expired*	*Total*
38	9	5	5	0	57

August 2018 Alaska Local Hazard Mitigation Plan Status

Plan Title	Plan Status	Community Name	Jurisdiction Type	Expiration Date
Akiachak Native Village Hazard Mitigation Plan	Approved	Akiachak ANVSA	Alaska Native Village	9/6/2018
Akiak City	Expired	Akiak city	City	6/20/2018
Alakanuk City	Approvable Pending Adoption	Alakanuk city	City	
Alatna Tribal Hazard Mitigation Plan	Approvable Pending Adoption	Alatna ANVSA	Alaska Native Village	
Aleut Community of St. Paul Island Tribal Mitigation Plan	Plan in Progress	St. Paul ANVSA	Alaska Native Village	
Aleutians East Borough	Expired - Plan in Progress	Akutan city	City	6/25/2015
Aleutians East Borough	Expired	Aleutians East Borough	Organized Borough	6/25/2015
Aleutians East Borough	Expired	Cold Bay city	City	6/25/2015
Aleutians East Borough	Expired	False Pass city	City	6/25/2015
Aleutians East Borough	Expired	King Cove city	City	6/25/2015
Aleutians East Borough	Expired	Nelson Lagoon ANV	Alaska Native Village	6/25/2015
Aleutians East Borough	Expired	Sand Point city	City	6/25/2015
Allakaket City	Expired	Allakaket city	City	4/12/2015
Allakaket (City of) and Allakakeet Village Hazard Mitigation Plan	Approvable Pending Adoption	Allakaket ANVSA	Alaska Native Village	
Allakaket (City of) and Allakakeet Village Hazard Mitigation Plan	Approvable Pending Adoption	Allakaket city	City	
Alutiiq Tribe of Old Harbor Tribal Mitigation Plan	Plan in Progress	Old Harbor ANVSA	Alaska Native Village	
Anchorage Municipality All Hazards Mitigation Plan	Approved	Anchorage municipality	Municipality	4/10/2022
Angoon City	Expired	Angoon city	City	2/28/2017
Angoon Native Village	Plan in Progress	Angoon ANVSA	Alaska Native Village	
Aniak City	Approved	Aniak city	City	12/8/2020
Anvik City	Expired	Anvik city	City	4/12/2015
Atmautluak HMP	Approved	Atmautluak	Unincorporated	11/2/2020
Atmautluak HMP	Approved	Atmautluak ANVSA	Alaska Native Village	11/2/2020
Bethel City Hazard Mitigation Plan	Approvable Pending Adoption	Bethel city	City	

Existing Local HMPs
(As of August 2018)

August 2018 Alaska Local Hazard Mitigation Plan Status				
Plan Title	**Plan Status**	**Community Name**	**Jurisdiction Type**	**Expiration Date**
Bettles City	Approvable Pending Adoption	Bettles city	City	
Brevig Mission City	Approved	Brevig Mission city	City	5/23/2019
Bristol Bay Borough Hazard Mitigation Plan	Approved	Bristol Bay Borough	Organized Borough	4/12/2023
Cheesh'na Tribal Mitigation Plan (Chistochina Native Village)	Plan in Progress	Chistochina ANVSA	Alaska Native Village	
Chefornak City	Approved	Chefornak city	City	7/25/2019
Chevak City	Awaiting Revisions	Chevak city	City	
Chevak City	Expired	Chevak city	City	9/22/2016
Chickaloon Native Village Tribal Mitigation Plan	Approvable Pending Adoption	Chickaloon ANVSA	Alaska Native Village	
Chitina HMP	Approved	Chitina	Unincorporated	11/20/2020
Chitina HMP	Approved	Chitina ANVSA	Alaska Native Village	11/20/2020
Chuathbaluk MJ Hazard Mitigation Plan	Approved	Chuathbaluk ANVSA	Alaska Native Village	5/7/2023
Chuathbaluk MJ Hazard Mitigation Plan	Approved	Chuathbaluk city	City	5/7/2023
Circle CDP	Approved	Circle	Unincorporated	7/23/2019
Cordova City	Approved	Cordova city	City	5/22/2023
Craig City	Approvable Pending Adoption	Craig city	City	
Craig Tribal Mitigation Plan	Approved	Craig ANVSA	Alaska Native Village	9/21/2021
Delta Junction City and Deltana CDP	Approved	Delta Junction city	City	8/1/2023
Delta Junction City and Deltana CDP	Approved	Deltana	Unincorporated	8/1/2023
Denali Borough	Expired	Anderson city	City	5/27/2015
Denali Borough	Expired	Denali Borough	Organized Borough	5/27/2015
Dillingham City HMP	Approved	Dillingham city	City	9/20/2021
Diomede City and Native Village	Awaiting Revisions	Diomede ANV	Alaska Native Village	
Diomede City and Native Village	Awaiting Revisions	Diomede city	City	
Eagle City and Eagle Native Village Hazard Mitigation Plan	Approved	Eagle ANVSA	Alaska Native Village	10/14/2019
Eagle City and Eagle Native Village Hazard Mitigation Plan	Approved	Eagle city	City	10/14/2019
Eek City	Approved	Eek city	City	9/11/2019
Elim City	Approved	Elim city	City	5/27/2019
Emmonak City	Approved	Emmonak city	City	11/20/2019
Evansville Native Village Local Mitigation Plan	Approved	Evansville ANV	Alaska Native Village	5/14/2023
Eyak ANV Hazard Mitigation Plan	Awaiting Revisions	Eyak ANV	Alaska Native Village	
Fairbanks Northstar Borough	Approved	Fairbanks city	City	10/8/2019
Fairbanks Northstar Borough	Approved	Fairbanks North Star Borough	Organized Borough	10/8/2019
Fairbanks Northstar Borough	Approved	North Pole city	City	10/8/2019
Fort Yukon City Hazard Mitigation Plan	Approved	Fort Yukon city	City	1/10/2023
Gambell City	Expired	Gambell city	City	3/14/2017
Glenallen CDP	Expired	Glennallen	Unincorporated	9/8/2016

August 2018 Alaska Local Hazard Mitigation Plan Status

Plan Title	Plan Status	Community Name	Jurisdiction Type	Expiration Date
Golovin (City of) and Chinik Eskimo Community Hazard Mitigation Plan	Approved	Chinik Eskimo Community	Alaska Native Village	12/21/2020
Golovin (City of) and Chinik Eskimo Community Hazard Mitigation Plan	Approved	Golovin city	City	12/21/2020
Goodnews Bay (City and Village of)	Approved	Goodnews Bay AKNV	Alaska Native Village	5/31/2023
Goodnews Bay (City and Village of)	Approved	Goodnews Bay city	City	5/31/2023
Grayling HMP	Approved	Grayling ANV	Alaska Native Village	12/21/2020
Grayling HMP	Approved	Grayling city	City	12/21/2020
Gulkana CDP	Approved	Gulkana	Unincorporated	2/13/2019
Haines Borough	Approved	Haines Borough	Organized Borough	3/14/2021
Holy Cross City	Approved	Holy Cross city	City	11/7/2018
Hoonah City	Approved	Hoonah city	City	5/14/2023
Hooper Bay City	Approved	Hooper Bay ANVSA	Alaska Native Village	11/4/2020
Hooper Bay City	Approved	Hooper Bay city	City	11/4/2020
Houston, City of, LHMP	Approved	Houston city	City	4/23/2023
Hughes City and ANV Multi-Jurisdictional Hazard Mitigation Plan	Approved	Hughes ANVSA	Alaska Native Village	9/13/2021
Hughes City and ANV Multi-Jurisdictional Hazard Mitigation Plan	Approved	Hughes city	City	9/13/2021
Huslia City	Awaiting Revisions	Huslia city	City	
Huslia City	Expired	Huslia city	City	2/23/2015
Hydaburg City	Expired	Hydaburg city	City	10/18/2016
Hydaburg Cooperative Association Tribal Mitigation Plan	Plan in Progress	Hydaburg ANVSA	Alaska Native Village	
Juneau City and Borough	Expired	Juneau city and borough	Organized Borough	9/11/2017
Kake City	Expired	Kake city	City	10/14/2016
Kaltag City and ANV	Approvable Pending Adoption	Kaltag ANV	Alaska Native Village	
Kaltag City and ANV	Approvable Pending Adoption	Kaltag city	City	
Kasaan City of/ Village of Kasaan Hazard Mitigation Plan	Approved	Kasaan city	City	11/8/2022
Kasaan City of/ Village of Kasaan Hazard Mitigation Plan	Approved	Organized Village of Kasaan	Alaska Native Village	11/8/2022
Kenai Peninsula Borough Multi-Jurisdictional Hazard Mitigation Plan	Approved	Homer city	City	7/22/2019
Kenai Peninsula Borough Multi-Jurisdictional Hazard Mitigation Plan	Approved	Kenai Peninsula Borough	Organized Borough	7/22/2019
Kenai Peninsula Borough Multi-Jurisdictional Hazard Mitigation Plan	Approved	Soldotna city	City	7/22/2019
Ketchikan Gateway Borough	Approved	Ketchikan city	City	1/11/2022
Ketchikan Gateway Borough	Approved	Ketchikan Gateway Borough	Organized Borough	1/11/2022
Ketchikan Gateway Borough	Approved	Saxman city	City	1/11/2022

Existing Local HMPs
(As of August 2018)

August 2018 Alaska Local Hazard Mitigation Plan Status				
Plan Title	**Plan Status**	**Community Name**	**Jurisdiction Type**	**Expiration Date**
Kipnuk ANV	Approved	Kipnuk	Alaska Native Village	5/30/2023
Kipnuk CDP	Approved	Kipnuk	Unincorporated	9/6/2018
Kivalina City	Approved	Kivalina city	City	11/20/2020
Klawock City	Expired	Klawock city	City	10/14/2016
Kluti-Kaah HMP	Approved	Copper Center	Unincorporated	12/8/2020
Kluti-Kaah HMP	Approved	Copper Center ANVSA	Alaska Native Village	12/8/2020
Kluti-Kaah HMP	Approved	Native Village of Kluti-Kaah	Alaska Native Village	12/8/2020
Kodiak Island Borough	Expired	Akhiok city	City	4/7/2011
Kodiak Island Borough	Expired	Kodiak city	City	4/7/2011
Kodiak Island Borough	Expired	Kodiak Island Borough	Organized Borough	4/7/2011
Kodiak Island Borough	Expired	Larsen Bay city	City	4/7/2011
Kodiak Island Borough	Expired	Old Harbor city	City	4/7/2011
Kodiak Island Borough	Expired	Ouzinkie city	City	4/7/2011
Kodiak Island Borough	Expired	Port Lions city	City	4/7/2011
Kongiganak HMP	Approved	Kongiganak ANVSA	Alaska Native Village	11/20/2020
Kongignak HMP	Approved	Kongignak	Unincorporated	11/20/2020
Kotlik City	Approved	Kotlik city	City	12/5/2018
Kotzebue City	Approved	Kotzebue city	City	12/29/2019
Koyuk HMP	Approved	Koyuk city	City	10/14/2019
Koyukuk City	Expired	Koyukuk city	City	10/3/2013
Kwethluk City	Expired	Kwethluk city	City	2/23/2015
Kwigillingok HMP	Approved	Kwigillingok	Unincorporated	12/8/2020
Kwigillingok HMP	Approved	Kwigillingok ANVSA	Alaska Native Village	12/8/2020
Lake and Peninsula Borough	Approved	Chignik city	City	11/4/2020
Lake and Peninsula Borough	Approved	Egegik city	City	11/4/2020
Lake and Peninsula Borough	Approved	Lake and Peninsula Borough	Organized Borough	11/4/2020
Lake and Peninsula Borough	Approved	Newhalen city	City	11/4/2020
Lake and Peninsula Borough	Approved	Nondalton city	City	11/4/2020
Lake and Peninsula Borough	Approved	Pilot Point city	City	11/4/2020
Lake and Peninsula Borough	Approved	Port Alsworth	Unincorporated	11/4/2020
Lake and Peninsula Borough	Approved	Port Heiden city	City	11/4/2020
Louden Tribal and City of Galena Multi-Jurisdictional Hazard Mitigation Plan	Approved	Galena city	City	9/8/2020
Louden Tribal and City of Galena Multi-Jurisdictional Hazard Mitigation Plan	Approved	Louden Tribal Council	Alaska Native Village	9/8/2020
Lower Kalskag City	Approved	Lower Kalskag city	City	10/29/2018
Marshall HMP	Approved	Marshall city	City	11/5/2019
Matanuska-Susitna Borough	Approved	Matanuska-Susitna Borough	Organized Borough	11/7/2018
McGrath City	Expired	McGrath city	City	2/26/2014
McGrath City and Tribe	Awaiting Revisions	McGrath ANV	Alaska Native Village	
McGrath City and Tribe	Awaiting Revisions	McGrath city	City	
Mekoryuk HMP	Approved	Mekoryuk ANVSA	Alaska Native Village	11/4/2020
Mekoryuk HMP	Approved	Mekoryuk city	City	11/4/2020
Metlakatla Native Village Tribal Mitigation Plan	Plan in Progress	Metlakatla Indian Community	Alaska Native Village	

August 2018 Alaska Local Hazard Mitigation Plan Status

Plan Title	Plan Status	Community Name	Jurisdiction Type	Expiration Date
Mountain Village City	Approvable Pending Adoption	Mountain Village city	City	
Napakiak City	Approved	Napakiak city	City	8/12/2023
Napakiak City	Expired	Napakiak city	City	9/8/2016
Napaskiak HMP	Approved	Napaskiak ANV	Alaska Native Village	12/29/2019
Napaskiak HMP	Approved	Napaskiak city	City	12/29/2019
Nenana City	Approvable Pending Adoption	Nenana city	City	
New Stuyahok City	Expired	New Stuyahok city	City	1/25/2017
Newtok HMP	Approved	Newtok ANVSA	Alaska Native Village	10/26/2020
Nightmute HMP	Approved	Nightmute ANVSA	Alaska Native Village	12/8/2020
Nightmute HMP	Approved	Nightmute city	City	12/8/2020
Nome City	Approved	Nome city	City	2/1/2022
North Slope Borough	Approved	Anaktuvuk Pass city	City	9/21/2021
North Slope Borough	Approved	Atqasuk city	City	9/21/2021
North Slope Borough	Approved	Barrow city	City	9/21/2021
North Slope Borough	Approved	Kaktovik city	City	9/21/2021
North Slope Borough	Approved	North Slope Borough	Organized Borough	9/21/2021
North Slope Borough	Approved	Nuiqsut city	City	9/21/2021
North Slope Borough	Approved	Point Hope city	City	9/21/2021
North Slope Borough	Approved	Point Lay ANV	Alaska Native Village	9/21/2021
North Slope Borough	Approved	Wainwright city	City	9/21/2021
Northwest Arctic Borough	Expired	Ambler city	City	6/8/2014
Northwest Arctic Borough	Expired	Buckland city	City	6/8/2014
Northwest Arctic Borough	Expired	Deering city	City	6/8/2014
Northwest Arctic Borough	Expired	Kiana city	City	6/8/2014
Northwest Arctic Borough	Expired	Kobuk city	City	6/8/2014
Northwest Arctic Borough	Expired	Noorvik city	City	6/8/2014
Northwest Arctic Borough	Expired	Northwest Arctic Borough	Organized Borough	6/8/2014
Northwest Arctic Borough	Expired	Selawik city	City	6/8/2014
Northwest Arctic Borough	Expired	Shungnak city	City	6/8/2014
Nulato City	Expired	Nulato city	City	1/13/2015
Nulato City and ANV	Awaiting Revisions	Nulato ANV	Alaska Native Village	
Nulato City and ANV	Awaiting Revisions	Nulato city	City	
Nunam Iqua City	Approved	Nunam Iqua city	City	8/21/2022
Nunapitchuck HMP	Approvable Pending Adoption	Nunapitchuk City	City	
Petersburg Borough Hazard Mitigation Plan	Approved	Petersburg city	City	6/13/2023
Pilot Station City	Approvable Pending Adoption	Pilot Station city	City	

Existing Local HMPs
(As of August 2018)

August 2018 Alaska Local Hazard Mitigation Plan Status				
Plan Title	**Plan Status**	**Community Name**	**Jurisdiction Type**	**Expiration Date**
Pilot Station City	Expired	Pilot Station city	City	9/23/2015
Quinhagak City	Expired	Quinhagak city	City	1/25/2017
Red Devil CDP	Expired	Red Devil	Unincorporated	9/12/2013
Ruby City	Approved	Ruby city	City	3/28/2023
Russian Mission City	Approved	Russian Mission city	City	10/18/2018
Saint Mary's City	Expired	St. Mary's city	City	2/16/2015
Saint Mary's City and Native Villages	Approvable Pending Adoption	Alqaaciq	Alaska Native Village	2/15/2015
Saint Mary's City and Native Villages	Approvable Pending Adoption	St. Mary's city	City	2/15/2015
Saint Mary's City and Native Villages	Approvable Pending Adoption	Yupiit of Andreafski	Alaska Native Village	2/15/2015
Saint Paul City HMP	Approved	St. Paul city	City	12/31/2020
Savoonga City	Expired	Savoonga city	City	1/25/2017
Scammon Bay City	Approved	Scammon Bay city	City	10/31/2018
Seldovia City HMP	Approved	Seldovia city	City	5/14/2023
Shaktoolik City	Approved	Shaktoolik ANVSA	Alaska Native Village	9/23/2020
Shaktoolik City	Approved	Shaktoolik city	City	9/23/2020
Shishmaref City	Approved	Shishmaref city	City	9/8/2020
Sitka City and Borough	Plan in Progress	Sitka city and borough	Organized Borough	
Sitka City and Borough	Expired	Sitka city and borough	Organized Borough	4/20/2015
Skagway Municipality	Plan in Progress	Skagway Municipality	Municipality	
Skagway Municipality	Expired	Skagway Municipality	Municipality	12/30/2014
Sleetmute CDP	Approved	Sleetmute	Unincorporated	2/13/2019
State of Alaska	Approved	Alaska	State/District/Territory	10/26/2018
Stebbins City	Approved	Stebbins city	City	12/5/2018
St. George HMP	Approved	St. George city	City	7/23/2020
St. Michael City	Approved	St. Michael city	City	12/5/2018
Tanacross CDP	Expired	Tanacross	Unincorporated	8/8/2018
Tanana City & ANV	Approvable Pending Adoption	Tanana ANVSA	Alaska Native Village	
Tanana City & ANV	Approvable Pending Adoption	Tanana city	City	
Teller City	Approved	Teller city	City	1/15/2023
Thorne Bay City	Expired	Thorne Bay city	City	1/25/2017
Tikigaq - Point Hope Tribal Mitigation Plan	Awaiting Revisions	Point Hope ANVSA	Alaska Native Village	
Togiak City	Awaiting Revisions	Togiak city	City	
Togiak City	Expired	Togiak city	City	2/16/2015
Tok CDP	Approvable Pending Adoption	Tok	Unincorporated	
Tok CDP	Expired	Tok	Unincorporated	8/19/2014
Toksook Bay City	Approved	Toksook Bay city	City	10/14/2019
Tuluksak CDP	Expired	Tuluksak	Unincorporated	8/8/2018
Tuntutuliak HMP	Approved	Tuntutuliak	Unincorporated	11/4/2020
Tuntutuliak HMP	Approved	Tuntutuliak ANVSA	Alaska Native Village	11/4/2020
Tununak HMP	Approved	Tununak	Unincorporated	11/4/2020
Tununak HMP	Approved	Tununak ANVSA	Alaska Native Village	11/4/2020

August 2018 Alaska Local Hazard Mitigation Plan Status

Plan Title	Plan Status	Community Name	Jurisdiction Type	Expiration Date
Tyonek AKNV	Approved	Tyonek AKNV	Alaska Native Village	3/11/2023
Unalakleet City	Approved	Unalakleet ANVSA	Alaska Native Village	12/21/2020
Unalakleet City	Approved	Unalakleet city	City	12/21/2020
Unalaska City	Approved	Unalaska city	City	12/5/2018
Unalaska City and Tribe	Approvable Pending Adoption	Unalaska ANVSA	Alaska Native Village	
Unalaska City and Tribe	Approvable Pending Adoption	Unalaska city	City	
Upper Kalskag City	Approved	Upper Kalskag city	City	12/5/2018
Valdez City	Awaiting Revisions	Valdez city	City	
Valdez City	Expired	Valdez city	City	6/27/2013
Wales HMP	Approvable Pending Adoption	Wales ANVSA	Alaska Native Village	
Wales HMP	Approvable Pending Adoption	Wales city	City	
Wasilla City	Approvable Pending Adoption	Wasilla city	City	
Wasilla City	Expired	Wasilla city	City	8/2/2017
White Mountain MJHMP	Approved	White Mountain ANV	Alaska Native Village	1/28/2023
White Mountain MJHMP	Approved	White Mountain city	City	1/28/2023
Whittier City	Approved	Whittier city	City	5/2/2019
Wrangell City and Borough	Expired	Wrangell city and borough	Organized Borough	1/21/2015
Yakutat City and Borough HMP	Approved	Yakutat City and Borough	Organized Borough	12/21/2020

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Existing Tribal HMPs
(As of August 2018)

August 2018 Alaska Tribal HMP Status

Plan Title	Plan Status	Community Name	Plan Update Number	APA Date	Expiration Date
Akiachak Native Village Hazard Mitigation Plan	Approved	Akiachak ANVSA	1	8/21/2013	9/6/2018
Alatna Tribal Hazard Mitigation Plan	Approvable Pending Adoption	Alatna ANVSA	2	8/28/2017	
Allakaket (City of) and Allakakeet Village Hazard Mitigation Plan	Approvable Pending Adoption	Allakaket ANVSA	2	7/24/2018	
Saint Mary's City and Native Villages	Approvable Pending Adoption	Alqaaciq	1	7/25/2018	2/15/2015
Angoon Native Village	Plan in Progress	Angoon ANVSA	0		
Atmautluak HMP	Approved	Atmautluak ANVSA	0	9/13/2015	11/2/2020
Chickaloon Native Village Tribal Mitigation Plan	Approvable Pending Adoption	Chickaloon ANVSA	0	6/28/2018	
Golovin (City of) and Chinik Eskimo Community Hazard Mitigation Plan	Approved	Chinik Eskimo Community	2	10/24/2015	12/21/2020
Cheesh'na Tribal Mitigation Plan (Chistochina Native Village)	Plan in Progress	Chistochina ANVSA	0		
Chitina HMP	Approved	Chitina ANVSA	0	10/9/2015	11/20/2020
Chuathbaluk MJ Hazard Mitigation Plan	Approved	Chuathbaluk ANVSA	0	3/19/2018	5/7/2023
Kluti-Kaah HMP	Approved	Copper Center ANVSA	0	9/18/2015	12/8/2020
Craig Tribal Mitigation Plan	Approved	Craig ANVSA	2	9/12/2016	9/21/2021
Diomede City and Native Village	Awaiting Revisions	Diomede ANV	0		
Eagle City and Eagle Native Village Hazard Mitigation Plan	Approved	Eagle ANVSA	1	6/25/2014	10/14/2019
Evansville Native Village Local Mitigation Plan	Approved	Evansville ANV	1	4/27/2018	5/14/2023
Eyak ANV Hazard Mitigation Plan	Awaiting Revisions	Eyak ANV	0		
Goodnews Bay (City and Village of)	Approved	Goodnews Bay AKNV	0	4/5/2018	5/31/2023
Grayling HMP	Approved	Grayling ANV	0	10/24/2015	12/21/2020
Hooper Bay City	Approved	Hooper Bay ANVSA	2	10/15/2015	11/4/2020
Hughes City and ANV Multi-Jurisdictional Hazard Mitigation Plan	Approved	Hughes ANVSA	1	7/9/2016	9/13/2021
Hydaburg Cooperative Association Tribal Mitigation Plan	Plan in Progress	Hydaburg ANVSA	0		
Kaltag City and ANV	Approvable Pending Adoption	Kaltag ANV	1	7/5/2018	
Kipnuk ANV	Approved	Kipnuk	1	4/26/2018	5/30/2023
Kongiganak HMP	Approved	Kongiganak ANVSA	0	9/13/2015	11/20/2020
Kwigillingok HMP	Approved	Kwigillingok ANVSA	0	9/13/2015	12/8/2020

August 2018 Alaska Tribal HMP Status

Plan Title	Plan Status	Community Name	Plan Update Number	APA Date	Expiration Date
Louden Tribal and City of Galena Multi-Jurisdictional Hazard Mitigation Plan	Approved	Louden Tribal Council	2	7/27/2015	9/8/2020
McGrath City and Tribe	Awaiting Revisions	McGrath ANV	1		
Mekoryuk HMP	Approved	Mekoryuk ANVSA	0	10/25/2015	11/4/2020
Metlakatla Native Village Tribal Mitigation Plan	Plan in Progress	Metlakatla Indian Community	0		
Napaskiak HMP	Approved	Napaskiak ANV	0	8/26/2014	12/29/2019
Kluti-Kaah HMP	Approved	Native Village of Kluti-Kaah	0	9/18/2015	12/8/2020
Aleutians East Borough	Expired	Nelson Lagoon ANV	1	3/31/2010	6/25/2015
Newtok HMP	Approved	Newtok ANVSA	2		10/26/2020
Nightmute HMP	Approved	Nightmute ANVSA	0	10/25/2015	12/8/2020
Nulato City and ANV	Awaiting Revisions	Nulato ANV	1		
Alutiiq Tribe of Old Harbor Tribal Mitigation Plan	Plan in Progress	Old Harbor ANVSA	0		
Kasaan City of/ Village of Kasaan Hazard Mitigation Plan	Approved	Organized Village of Kasaan	0		11/8/2022
Tikigaq - Point Hope Tribal Mitigation Plan	Awaiting Revisions	Point Hope ANVSA	0		
North Slope Borough	Approved	Point Lay ANV	2	2/11/2016	9/21/2021
Shaktoolik City	Approved	Shaktoolik ANVSA	2	8/17/2015	9/23/2020
Aleut Community of St. Paul Island Tribal Mitigation Plan	Plan in Progress	St. Paul ANVSA	0		
Tanana City & ANV	Approvable Pending Adoption	Tanana ANVSA	1	5/11/2018	
Tuntutuliak HMP	Approved	Tuntutuliak ANVSA	0	10/25/2015	11/4/2020
Tununak HMP	Approved	Tununak ANVSA	0	9/13/2015	11/4/2020
Tyonek AKNV	Approved	Tyonek AKNV	0	12/22/2017	3/11/2023
Unalakleet City	Approved	Unalakleet ANVSA	2		12/21/2020
Unalaska City and Tribe	Approvable Pending Adoption	Unalaska ANVSA	1	7/26/2018	
Wales HMP	Approvable Pending Adoption	Wales ANVSA	0	10/25/2015	
White Mountain MJHMP	Approved	White Mountain ANV	0	12/19/2017	1/28/2023
Saint Mary's City and Native Villages	Approvable Pending Adoption	Yupiit of Andreafski	1	7/25/2018	2/15/2015

APPENDIX 13.18 2018 DISASTER COST INDEX (CURRENT AS OF JUNE 2018)

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DISASTER COST INDEX

PURPOSE OF THE DISASTER COST INDEX

The purpose of this index is to establish a summary of State funds expended on disaster relief since the creation by the Alaska Legislature of the Division of Homeland Security and Emergency Management (DHS&EM) formerly the Division of Emergency Services. Much of the information contained in this index is readily available from other sources; the intention of this index is to bring this information together in a single source in order to provide the user with an immediate and ready reference regarding the cost of disasters to the State of Alaska. For numerous disasters, the accounts are still open, and it may be anticipated that the amount of expenditures for each category will change as assistance is provided and additional funds are expended.

TIME FRAME OF INDEX: JUNE 10, 1977 TO PRESENT

The decision to begin the index on June 10, 1977, is to a certain extent an arbitrary decision. This date marks the effective date of the Alaska Disaster Act. Obviously, disasters occurred in the state prior to that date and State funds were expended on disaster relief prior to this Act. But the Alaska Disaster Act established the mechanism of providing State assistance, which is currently in effect, and so beginning an index at this point provides a continuous monitor of expenditures since the adoption of the mechanism currently in use for providing State disaster assistance.

SCOPE OF INDEX: STATE EXPENDITURES

This index is limited in scope to State funds expended subsequent to a proclamation by the governor of a disaster emergency. These expenditures are categorized according to two types of assistance, which the Alaska Disaster Act provides subsequent to a governor's proclamation: public assistance to communities and political subdivisions for the purpose of restoring essential public services, and assistance provided to individuals and families. The index does not provide an indication of all public and private funds expended for the purpose of disaster relief. In many of the incidents included in the index other federal and private or volunteer organizations had the authority and did provide assistance (e.g., Small Business Administration, American Red Cross). Moreover, the Alaska Disaster Act requires that subsequent to a disaster incident, the state expend first those funds regularly appropriated to the affected state and local entities. If these funds are sufficient to alleviate the situation, there is no resulting proclamation by the governor and it is not necessary to draw from the Governor's Disaster Relief Fund (A.S. 26.23.300). This index therefore does not include all State funds expended in response to natural or manmade disasters, but is limited to those funds expended from the Governor's Disaster Relief Fund subsequent to a Proclamation of a Disaster Emergency. In addition to indicating the distinction between public assistance and assistance to individuals and families, this index indicates expenditures by DHS&EM for the administrative costs related to providing assistance to the affected residents and communities.

SUMMARY OF THE ALASKA DISASTER ACT (A.S. 26.23.010)

The Alaska Disaster Act, which was approved by the governor on June 9, 1977, and which became effective the following day, establishes the mechanism whereby the State of Alaska provides assistance to individuals and communities within the state who suffer damage due to natural or man-made peacetime disasters. The act grants the governor authority to declare that a disaster emergency exists "if he finds that a disaster has occurred or that such an occurrence is imminent." The Act defines a "disaster" as "the loss of life or property resulting from any natural or non-military manmade cause including but not limited to, fire, flood, earthquake, landslides, mudslides, avalanche, wind-driven water, weather condition, tsunami, oil spill or other water contamination requiring emergency action to avert danger or damage, volcanic activity, epidemic, air contamination, blight, infestation, explosion, riot, equipment failure, or shortage of food, water, fuel or clothing."

EFFECT OF DISASTER EMERGENCY PROCLAMATION: DISASTER ASSISTANCE

Besides granting the governor certain emergency powers, the act permits the State to provide assistance to the

affected communities and individuals without prior approval by the Alaska Legislature. The funds necessary to provide this assistance are drawn from the Governor's Disaster Relief Fund established by A.S. 26.23.300. In general, State assistance permitted by the Act falls into two broad categories: public assistance provided in the form of grants to communities to enable them to restore essential services, individual assistance in the form of temporary housing, and grants to individuals and families of up to $5,000.00 to enable them to repair or replace essential items damaged or destroyed by the disaster incident. Public assistance includes repair or replacement of buildings, levees, flood control works, channels, irrigation works, streets, roads, bridges, equipment and other public works except those used for only recreational purposes. This type of assistance is not necessarily limited to local governments. Essential public utilities, for instance, may receive public assistance even if they are owned and operated by private concerns.

Besides these two categories of assistance, the Act provides for State assistance to communities for the purpose of debris clearance if such clearance is necessary for health and sanitation purposes, and it provides for disaster loans to both individuals and communities.

In general, the Act intends to provide State assistance to a community and its residents that will enable the community to return to its pre-disaster condition. It thus contemplates replacement in kind with allowances for such incidental improvement as is necessary to comply with minimum adequate codes or standards of present day construction. With respect to grants to individuals and families, the intent of the Act is to repair or replace only those items deemed essential for the well-being of the affected party, and again to assist the affected party to return only to pre-disaster condition.

ROLE OF THE ALASKA DIVISION OF HOMELAND SECURITY AND EMERGENCY MANAGEMENT

The Alaska Disaster Act created DHS&EM under the Department of Military and Veterans' Affairs. A.S. 26.23.040 prescribes duties and powers of DHS&EM which demonstrate the intent of the legislature to establish a centralized office for the direction and coordination of the state's emergency management activities. These activities include the development and carrying out of the procedures to effectively employ the disaster relief funds made available under the governor's authority. The director of DHS&EM makes a recommendation to the governor to assist a community by determining whether an incident is of sufficient magnitude to warrant the Proclamation of a Disaster Emergency; he recommends the type and amount of assistance necessary to restore the community to its pre-disaster condition, and acting on behalf of the governor, the director carries out the administrative functions related to actually providing the assistance approved by the governor. Besides these responsibilities, the Act assigns to DHS&EM numerous duties related to disaster preparedness and civil defense.

DISASTER EMERGENCIES INCLUDED IN THE INDEX

Between the effective date of the Alaska Disaster Act (June 10, 1977), and at the time of this writing, a total of 190 events of sufficient magnitude to warrant a Proclamation of Disaster Emergency by the governor have occurred. On eight occasions, the West Coast Storm (1979), Kodiak (1980), Southeast Alaska Storm (1984), the Wainwright School Fire (1987), Valdez Oil Spill (1989), the Anchorage/Kenai Peninsula Flooding (1989), the Bristol Bay Fish Failure (1997), and the Western Alaska Fish Disaster (1998) the governor requested that the president declare a major disaster, which would have provided federal assistance in accordance with Public Law 93-288. However, these requests were denied by the FEMA Region 10 director, acting on behalf of the president. On eight other occasions, the Arctic Slope Storm of (1986), the October flooding in Southcentral Alaska of (1986), the Barrow School Fire of (1988), Omega Block Cold Spell (1989), Spring Breakup Flooding (1989), Spring Breakup Flooding (1991), the Southcentral Fall Floods (1995), and the Miller's Reach Fire (1996), the president declared major disasters, providing federal payment of up to 75 percent of the assistance provided. On two occasions, Statewide Fires (1990), and the Miller's Reach Fire (1996) the FEMA authorized federal payment of up to 70 percent of fire expenditures that exceeded the average annual fire management budget. On one occasion, the 1994 Koyukuk Flood, the president authorized federal payment of up to 85 percent of the assistance provided.

In the federally declared disasters, and on several other occasions, federal assistance was also provided through the Army Corps of Engineers' emergency assistance programs, and the Federal Highway Administration. The Small Business Administration provided low interest disaster loans.

In other non-federally declared disasters various other forms of federal assistance has been provided such as loans through the Small Business Administration, disaster assistance through the Department of Agriculture, economic assistance through the Magnuson Stevens Act and assistance through the Federal Highway Administration.

The following incidents were determined by the governor to constitute Disaster Emergencies from the period of June 10, 1977 to present.

1. The Village of Karluk, January 21, 1978: As a result of a winter storm which struck Kodiak Island, wind driven waves broke over the top of a spit in Karluk and ultimately cut a channel through the spit. The storm destroyed a bridge connecting the mainland portion of the village with the spit, and thus isolated the only store and the post office from the rest of the community. The waves also washed away a 10,000 gallon fuel storage tank which provided the village's only fuel supply, and destroyed all but about 1,500 gallons of fuel. Loss of electric power destroyed frozen food stocks in the store and the owner subsequently went out of business. The loss of the bridge prevented some school children from walking from their homes to school, and in addition the new channel formed by the storm undercut the bank and threatened the village's community hall and an RCA antenna, as well as two private residences. In response to this Disaster Emergency, the State provided public assistance to restore the bridge and replace the village's fuel storage facility. A number of threatened houses were moved to safer locations. The Corps of Engineers conducted bank stabilization operations which alleviated the threat to the community hall and RCA antenna.

2. Campbell Creek (Anchorage), February 10, 1978: On this occasion the Governor proclaimed a Disaster Emergency as a result of flooding and glaciation in the south fork of Campbell Creek in Anchorage which affected an area bounded by East 8Oth Avenue, Spruce Avenue, Lake Otis Parkway, and Abbott Loop Road, threatening a number of homes in the area with water and ice, and contamination of surface and subsurface water. Public assistance was provided through private contractors and resources of the Alaska Department of Transportation (DOT) in order to thaw the stream bed and allow the water to flow and to remove the ice which had overflowed the creek's bank. Most of the property owners in the area were insured, and thus no form of assistance to individuals and families was necessary.

3. Wrangell/Craig, November 6, 1978: During this period an intense storm occurred in the Wrangell/Craig area in Southeastern Alaska generating high winds, torrential rains and heavy sea waves. The storm caused considerable damage to both private and public property in the two communities. Subsequent to the Governor's Proclamation of Disaster Emergency, DHS&EM provided both public assistance and assistance to individuals and families to assist the communities in recovering from the disaster. SBA made disaster loans available to affected businesses and homeowners.

4. Matanuska-Susitna Borough, February 9, 1979: As a result of a winter storm generating high winds and drifting snow, many roads in the Matanuska-Susitna Borough were rendered impassable to all traffic, including emergency vehicles. DOT was tasked by DHS&EM and public assistance was provided to clear the roads; the Alaska National Guard conducted rescue operations to provide to isolated and stranded individuals. Subsequent to the Governor's request, the Small Business Administration made disaster loans available to some 44 residents and 24 businesses which suffered damage as a result of the storm. The State did not make any direct grants to individuals or families.

5. Delta Fire, June 18, 1979: During the period from May to June of 1979, abnormally dry weather resulted in over 200 wild forest and grassland fires in the interior of Alaska. At that time the Alaska Department of Natural Resources (DNR) was conducting its fire suppression activities with funds contained in a special account created by the Legislature in 1978 in the amount of $750,000. When these funds were depleted, the Governor proclaimed a Disaster Emergency in order to permit the immediate transfer of funds from the Disaster Relief Fund to DNR's Fire Suppression Fund. This transfer thus represents public assistance provided through DHS&EM to a State agency, the Department of Natural Resources. In part as a result of this Disaster Emergency Proclamation and the depletion of DNR's Fire Suppression Fund, the Alaska Legislature increased the fund to $5,000,000 in 1980-81, and again to $9,000,000 in 1982. No assistance to individuals and families was provided as a result of this incident.

6. West Coast Storm, November 23, 1979: A major sea storm on the west coast of Alaska caused extensive damage in 14 villages in the area. The Governor proclaimed a Disaster Emergency effective from Sheldon Point to Togiak. At the request of the Governor, the SBA authorized disaster loans to affected individuals and businesses, and the State provided grants to individuals and families as well as some public assistance related to a fuel spill at Togiak.

7. Willow Creek, December 20, 1979: Abnormal weather conditions, caused by a combination of extreme debris jams, abnormal temperature variations and glaciation caused flooding of Willow Creek in the Matanuska-Susitna Borough, rendering roads in the area impassable and threatening homes.

8. Kodiak Island, February 5, 1980: The Governor proclaimed a Disaster Emergency subsequent to an intense winter storm which caused extensive damage to public and private properties on Kodiak Island during January and February of 1980. The storm caused damage to port facilities, docks and shoreline roadways in Kodiak, harbor facilities at Port Lions and Ouzinkie, and breakwaters at Old Harbor and Akhiok. On the day of his proclamation, the Governor requested that the President declare a Major Disaster in the area, but after an on-site inspection by officials of FEMA, this request was denied. The State provided disaster assistance for repair of the damaged public facilities. No grant assistance was provided to individuals and families.

9. Anchorage Windstorm, April 4, 1980: The Governor proclaimed a Disaster Emergency subsequent to a hurricane force windstorm which caused damage to over 5,000 residences and businesses in the Anchorage area and parts of the Matanuska-Susitna Borough. Though most of the residents were insured against their losses, the State provided a number of Individual and Family Grants and temporary housing, as well as public assistance to the Municipality. In addition, the SBA made disaster loans available to affected individuals.

10. Bristol Bay, September 2, 1980: Following a storm which generated high winds and heavy sea waves, causing damage to the equipment of numerous commercial fishermen, canneries and approximately 15 to 20 private houses, the Governor proclaimed a Disaster Emergency extending from Dillingham to Port Heiden. The State provided both public assistance to communities and grants to individuals and families; the SBA provided disaster loans to residents of the area. In addition, the State provided temporary housing assistance to one of the residents who were forced to relocate due to damage to his home.

11. Copper Center, December 11, 1980: A Disaster Emergency was proclaimed as a result of flooding of the Klutina River at Copper Center due to extreme cold temperatures combined with lack of snow insulation and a high volume of water flow in the river. All structures in the area were threatened, including the Fire Hall. Public assistance was provided by DHS&EM to alleviate the situation and prevent damage. A major portion of the Disaster Relief Funds were provided to the Alaska Department of Transportation for the purpose of conducting drainage operations and performing the work necessary to recommence the normal flow of the river. No funds were necessary for grants to individuals and families.

12. Angoon, June 8, 1981: In May 1981, the community of Angoon experienced a catastrophic failure of its submerged water main resulting in a failure of the water system, the sewer system, and the

interruption of firefighting capabilities in the area. The Governor's Proclamation of a Disaster Emergency enabled DHS&EM to provide the community with the funds necessary to repair these systems and restore these services. Only public assistance was provided as damage to individual and family properties was not sufficient to warrant the institution of an Individual and Family Grant Program.

13. Southcentral Alaska Rainstorm, July 22, 1981: A torrential rainstorm resulted in widespread flooding, stream over flow and damage to bridges and culverts in South-central Alaska. This condition made travel hazardous throughout the region and in some cases roads were impassable to all traffic, including emergency vehicles. The Governor's Proclamation of a Disaster Emergency enabled DHS&EM to provide the affected communities with immediate recovery assistance, resulting in the restoration of the area's transportation system. No direct assistance was provided to individuals and families.

14. Emmonak, February 12, 1982: On February 7, 1982, a catastrophic fire destroyed the safe water facility in the community of Emmonak, situated at the mouth of the Yukon River, resulting in a shortage of potable water, causing a health hazard, and forcing the closure of schools. The Governor's Proclamation of a Disaster Emergency enabled DHS&EM to provide the community with the public assistance necessary to replace the destroyed facility.

15. Fort Yukon, May 17, 1982: In May of 1982, ice jams, excessive stream flow and abnormal temperature variations resulted in flooding in the community of Ft. Yukon located at the juncture of the Porcupine and Yukon rivers. The flood resulted in extensive damage to public and private property and forced the dislocation of several hundred residents. The Governor's Proclamation of a Disaster Emergency enabled DHS&EM to draw on the Disaster Relief Fund to provide both public assistance and grants to individuals and families. In addition to State assistance, SBA made disaster loans in the area and the American Red Cross provided assistance using the organizations' Disaster Relief Fund.

16. Russian Mission, Akiak, Akiachak, October 1, 1982: During September of 1982, severe windstorms generating high waves caused extensive damage in the villages of Russian Mission, Akiak and Akiachak. The Governor proclaimed a Disaster Emergency to exist in the three villages and the State, through DHS&EM, provided both public assistance and grants to individuals and families in the affected villages.

17. Takotna, December 2, 1982: The Governor proclaimed a Disaster Emergency following a catastrophic fire at Takotna which destroyed the village's generator/equipment shop and storage facility. As a result of the fire, there was no electricity in the village, and heavy equipment necessary to maintain the airstrip and roads was damaged or destroyed. The Governor's proclamation provided public assistance from the Disaster Relief Fund to replace these facilities and equipment.

18. Kipnuk, April 1, 1983: During the winter of 1982, the bridge connecting the village of Kipnuk with the community school was damaged by high water and ice flows, and thus rendered unsafe for use. The Governor's Proclamation of Disaster Emergency enabled the State to provide public assistance in order to replace the bridge. At the time the Alaska Department of Transportation was able to provide a bridge that was surplus to its needs. Disaster Relief Funds were used to reimburse the Alaska National Guard for expenses incurred in transporting the bridge to the village.

19. Aniak, June 15, 1983: Flooding during spring break-up caused by ice jams and excessive stream flow resulted in damage to a public roadway and a number of public buildings in Aniak. Several families were forced to temporarily relocate due to high water. The Governor's Proclamation of a Disaster Emergency provided public assistance for the purpose of restoring the roadway to its pre-disaster condition. No assistance was provided for individuals and families.

20. City of Ketchikan, August 29, 1983: On August 27, 1983, a ferry mishap occurred in the City of Ketchikan which caused damage to the ferry dock on Gravina Island. The dock is needed for transport of fuel and supplies, as well as emergency fire support, between the city and the airport. The Governor's Proclamation of a Disaster Emergency enabled the State to provide temporary alternate transport capabilities using manpower and equipment of the Alaska National Guard. Public assistance from the Disaster Relief

Fund will defray in part the expenses involved in the use of this personnel and equipment.

21. Cordova, September 16, 1983: The Governor proclaimed a Disaster Emergency after a flash flood generated by heavy rainfall destroyed portions of a pipeline system which provides the City of Cordova with, approximately 60% of its water supply. Public assistance was provided for the purpose of repairing the city's water system.

22. Chefornak, November 17, 1983: As a result of failure of the primary electrical generator, the city was without power. Public assistance was granted to purchase and install a new generator.

23. Unalakleet, March 5, 1984: Extreme cold for a period of 6-7 weeks caused a drastic reduction in the city water supply and eventual freezing of a major loop on the city water system. Public assistance has granted to repair/replace portions of the water system.

24. Mountain Village, March 8, 1984: Circumstances about the same as that in Unalakleet. Public assistance granted to repair/replace one loop of the city water system.

25. Elim, March 9, 1984: A reduction in water from the village source resulted in freezing and rupture in portions of the water and sewer system. Public assistance was granted to replace frozen portions of the water system and to assist in repairing service lines.

26. Kotzebue, April 30, 1984: The Governor declared a Disaster Emergency after prolonged cold weather caused freezing and ruptures in the city water system. A public assistance categorical grant was awarded to replace damaged portions of the system.

27. Cold Bay, May 5, 1984: Equipment failure of a private utility left the City of Cold Bay without electricity. Due to the critical needs of the residents, the Governor declared a Disaster Emergency to allow DHS&EM to transport a State-owned generator to the city for use on a temporary basis.

28. Alakanuk, June 13, 1984: Ice jam caused flooding caused extensive damage to the village road system. Subsequent to the Governor's Proclamation, the State awarded a categorical grant to the city to repair the roads.

29. Emmonak, June 15, 1984: The city requested disaster assistance to repair minor flood damage to a road. The State's categorical grant covered the cost of material to repair the road. The village provided manpower and equipment.

30. Cold Bay, July 31, 1984: In Cold Bay, the owner of the private electrical utility was unwilling to make the repairs necessary to provide reliable service to residents. The Governor's Declaration of Disaster Emergency authorized a disaster loan that assisted a buyer in purchasing the company.

31. Russian Mission, August 9, 1984: The Governor declared a Disaster Emergency after a fire destroyed the city power plant in Russian Mission. The State awarded a categorical grant to replace the plant.

32. Southeast Alaska, November 26, 1984: A hurricane force windstorm and wind driven tides caused extensive damage to public and private property in five Southeast Alaskan communities. The State provided public and individual assistance grants and temporary housing in Juneau, Sitka, Kake, Angoon and Tenakee Springs. SBA provided disaster loan assistance and the American Red Cross made grants to meet immediate needs of victims. The Governor's request for a Presidential declaration was denied.

33. Haines, January 25, 1985: After prolonged and excessive rainstorms caused permanent damage to the city sewer system, the Governor proclaimed a Disaster Emergency to provide funds to repair the system through a categorical public assistance grant.

34. Savoonga, February 26, 1985: The Governor proclaimed a Disaster Emergency to repair damage caused by freezing to the village water and sewer system in Savoonga. A categorical grant provided funds to repair the system.

35. Gambell, May 17, 1985: Unanticipated needs for fuel in Gambell throughout the winter depleted stocks in the village before re-supply by barge was possible. Since the freight charges of air resupply were prohibitive for residents, the Governor declared a Disaster Emergency to pay freight charges through a public assistance grant to the City.

36. Buckland, May 30, 1985: Flooding of the Buckland River caused damage to public roads and public and private buildings in Buckland. The Governor's declaration provided a State grant to repair public property. American Red Cross disaster relief programs gave assistance to individuals and families.

37. Kobuk, May 30, 1985: Ice moving through the village when the Kobuk River overflowed its banks caused damage to the city-owned fuel storage and distribution center. The Governor's declaration resulted in a categorical public assistance grant to repair the facility and replace lost fuel.

38. Anvik, June 5, 1985: Flooding of the Yukon River caused damage to city roads and private property. The Governor's declaration provided a categorical grant to repair the roads. American Red Cross granted assistance to individuals and families.

39. Emmonak, June 11, 1985: The Governor declared a Disaster Emergency after flooding caused damage to city roads. A categorical grant provided funds to assist in repairing the roads.

40. Pilot Station, June 18, 1985: Flooding of the Yukon River damaged several city-owned buildings: a lodge, day care center, television station and warehouse. Subsequent to the Governor's declaration, the State provided a categorical grant to repair these facilities. American Red Cross provided assistance for individuals and families.

41. Upper Kuskokwim River, June 18, 1985: The Governor signed a combined declaration to assist the communities of McGrath, Sleetmute and Red Devil in repairing flood damage to roads. In McGrath and Sleetmute, categorical grants assisted in restoring the roads to pre-disaster condition. The community of Red Devil elected to utilize a flexible funding option to construct an alternate road in a less hazardous location.

42. Pitka's Point, July 9, 1985: Pans of river ice moving with flood waters destroyed the sewer leach field serving the village safe water facility and elementary school. A public assistance grant provided funds to replace the leach field.

43. Bethel, July 10, 1985: High water accompanying breakup of the Kuskokwim River caused erosion damage at the city petroleum dock and washout of fill at the end of the seawall. Undercutting of river bank also threatened eight private residences. The Governor's Proclamation of Disaster Emergency provided public assistance to replace fill at the petroleum dock and seawall end. The State also provided funds to relocate the endangered homes, with the provision that the City of Bethel guarantee that the threatened property remain undeveloped.

44. Gambell, August 31, 1985: A fire originating in the power plant owned by Alaska Village Electric Cooperative (AVEC), destroyed the plant, the adjacent tank farm and city shop, and six private residences and buildings. The State provided temporary housing, public and individual and family assistance to replace uninsured losses. American Red Cross provided additional assistance to individuals and families.

45. Cordova, October 31, 1985: After heavy rains, a landslide destroyed water lines between Heney Creek catchment basin and the city. Disaster public assistance supported repair by the city.

46. Manokotak, November 22, 1985: A fire destroyed the power plant, leaving the city without electricity. DHS&EM assistance provided emergency replacement of the primary generator and funding to repair the backup generator and power plant building.

47. Thorne Bay, December 5, 1985: Cold weather precipitated catastrophic failure of the city water system. The Governor's declaration of disaster provided emergency assistance to restore water service and longtime recovery assistance.

48. Metlakatla, December 10, 1985: Lack of rainfall in the generally rainy village reduced water levels to the point that the hydroelectric system could not generate sufficient power. Public disaster assistance provided supplemental generating capability with diesel generators.

49. Unalaska, December 13, 1985: A severe windstorm caused mudslides, road and port public building damages. Public disaster assistance supplemented insurance settlements to assist in recovery.

50. Thorne Bay, February 3, 1986: Collapse of a public bridge isolated residents in sections of the village. DHS&EM provided public assistance to replace the bridge.

51. Venetie, March 3, 1986: Catastrophic failure of the electrical power generating plant caused the village to declare a local disaster. The Governor's declaration provided a loan to replace the generator.

52. Pelican, March 19, 1986: A windstorm destroyed the roof of the Pelican public school. DHS&EM provided emergency assistance to repair the roof. After the city received an insurance settlement, it reimbursed the State for the insured portion of the costs.

53. Crown Point (Moose Pass), May 1, 1986: A railroad tanker car accident contaminated the Crown Point area with dangerous fumes. The disaster declaration provided IFG and temporary housing assistance for dislocated residents and public assistance for environmental quality monitoring.

54. Napakiak, May 15, 1986: Severe bank erosion of the Kuskokwim River had reached a point where homes in Napakiak were in danger of falling in the river. The Governor's disaster declaration provided funds to move seven houses to a safe location.

55. Arctic (North Slope Major Disaster), September 25, 1986 & FEMA declared (DR-0781) on October 27, 1986: After an intense windstorm generating wind driven tides and flooding, caused extensive damage to public property, the President declared a Major Disaster to assist the State and local governments in recovering.

56. Southcentral Alaska Flood (Major Disaster), October 12, 1986 FEMA declared (DR-0782) on October 27, 1986: Record rainfall in South-central Alaska caused widespread flooding in Seward, Matanuska-Susitna Borough and Cordova. The President declared a Major disaster implementing all public and individual assistance programs, including SBA disaster loans and disaster unemployment insurance benefits.

57. Aniak, October 27, 1986: The city experienced a catastrophic failure of the sewer system serving the public day care center, laundry, library and home canning facility. Disaster assistance in the form of a loan to the City of Aniak.

58. Venetie, January 9, 1987: A structural fire destroyed the village owned electric plant and heavy equipment required for road and airport maintenance. The Governor's declaration provided public assistance to help the village recover.

59. Kotzebue, February 5, 1987: Freezing of the municipal water system reduced supplies to a level that posed a threat to public health and safety, motivating the city to declare a local disaster. The corresponding State declaration allocated public assistance from the Disaster Relief Fund to repair the system.

60. Sleetmute/Red Devil, May 28, 1987: Ice jam caused flooding inundated the Red Devil electric plant and tank farm, causing damage also to heavy equipment and power poles stored in Red Devil by the City of Sleetmute. The disaster declaration provided funds to repair or replace these items and to implement mitigation measures designed to prevent damage in future years.

61. Delta Junction, May 28, 1987: When a wildland fire in the Delta Junction area threatened urban and developed property, DHS&EM joined the State Division of Forestry in responding. The Governor's disaster declaration covered DHS&EM costs in the response.

62. Aniak, May 29, 1987: Flooding during breakup of the Kuskokwim River caused damage to the city dike, road system, waste dump and sewage lagoon. The city repaired these items using funds authorized by the Governor's Declaration of Disaster Emergency.

63. Buckland, June 16, 1987: Flooding damaged city roads and a number of private homes. Individual and family assistance was provided. Since flooding is frequent in Buckland, the State disaster declaration included funds to mitigate the impact of future events.

64. Richardson Highway, July 24, 1987: The Governor declared a disaster after heavy rains washed out parts of the Richardson Highway. The declaration was required to obtain federal funds to repair the highway. No State funding was necessary.

65. Wainwright School, October 6, 1987: A fire destroyed the high school and major source of power to the City of Wainwright. A State disaster declaration provided funds to fly in a temporary generator and to assist in the permanent replacement of both the school and power plant.

66. Angoon, November 6, 1987: The City of Angoon sustained a threat to life and property as a result of damage to the fresh water transmission lines serving the community. The leaking lines threatened to deplete the city's entire water supply. State disaster funds were authorized to assist the community in repairing the water lines.

67. Togiak, October 1987: The City of Togiak experienced a catastrophic loss of fuel. The funds were transferred from the Disaster Relief Fund to the Governor's Emergency Fuel Relief Fund for disbursement.

68. Klehini River Bridge, November 9, 1987: Bridge failure was experienced when a snow plow attempted to cross. This bridge is on the only access route to several small communities in the area. A State disaster declaration provided the funds necessary to repair the bridge.

69. Barrow, February 16, 1988 & FEMA declared (DR-0813) on March 11, 1988: A fire destroyed the only Early Childhood Education School in the city and damaged teachers living quarters. Two hundred thirty-five children were displaced from their classes. The State disaster declaration provided an initial $1 million to provide immediate assistance. The President declared a Major Disaster to assist the State and local governments in recovering.

70. Haines, February 29, 1988: The city experienced severe damage to streets from flooding and runoff triggered by extremely heavy rainfall. The State made available $150,000 in disaster funds to assist in the repair of the city streets.

71. Beaver, March 8, 1988: The village of Beaver experienced total failure of their electrical distribution system when several transformers faltered. The State disaster declaration helped the village replace the defective transformers and restore power.

72. Chefornak, March 23, 1988: A fire destroyed the village's only electric generation plant leaving the community without power. State disaster funds were utilized to provide a replacement generator for the village.

73. Chenega Bay, March 25, 1988: The village experienced failure of one of their two generators and failure of the other was imminent. A State disaster declaration provided the funds for a replacement generator to insure continued power for the community.

74. Pitka's Point, March 29, 1988: A fire caused major damage to the safe water facility supporting the village with potable water. The State provided $105,000 in disaster funds to help restore the facility.

75. Nondalton, April 5, 1988: A fire destroyed the City Hall, fire station and fire fighting equipment. State disaster funds were made available to replace the facility and equipment.

76. Crooked Creek, May 12, 1988: After flooding of the Kuskokwim River caused extensive damage to village roads, utilities, and homes, the Governor declared a disaster providing public and individual assistance.

77. Napakiak/Napaskiak, May 24, 1988: Flood damage to roads in Napakiak and both roads and boardwalks in Napaskiak resulted in a declaration of Disaster Emergency. State disaster funds of $200,000 were made available for public assistance.

78. Kaltag, May 26, 1988: Flooding of the Yukon River and Tributaries washed out an essential bridge in the community of Kaltag. State disaster assistance provided funding to replace the bridge.

79. **Eagle, July 22, 1988:** The village of Eagle experienced a catastrophic failure of it electrical utility. The Governor's declaration of disaster made funds available for emergency repair of the system.

80. **Shishmaref, August 5, 1988:** In late July and early August a series of intense windstorms with sea surges caused extensive damage to the seawall and erosion protection structure in the village of Shishmaref, leaving a number of critical public and private buildings subject to imminent damage. State disaster assistance provided funding to repair the damage.

81. **Klawock, October 17, 1988:** In Klawock, a fire of unknown origin in the land fill caused a threat to public health. Disaster funding helped the community extinguish the fire by providing funding for equipment and manpower.

82. **Yukon Flats, November 10, 1988:** Council of Athabascan Tribal Governments requested assistance on behalf of trappers in the Yukon Flats for loss of trapping related essential items destroyed by the fires in the Summer of 1988.

83. **Omega Block Disaster, January 28, 1989 & FEMA declared (DR-00826) on May 10, 1989:** The Governor declared a statewide disaster to provide emergency relief to communities suffering adverse effects of a record breaking cold spell, with temperatures as low as -85 degrees. The State conducted a wide variety of emergency actions, which included: emergency repairs to maintain & prevent damage to water, sewer & electrical systems, emergency resupply of essential fuels & food, & DOT/PF support in maintaining access to isolated communities.

84. **Northwest Arctic Borough, February 1, 1989 & FEMA declared (DR-00826) on May 10, 19:** During the Omega Block cold spell, the City of Kotzebue and five other villages in the Northwest Arctic Borough suffered extensive permanent damage to water & sewer systems. The City of Buckland suffered a total loss of its electrical system. The Governor declared a disaster to assist the Borough in making permanent repairs to these facilities.

85. **St. George, February 9, 1989:** A severe windstorm caused sinking of a landing barge used as a dock by the City of St. George. The incident resulted in a blockage of the port and a loss of the capability to off-load essential supplies. The Governor declared a disaster to provide State assistance in recovering the barge.

86. **Sand Point, February 27, 1989:** After the Omega Block cold spell caused permanent damage to the water main serving the Sand Point boat harbor, the Governor declared a disaster to provide assistance in repairing the line & restoring services.

87. **Ahkiok, March 2, 1989:** The Governor declared a disaster to assist the village of Ahkiok in replacing its electrical power generating plant, which had experienced irreparable damage caused by prolonged cold weather.

88. **North Slope Borough, March 8, 1989:** On February 24-28, 1989, a severe winter storm caused extensive damage to public and private property in North Slope Borough villages. The Governor's declaration of disaster authorized public, individual & family assistance in recovering.

89. **Valdez Oil Spill, March 26, 1989:** The Governor's declaration provided needed funding for State agency operations mobilized in response to the "Exxon Valdez" oil spill. A request for federal assistance through a Presidentially declaration of disaster was denied.

90. **Galena, April 20, 1989:** Declared as a result of the Omega Block Cold Spell (temperatures to -85 in Galena), which caused extensive damage to water and sewer utilities in Galena.

91. **Glennallen, May 6, 1989:** Ice damaged a bridge across Moose Creek, preventing access to the community sewage lagoon and a small subdivision. The Declaration of Disaster funded replacement of the bridge.

92. Circle, May 6, 1989: Flooding of the Yukon River in Circle during Spring Breakup of 1989 caused damage to public and private property. Disaster was eventually included in the Presidential Declaration (#94 below).

93. Ft. Yukon, May 6, 1989: Flooding of the Yukon River which occurred one day after the Circle flood, also included in the Presidential Declaration.

94. Spring Floods, FEMA declared (DR-0832) on June 10, 1989: Presidential Declaration of Major Disaster, incorporated sixteen local declarations and applied to all communities on Yukon, Kuskokwim and Kobuk rivers and their tributaries. Provided public and individual assistance to repair damage.

95. Klawock, June 19, 1989: A heavy Fall rainstorm washed substantial materials into the city's water reservoir, reducing capacity to the extent that during the following summer water shortages threatened health and safety and economic losses due to closure of a local fish hatchery. The disaster declaration funded restoration of the reservoir to its original, pre-disaster capacity.

96. Fairbanks/North Star Borough, August 1, 1989: Flash flooding along the Tanana River in the Borough caused damage to public and private property. The Governor's declaration authorized public and individual disaster assistance.

97. Mat-Su Borough, August 4, 1989: The Governor declared a disaster to mitigate a flood threat caused by high water in the Matanuska River and placed the Old Glenn Highway and private residences along the river at risk. Funding was applied towards construction of an earthen/gravel dike.

98. Whittier, August 8, 1989: Provided funding to DOT/PF to repair the breakwater to the small boat harbor in Whittier, which was at risk of imminent collapse, threatening damage to the harbor itself and large numbers of privately owned boats.

99. Municipality of Anchorage, August 30, 1989: The Declaration addressed widespread damage caused by heavy flooding along the drainage systems within the Municipality. State assistance was limited to public property damage, although the federal Small Business Administration implemented its Disaster Loan Programs for businesses and homeowners.

100. Seward/Kenai Peninsula Borough, August 30, 1989: This Declaration relates to the same storm and flooding incident that affected Anchorage. Primary area of damage was in the city of Seward. As in Anchorage, State disaster assistance was limited to public property damage, with SBA loans available for individuals and businesses.

101. Richardson Highway, September 13, 1989: The same torrential rains that impacted Anchorage and the Kenai Peninsula Borough caused extensive damage to the Richardson & Copper River Highways. The Governor's Declaration enabled DOT/PF to apply for and receive emergency assistance through the federal Dept. of Transportation. No State disaster funds were expended as a result of this Declaration.

102. Search & Rescue, September 13, 1989 : The Governor made this Declaration of Disaster for the purpose of providing emergency funding to the Dept. of Public Safety for conducting search and rescue operations. The appropriated operating budget for these activities was depleted only two months into the fiscal year.

103. Mt. Redoubt Volcano, December 20, 1989: When Mt. Redoubt erupted in December 1989, posing a threat to the Kenai Peninsula Borough, Mat-Su Borough, and the Municipality of Anchorage, and interrupting air travel, the Governor declared a Disaster Emergency. The Declaration provided funding to upgrade and operate a 24-hr. monitoring and warning capability.

104. KPB-Mt. Redoubt, January 11, 1990: The Kenai Peninsula Borough, most directly affected by Mt. Redoubt, experienced extraordinary costs in upgrading air quality in schools and other public facilities throughout successive volcanic eruptions. The Borough also sustained costs of maintaining 24-hr. operations during critical periods. The Governor's declaration of Disaster Emergency supported these

activities.

105. Tatitlek, January 31, 1990 : The Governor declared a disaster to assist in the restoration of electrical service in Tatitlek after a fire destroyed the village's generator plant.

106. Broadcast Emergency (KYUK/KDGL), February 22, 1990: Radio Station KYUK in Bethel, Alaska, a public radio station and the EBS station for a large portion of Western Alaska, experienced a failure in its transmission antenna. Concurrently, KDLG, the public radio station and EBS station for the Dillingham operational area, lost its source of emergency power. The Governor's declaration of disaster enabled these stations to immediately repair these shortfalls in their capability to serve as stations on the Emergency Broadcast System network.

107. Kongiganak, March 2, 1990: Inclement weather and equipment failures prevented normal barge deliveries of winter fuel to the village of Kongiganak, causing a shortage as the winter progressed. The governor's declaration of disaster supported air delivery of supplies sufficient to last the winter.

108. Moose Feeding Project, March 28, 1990: Recorded snow depths in interior Alaska resulted in a situation where moose, unable to walk to areas of their natural feeding, were starving to death or browsing along the cleared railway, where they were killed by train. To prevent catastrophic loss of the moose population, the Governor declared a disaster. Funding provided under the declaration supported the clearing of trails and provision of alternative supplies of food.

109. Manokotak, April 5, 1990: Due to an inadequate storage capacity for fuel and gasoline, the City of Manokotak experienced a shortage of fuel for resale to residents and for its own use. The Governor's declaration of disaster subsidized air transport of fuel.

110. Stebbins, April 9, 1990: After a fire destroyed the high school in Stebbins, the Governor declared a disaster to support the design and construction of a new high school. The declaration stipulated that the design emphasize safety and the mitigation of damage by fire or other hazards.

111. '89 Spring Floods Hazard Mitigation, April 14, 1990: The Major Disaster Declaration by the President in response to statewide flooding in the Spring of 1989 authorized the commitment of federal funds to projects designed to mitigate flood damage in future years. Since the federal funding required a State matching share, the Governor declared a disaster to provide these funds and authorize their expenditure.

112. Snow & Ice Removal, 1990: Because of record snowfalls in Southcentral Alaska, the Legislature appropriated a special grant to local governments affected in order to supplement normal snow and ice removal budgets. The Legislature directed that funds be managed by the Division of Homeland Security and Emergency Management. No Disaster Declaration occurred.

113. McGrath, May 16, 1990: Ice jam flooding washed out an extensive section of Cranberry Ridge road. The Disaster declaration provided funds for repair of the road and for mitigation to prevent a recurrence of the same event in the future.

114. Kobuk, May 17, 1990: Ice jam flooding threatened the City of Kobuk to the extent that the local government requested State assistance in evacuating the community. The Governor's declaration of disaster authorized this assistance.

115. Fire Suppression, May 29, 1990: An early wildland fire season depleted the Alaska Dept. of Natural Resources' fund for wildland fire suppression. The Governor's declaration of disaster authorized transfer of funds from the Disaster Relief Fund to this account.

116. Teklanika, May 31, 1990: Continued demands for suppressing early wildland fires resulted in a declaration of disaster authorizing transfer of additional money from the disaster relief fund to the Dept. of Natural Resources.

117. Bethel, July 2, 1990: Abnormally high water in the Kuskokwim River during breakup and continuing for an extended period after breakup resulted in scouring of toe material along the Bethel bulkhead, dislocation of the pipe pilings that form the bulkhead, and loss of material behind these pilings. The disaster declaration supported repair of the bulkhead and placement of riprap material along the toe of affected sections.

118. Statewide Fires, July 4, 1990 : The wildland fire season, with all-time records in the number and gravity of fires, caused fire suppression requirements beyond the normal capability of the Dept. of Natural Resources. The Governor declared a disaster in order to authorize the use of the resources of the Alaska National Guard in support of the State's wildland fire management programs. The Federal Emergency Management Agency authorized federal payment of up to 70% of fire expenditures that exceeded the average annual fire management budget.

119. Hazard Mitigation Cold Weather, 1990: The Presidential Declaration of Major Disaster for the Omega Block cold spell of January and February 1989 authorized federal funds for mitigation of cold weather damage in future events. The Governor's declaration of disaster provided the State matching funds required for obtaining and using this federal money.

120. Lower Kuskokwim, September 4, 1990: A severe storm compounded by high tides caused extensive flooding in coastal communities of the Kuskokwim and Bristol Bay areas and along the lower Kuskokwim River. The flooding caused damage to both public and private property. The disaster declaration authorized assistance to local governments, individuals and families affected by the flooding.

121. Kotzebue, September 4, 1990: An unseasonable storm and wind driven tides damaged public and private property in Kotzebue and surrounding traditional use areas. The Governor's declaration of disaster provided assistance to the City of Kotzebue and to individuals and families. (closed after Jan 03)

122. Nome, September 10, 1990: An unseasonable sea storm caused the sinking & destruction of a transfer barge owned by the city. As a result the city was unable to receive essential goods that are customarily transported by sea. In addition the debris presents a hazard jeopardizing the structural integrity of the Nome causeway.

123. Teller, September 10, 1990: A storm on the Bering Sea caused major damage to the wood cribbing/gabion breakwater.

124. Lowell Creek Tunnel, September 27, 1990: A major rehabilitation of Lowell Creek Tunnel is required to insure continued protection of the City of Seward. This is a mitigation project.

125. Diomede, November 21, 1990: A severe early winter storm with waves up to 25 feet destroyed several fuel storage facilities. The resultant loss of critically needed petroleum products along with other equipment, required the declaration of disaster.

126. Eagle, December 28, 1990: A fire destroyed the privately owned power generation facility that services Eagle and Eagle Village. A temporary replacement generator was delivered and power restored on December 30, 1990.

127. Togiak, February 8, 1991: An electrical failure lasting four days, combined with extreme cold temperatures, caused damage to the Municipal water system and the plumbing and heating systems of public buildings. Disaster assistance supported emergency work and permanent repair work.

128. Larsen Bay, February 14, 1991: Abnormal freezing conditions affected the City's water system, interrupting service to approximately fifty percent of the residents. The Governor's Declaration of Disaster enabled the City to obtain equipment and labor needed to restore service.

129. Karluk, February 22, 1991: A fuel shortage in the community threatened the loss of heat in private homes and the loss of electricity city-wide. The Governor declared a disaster to provide money to resupply the village with fuel. The funds were in the form of a disaster loan to the Village Council.

130. Marshall, February 25, 1991: Contamination of the water supply system for Marshall resulted in declaration of February 25, 1991. Funding was provided to Public Health Service to ensure potable water availability for residents of Marshall.

131. Angoon, May 3, 1991: Failure of an undersea water main reduced volume of water being provided to the city system to a critically low level. Declaration authorized public assistance to repair the main.

132-142. Fairbanks/North Star Borough, Aniak, McGrath, Red Devil, Anvik, Grayling, Emmonak, Holy Cross, Alakanuk, Shageluk, Galena. the Governor declared on May 3-23, 1991 FEMA declared May 30, 1991: Flooding. Record snowfalls in the interior combined with sudden Spring melt caused flooding all along the Yukon and Kuskokwim River systems. Numerous State Declarations were combined into a single Presidential Declaration of Major Disaster (FEMA-0909-AK) that authorized assistance for repair of public property only. State Disaster Relief Funds were used to implement the Individual and Family Grant Program in all of the communities included in the federal declaration.

143. Dept. of Natural Resources, July 11, 1991: A severe, early, and intense wildland fire season caused rapid depletion of the State fire suppression funds. The Governor's Declaration of Disaster was made to comply with requirements for receiving Federal wildland fire suppression funds.

144. Mat-Su Borough, July 18, 1991: Severe bank erosion near the Circle View Subdivision area along the Matanuska River destroyed one home and threatened several others, causing the Mat-Su Borough to support either construction of emergency bank protection measures or relocation of homes. The Governor's Declaration authorized a loan of up to $500,000 dollars to the Mat-Su Borough. The following year the legislature converted this loan to a grant.

145. Whitestone Farms, July 25, 1991: The electric plant in this community was destroyed by a fire thought to be caused by lightning. The Declaration authorized public assistance funds for replacement of the plant.

146. Little Diomede, July 25, 1991: Mechanical system problems and lack of rainfall caused a critical shortage of safe water in the village of Little Diomede. Public assistance made available by the Declaration funded desalination equipment used to fill the village's storage reservoirs with processed seawater.

147. Aniak, August 7, 1991: At the recommendation of OMB, the Alaska Energy Authority and the Office of the Attorney General, the Governor declared a Disaster to authorize an emergency loan from the Disaster Relief Fund to the City of Aniak. Funds were for the purchase of fuel and for averting a general fiscal crisis in the City.

148. Diomede Fire, September 20, 1991: A fire in the City of Diomede destroyed the City electric plant and water treatment plant. Also damaged the water storage tank and destroyed equipment and materials essential to recovery from two previous disasters.

149. New Koliganek, October 14, 1991: The village of New Koliganek sustained flooding which resulted in damage to a bridge and severe threat to public safety of residents. Immediate repair of the bridge was necessary in order to allow residents, school children, to safely transit within the village.

150. Kodiak, November 2, 1991: Commencing on October 31, 1991, the City of Kodiak sustained severe damage and threats to life and property from heavy rains, flooding and landslides. The rains caused severe damage to the City's roads and buildings; and caused damage to homes, businesses and loss of personal property.

151. Earthquake Mitigation, November 7, 1991: Under the authority granted in A.S.26.23.300, the Governor issued a declaration of emergency to prevent or minimize the effects of events that pose a direct and imminent threat of disaster to the State; and, to allow for training and exercise of State agency personnel, to familiarize responders with, and test the capabilities of the State's new Emergency Operations Center.

152. Seward Sewage Disaster, November 20, 1991: On August 26, 1991, the City of Seward sewage treatment lagoon located on Lowell Point Road suffered a catastrophic failure from undetermined causes.

153. Eagle City, May 19, 1992: On May 13, 1992, the ice jam precipitating the Eagle Village flood moved down to the City of Eagle flooding some private property and destroying an erosion control structure along the river front street. Both the public assistance and individual assistance programs were implemented as well as the SBA disaster loan program.

154. Eagle Village, May 19, 1992: On May 12 through 13, the Native Village of Eagle was inundated by ice jam flooding causing the entire town to be evacuated high ground. Flood waters caused damage to a majority of the homes, eroded the street along the river front and caused damage to the clinic, washeteria and tank farm. Both public assistance and individual assistance programs were implemented as well as the SBA disaster loan program.

155. Galena-92 Flood: From May 26 through 29, 1992, both down town and up town Galena were flooded as a result of an ice jam at Bishop Rock several miles downstream of Galena. This was their third worst flood in recorded history. Extensive damage to State road systems, City streets, electrical distribution system, sewage lagoon and the majority of homes in down town area resulted. Both the public assistance and individual assistance programs were implemented as well as the SBA disaster loan program.

156. Flood Response, June 9, 1992: The Upper Yukon River drainage was experiencing the third worst snow melt flooding in recorded history according to the National Weather Service. The Declaration provided $100,000.00 from the Disaster Relief Fund to cover DHS&EM expenses that began to occur as a result of the need to provide response activities and surveillance. An RSA was established with the Division of Environmental Quality, DEC to respond to and test for environmental contamination for assurance of public health.

157. Yukon River Flood, June 17, 1992 A very late spring combined with above average snow packs in the Canadian and U.S. portions of the Yukon drainage resulted in post-breakup (snow melt) Yukon River and tributary flooding from Fort Yukon to Rampart. Flood waters rose slowly over a period of days and receded gradually. The North Pole area was included in this declaration due to ground water to rise from the Chena River drainage area. High ground water was exacerbated the Moose Creek Diversion Dam (COE) activation. Public and private property received major damage. The IFG program was implemented in Fort Yukon, Beaver, Stevens Village and North Pole. No Public Assistance was implemented for the North Pole area. Rampart received only public damage. The Small Business Administration declared for the same geographic area and provided disaster loans.

158. Fire Disaster, July 7, 1992: The Department of Natural Resources exhausted fire suppression funds prior to the end of the fire season. A total of $750,000 was appropriated from statewide funding lapse to the FY93 the Statewide Fire Suppression Program.

159. Norton Sound Herring Fishery Disaster, July 13, 1992: The Governor requested the Small Business Administration to declare an Economic Injury Disaster for Businesses and fishermen impacted by the Norton Sound herring fishery failure. Due to a very late spring, sea ice in the area did not breakup at the time the herring arrived in the Sound making them inaccessible to the fishermen. The Governor did not declare under AS 26.23.

160. Haines Highway Disaster, August 14,1992: This disaster was declared in order for the State DOT/PF to request $1.8 million in Federal Highway Administration emergency funds (under Title 23 U.S.C., Section 125) to repair damages relating to flooding of the Klehini River 30 miles north of Haines. No expenditure of State Disaster Relief Funds was required.

161. Mt. Spurr, September 21, 1992: Frequent eruptions and the possibility of further eruptions has caused health hazards and property damage within the local governments of the Municipality of Anchorage, Kenai Peninsula Borough and Mat-Su Borough. These eruptions caused physical damage to observation and warning equipment. Funds to replace equipment for AVO.

162. Nome Highway Disaster: On October 5, 1992, a major Bering Sea Storm with gale-force winds impacted the he Seward Peninsula's Norton Sound Coast in Western Alaska, producing an unusually high storm surge tide and very large waves, particularly in the Nome area. High tidal waves severely damaged two federal-aide highways, isolating the mining community of Council and endangering the traveling public in the Nome area. DOT/PF will request emergency relief funds from Federal Highway Administration.

163. Kuskokwim Disaster: On July 19, 1993, the Governor's Task Force issued a disaster

declaration of economic hardship to fishermen due to poor chum fishing in the Kuskokwim area.

164. **Tenakee Springs Fire** On July 19, 1993, a community-wide fire destroyed 10 single family homes, the hotel and electrical poles/power lines.

165. **Department of Natural Resources:** On August 3, 1993, funds were allocated to DNR for fire suppression.

166. **Shaker IV:** Under the authority granted in AS 26.23.300, the Governor issued a declaration of emergency to prevent or minimize the effects of events that pose a direct and imminent threat of disaster to the State; and, to allow for training and exercise of State agency personnel, to familiarize responders with, and test the capabilities of the State's Emergency Operations Center.

167. **Prince of Wales Island:** On October 29, 1993, funds were made available through emergency highway funding assistance to all roads on Prince of Wales Island eligible under the Department of Transportation ICTEA provision due to heavy rains and numerous mud slides.

168. **Hazard Mitigation AK-0909:** This is a pilot program in Ft. Yukon designed to confirm the need for long-range flood mitigation measures to prevent flooding.

169. **McGrath Road Disaster:** On May 23, 1994, a disaster declaration was signed for the City of McGrath due to damages to approximately 1,147 linear feet of Cranberry Ridge Road. This road provides access to 3 subdivisions occupied by two family homes, the community rifle range, the rock quarry, and the emergency air strip.

170. **Galena Disaster:** On May 10, 1994, the City of Galena sustained losses and threats to life and property resulting from flooding due to breakup. As a result of this disaster, roads and revetments suffered significant damage, and the sewer lagoon was breached.

171. **Cummings Road Flood:** On July 13, 1994, Cummings Road was severely damaged by an overflow of waters from the Gerstle River. As a result of this disaster, families were isolated, which constituted a significant threat to the lives and safety of those individuals.

172. **Matanuska River Erosion:** On July 1, 1994, Matanuska-Susitna Borough sustained serious damage and threats to life and property resulting from erosion of the Matanuska River, in the vicinity of Circle View Estates. As a result of this disaster authority was granted under Alaska Statutes, Section 26.23.020 to loan $500,000.00 from the Disaster Relief Fund to the Matanuska-Susitna Borough.

173. **94 Fall Flood declared August 26, 1994 by Governor Hickle then FEMA declared (DR-1039) on September 12, 1994:** On August 26, 1994, the Governor declared disaster emergencies for the communities of Kobuk, Kiana, and Kotzebue as a result of flood damage. As a result of this disaster, the conditions continue to create unprecedented losses of personal and public properties. The communities of Allakaket and Alatna had to be evacuated under emergency life-threatening conditions on Sunday, August 28, 1994, Hughes was also evacuated several days later. Active duty military assets (CH-47 Chinook helicopters) were used to evacuate Allakaket and Alatna. Guard assets were used to evacuate Hughes. Also affected by this disaster were the communities of Bettles and Wiseman.

174. **Metlakatla Sea Storm:** On November 10, 1994, the Governor declared that a condition of disaster exists in Metlakatla, as a result of high tides and storm driven waves that threaten coastal sections. The Metlakatla Community Senior Citizens Center and a nearby drainage culvert under the public right-of-way have been put at risk.

175. **Skagway Submarine Landslide:** On November 16, 1994, the Governor declared that a condition of disaster emergency exist in the City of Skagway, as a result of a submarine landslide. As a result of this disaster damages to Alaska Marine Ferry facilities have interrupted normal service and require emergency repairs, and damages to the small boat harbor exceed the capability of the City of Skagway to repair in an urgent manner to preclude ongoing collateral damages.

176. Yukon Kuskokwim Delta: On June 5, 1995, the Governor declared a condition of disaster emergency exist in the Cities of Akiak, Kwethluk, Napaskiak, Emmonak, and Alakanuk, as a result of inundation. As a result of this disaster roads, boardwalks, and other public works essential to vital community services were damaged. (closed after Jan 03)

177. Aniak Ice Jam Flood: On June 5, 1995, the Governor declared that a condition of disaster emergency exist in the City of Aniak, as a result of ice jam flooding of the Kuskokwim River and Aniak Slough. As a result of this disaster sections of Birch Road, Airport Boulevard, and the landfill access road were severely damaged.

178. Bethel Sinkhole Erosion: On June 5, 1995, the Governor declared that a condition of disaster emergency exist in the City of Bethel, as a result of erosion during spring breakup. As a result of this disaster the face of the protective sea wall was damaged causing erosion under the City Dock to create and expand sinkholes on the dock.

95-179 Statewide Fire Suppression: On June 22, 1995, the Governor declared that a condition of disaster emergency exist in the State, as a result of insufficient money regularly appropriated to the Department of Natural Resources has been exhausted along with supplemental funds. As a result of this disaster authorization of sufficient funds were made available to continue fire suppression activities through June 30, 1995. DNR administers this funding; therefore, DHS/EM has no data to reflect the applicants or amount of funding.

96-180 South-central Fall Floods declared September 21, 1995 by Governor Knowles then FEMA declared (DR-1072) on October 13, 1996: On September 21, 1995, the Governor declared a disaster as a result of heavy rainfall in South-central Alaska an as a result the Kenai Peninsula Borough, Matanuska-Susitna Borough, and the Municipality of Anchorage were initially affected. On September 29, 1995, the Governor amended the original declaration to include Chugach, and the Copper River Regional Education Attendance areas, including the communities of Whittier and Cordova, and the Richardson, Copper River and Edgerton Highway areas which suffered severe damage to numerous personal residences, flooding, eroding of public roadways, destruction & significant damage to bridges, flood control dikes and levees, water and sewer facilities, power and harbor facilities. On October 13, 1995, the President declared this event as a major disaster (AK-1072-DR) under the Robert T. Stafford Disaster Relief and Emergency Assistance Act. Individual Assistance totaled $699K for 190 applicants. Public Assistance totaled $7.97 million for 21 applicants with 140 DSR's. Hazard Mitigation totaled $1.2 million. The total for this disaster is $10.5 million.

96-181 Millers Reach Fire declared June 4, 1996 by Governor Knowles then FEMA declared (DR-1119) on June 8, 1996: A fire which began on June 2,1996 near Houston, Alaska on Miller's Reach Road spread rapidly destroying 344 structures and burning 37,366 acres in the Houston-Big Lake area. Command and control of this fire was initially controlled from the Houston High School with a Type I Incident Management Team. Later a Unified Command structure was established at the Creekside Plaza Mall in Wasilla which consisted of Local, State and Federal representatives. On June 4th, 1996 Governor Knowles declared a State Disaster Declaration and President Clinton signed the Federal Disaster Declaration (AK-1119-DR) on June 8th, 1996. This provided the State with Federal Disaster relief funding for the incident. The fire was contained on June 10th and declared under control on June 15th. Individual Assistance totaled $1.87 million for 425 applicants. Public Assistance totaled $5.1 million for 7 applicants with 50 DSR's. Hazard Mitigation totaled $1.75 million. The total for this disaster is $9.35 million.

97-182 '96 Southeast Storm (Pelican/Elfin Cove): On Wednesday, September 25,1996 a severe storm struck Southeast Alaska causing severe damage to some of the communities in the area. The community of Pelican sustained erosion damage to temporary construction (sandbags) placed to curtail erosion on Pelican Creek. The storm also caused additional erosion around the bridge that crosses the creek. In Elfin Cove the landslide damaged electrical distribution lines to homes, disrupted telephone service to 12 homes and caused remaining telephones to operate off battery power. Two homes sustained damage. Also the trail which provided the only means of access between the two sides of town was damaged causing residents to commute from one side of town to the other by boat. The Governor declared the area a disaster on

November 1, 1996 due to the threat to life and property. Public Assistance totaled $486K for 1 applicant with 1 DSR. The total for this disaster is $528K.

98-183 DNR Fire Suppression: On July 14, 1997, the Governor made a finding that regularly appropriated fire suppression funds were depleted and disaster relief funds to be insufficient to prevent ongoing and new fires from threatening life and property. The Department of Natural Resources implemented funding via the disaster declaration process, as referenced by legislative intent in Chapter 98, SLA 1997, Sec. 7 Pg. 3, L21-29. DNR administers these funds; therefore, DHS/EM has no data that reflect the applicants or the amount of funding.

98-184 Bristol Bay Distressed Salmon: On July 18, 1997 the Governor declared that as a result of low salmon harvest and depressed prices, municipalities in Bristol Bay and Kuskokwim river drainages suffered a sever reduction in anticipated fish tax revenue. DCRA was assigned the lead agency in a Coordinated Response Partnership of State agencies to act within their statutory authority to assist in restoring the economic health and stability in area communities and to develop goals and strategies for future economic development. Individual Assistance totaled $500K for 446 applicants. Public Assistance totaled $1.5 million. The total for this disaster is $2 million.

98-185 Eastern Tanana River: Continuing heavy rains, glacial melt due to warm temperatures and glacial dam dumping in the Eastern Tanana and Northern Copper River Valleys produced unusually high volume of runoff. This caused severe flooding along the Taylor Highway, Alaska Highway, Nebesna Road, Tok Cutoff, Richardson Highway, Copper River Highway, and Northway Road. The Village of Northway was evacuated and several families remained in emergency housing for an extended period. All along these drainages, homes were flooded and public property was damaged. Individual Assistance totaled $105K. Public Assistance totaled $794K for 8 applicants with 20 DSR's.. The total for this disaster is $946K. (closed after Jan 03)

98-186 Shishmaref Sea Storm: On October 6, 1997, under authority granted by the Alaska Statutes, Section 26.23.020, the Governor declared a condition existed in the City of Shishmaref to warrant a disaster declaration in order to provide for assistance. An unusually early sea storm caused severe damage resulting in homes being eroded into tidewater and being destroyed. Additional federal assistance under the Federal Emergency Management Agencies Flood Mitigation Assistance Grant in the amount of $600,000 was provided to complete the move of additional damaged structures. In addition the Alaska Housing Finance Corporation provided $200,000 in housing assistance for the match to the federal assistance. Individual Assistance totaled $16K for 6 applicants. Public Assistance totaled $1.2 million for 3 applicants and 14 DSR's. Hazard Mitigation totaled $50K. The total for this disaster is $1.46 million. (closed after Jan 03)

98-187 DNR Fire Suppression: On June 5, 1998, the Governor made a finding that insufficient money was regularly appropriated and money from the disaster relief fund was insufficient. DNR Commissioner was hereby authorized to utilize money made available necessary for fire protection and suppression for the balance of FY98 to prevent continuing and new fires from threatening life and property as referenced by legislative intent in sec 7(b), chapter 98, SLA 1997. DNR administered the funding for this disaster; therefore, DHS/EM has no date reflecting the applicants or amount of funding.

98-188 Endicott Mountains Flood 6/18/98: On June 18, 1998, under the authority granted by the Alaska Statues, Section 26.23.020, the Governor declared a disaster existed in the cities of Allakaket and Huslia, the communities of Wiseman and Evansville and along the Dalton Highway between Coldfoot and Atigun Pass. Acute erosion, flash flooding caused damaged to public infrastructures, fuel tank farms, private property, dikes and bridge abutment revetments. Only Public Assistance was granted. It totaled $660K for 5 applicants with 8 DSR's. The total for this disaster is $668K.

98-189 Western AK Fisheries Disaster: On July 30, 1998, under the authority granted by Alaska Statute 26.23.020 (c), the Governor declared a disaster existed in the Bering Sea that affected fishing communities along its coastal areas. The Bering Sea suffered a catastrophic rise in sea surface temperatures and as a result disrupted the salmon populations which in the food chain cause the starvation of seabirds and marine mammals. Families in this area depend on the salmon industry to earn salaries to pay for fuel oil to

heat their homes, electricity, water and sanitation and food in the harsh winter climate. The Governor requested that the Small Business Administration made an administrative declaration of economic injury to provide loans to small businesses. On September 16, 1998 the Governor issued another declaration of disaster emergency adding the communities of Stebbins, St. Michaels, Minto and Manley Hot Springs. On October 16, 1998 the Governor amended his declaration of September 16, 1998 to include the communities of Nelson Lagoon, False Pass and Tyonek. Assistance was broken into two groups FEDA and ELE. The following is the total for both groups: Individual Assistance, for 4800 applicants, = $19.4 million, and Public Assistance = $348K. The grand total for the disaster is $24.1 million.

98-190 Southeastern Storm: On October 27, 1998, the Governor declared a disaster to exist in the communities of Haines and the City and Borough of Juneau for the purposes of accessing federal highway administration funds after the worst two-day rainfall in fifty years occurred in Southeast Alaska on October 19-20, 1998. Over 6 inches of rain fell within a 48-hour period. As a result, extensive damage to many road systems, public, private and non-profits properties was caused from mudslides and water erosion. On November 24, 1998, under the authority granted by Alaska Statute 26.23.020, the governor amended his declaration of disaster in the City and Borough of Juneau, the City and Borough of Haines, to include the Chilkat Indian Village (Community of Klukwan) in order for public (infrastructure) assistance to public property and individual and family grant assistance. The Governor also requested that the Small Business Administration declare an administrative declaration for physical disaster damages to provide low interest loans to businesses and private property owners. Individual Assistance totaled $167K for 65 applicants. Public Assistance totaled $828K for 10 applicants with 30 PW's. The total for this disaster is $1.12 million.

00-191 Central Gulf Coast Storm declared February 4, 2000 by Governor Murkowski Murkowski then FEMA declared (DR-1316) on February 17, 2000: On Feb 4 2000, the Governor declared a disaster due to high impact weather events throughout an extensive area of the state. The State began responding to the incident since the beginning of December 21, 1999. The declaration was expanded on February 8 to include City of Whittier, City of Valdez, Kenai Peninsula Borough, Matanuska-Susitna Borough and the Municipality of Anchorage. On February 17, 2000, President Bill Clinton determined the event disaster warranted a major disaster declaration under the Robert T. Stafford Disaster Relief and Emergency Assistance Act, P.L. 93-288 as amended ("the Stafford Act). On March 17, 2000, the Governor again expanded the disaster area and declared that a condition of disaster exists in Aleutians East, Bristol Bay, Denali, Fairbanks North Star, Kodiak Island, and Lake and Peninsula Boroughs and the census areas of Dillingham, Bethel, Wade Hampton, and Southeast Fairbanks, which is of sufficient severity and magnitude to warrant a disaster declaration. Effective on April 4, 2000, Amendment No. 2 to the Notice of a Major Disaster Declaration, the Director of FEMA included the expanded area in the presidential declaration. Public Assistance, for 64 applicants with 251 PW's, totaled $12.8 million. Hazard Mitigation totaled $2 million. The total for this disaster is $15.66 million.

00-192 Fire Suppression: Governor Knowles issued a disaster declaration on May 24, 2000 to make funds available for wildland fire fighting for the remainder of the fiscal year. DNR administers funding; therefore, DHS/EM has no data reflecting applicants or amount of funding.

00-193 Fire Suppression: On June 23, 2000, Governor Knowles writes to speaker of the House, Brian Porter mentioning the issuance of another fire suppression declaration, because the 30-day life period of his May 24, 2000 declaration had expired. Funding was still needed to fight fires through the end of Fiscal Year 2000. DNR administered funding; therefore, DHS/EM has no data reflecting applicants or amount of funding.

01-194 Identified as YKN: dated prior to Kake: On July 19, 2000 Governor Knowles declared a disaster due to failure of salmon returns to the Yukon, Kuskokwim and Norton Sound fishing districts. In some areas the return was significantly less than 50% of the long-term average. This catastrophic decline resulted in food shortages for subsistence fishermen and economic injury to businesses and individuals. The Governor initiated a coordination group named Operation Renew Hope (ORH) to manage this disaster. ORH was lead by DCED Deputy Commissioner Bernice Joseph. DHS&EM provided a full time Public

Information Officer (Kerre Fisher) and Department liaison (Michael Bird) in support of this operation. The group was charged with securing basic needs such as heating fuel, essential utilities, USDA commodities and chum salmon from the Kotzebue fishery. At Governor Knowles request, the federal commerce Department issued a declaration of a fishery disaster under the Magnuson-Stevens Act. On October 24, 2000 the U.S. Small Business Administration issued a Declaration of Economic Injury Disaster #9J35. SBA tied this event to the 1995 Fall Flood Disaster. The Kenai Peninsula borough was the primary declaration area. The contiguous Boroughs of Mat-Su, Lake and Peninsula and the Regional Education Attendance Area #10 and the Municipality of Anchorage were eligible. The total for this disaster is $747K (mainly from Admin. Allowance). (closed after Jan 03)

01-195 Kake Water Containment Failure: On July 31, 2000 Governor Knowles submitted a financial plan in accordance with AS 26.23.020 (h) to the Alaska State House and Senate for immediate financial assistance to the City of Kake. As general fund appropriations were not made to the disaster relief fund for FY2001 to cover state costs to prevent, minimize or respond to an incident that poses direct and imminent threat to the community, a supplemental appropriation was submitted during the following legislative session. On July 27, 2000, the Mayor of Kake declared a disaster emergency due to public health threat resulting from the Gunnuck Creek Dam failure. The community does not have a potable drinking source available and was seeking assistance to fund an interim water supply system until the Alpine Lake Water Pipeline, which is under construction and projected to be operational in Spring of 2001, was completed. One applicant was funded, which totaled $405. The disaster total was $410K.

01-196 Middle Yukon Flood: On May 31, 2001 Governor Knowles declared a disaster for the communities of Koyukuk and Nulato due to ice jams on the Yukon River. On May 24, 2001, ice jams at Last Chance and Nine-Mile Island caused flooding in Nulato and Koyukuk. The ice jam persisted for several days and floodwaters continued to rise until there was little or no dry ground in the village of Koyukuk. Weather conditions were unseasonably cold, and windy. Both snow and rain showers exacerbated the human misery. As precautionary and planned event to avoid attempting to respond to a crisis on a long holiday weekend, 35 high-risk individuals were transported to Galena via helicopter. Able-bodied adults remained in town to minimize losses. Flooding occurred in the village of Nulato on the Yukon River. Homes sustained water damages inside of the structures. City owned fuel tanks at tank farm were unstable. Fuel intake heads were inundated and sustained damages. Water overtopped the public landfill. Individual Assistance totaled $209K for 30 applicants. Public Assistance totaled $250K for 4 applicants with 17 PW's. The total for this disaster is $510,554.

Note: *Chronicling major events through Administrative Order tracking and other Disaster Relief Fund access begin at this point.*

02-197 KOTZ AM Radio (Admin Order 191): On August 13, 2001, the radio tower antenna for KOTZ AM, the radio station serving the northwest arctic area, was destroyed in a fatal aircraft accident. Because the radio station disseminates event warnings and notifications to local villages and numerous subsistence and hunting camps by way of the Emergency Alert System and programmed messaging services, the governor signed Administrative Order No. 191 on August 24, 2001. The prescribed assistance was to provide this essential service through several low-watt FM stations placed in 6 villages. KOTZ AM Radio is part of the Public Broadcasting System and is a non-profit entity. The Northwest Arctic Borough acted as the applicant in this incident. The total for this incident is $41,226.77.

02-198 Shishmaref Seawall (Admin Order 194): Winds and high tides combined to strike the Shishmaref coastline from October 5 through October 7, 2001 and eroded inward as much as 50 feet. Some sections of the sand scarp were undercut as much as 16 to 20 feet due to the surf melting the underlying permafrost. In order to prevent further destruction of the coastline due to storms prior to tidewater freeze up, Governor Knowles issued Administrative Order No. 194 on October 27, 2001 which was not to exceed $110K (including DHS&EM administrative costs). These Public Assistance funds were to be used to establish a sacrificial sandbag revetment to last through the storm season. The total for this incident is $87,858.74.

02-199 Sleetmute Core Service Facility Fire (Admin Order 196): At approximately midnight December 20th, 2001, a fire destroyed the community building in Sleetmute. The building housed the clinic, Council Office, VPSO office, washeteria and the TV equipment for the ARCS station. The Disaster Policy Cabinet recommended that disaster assistance be provided to Sleetmute for, "full recovery or temporary measures only as appropriate for the parameters that will provide for a safe, secure and sanitary community by measures that are unable to be addressed through other State (non-DRF), and federal and non-profit agency's emergency funding resources." On May 24, 2002, the Governor signed AO 196 and provided funding not to exceed $150K. This was the unfunded balance after all other grant sources were exhausted. Total recovery costs for the village were estimated to be $2.26M. Disaster Relief Funds provided were an "improved project" category. Sleetmute was funded for the entire $150K.

02-200 02 Interior Floods (AK-DR-1423) Declared May 29, 2002 by Gov Knowles then FEMA Declared (DR-1423) on June 26 2002: Flooding occurred in various interior and western Alaska river drainages, including the Tanana, Kuskokwim, Nushagak, Susitna and Yukon River drainages beginning on April 27, 2002 and continuing. The floods caused widespread damage to and loss of property in the Fairbanks North Star Borough (Tanana River drainage); in McGrath, Lime Village, Sleetmute, Red Devil, Crooked Creek, Aniak and Kwethluk (Kuskokwim River drainage); Ekwok and New Stuyahok (Nushagak River drainage); in the Susitna River drainage from Chase to Montana Creek; and in Emmonak (Yukon River drainage). The following conditions exist as a result of this disaster: widespread damage to public facilities and infrastructure, including damage to public airports, roads, and buildings; to public utilities, including water , sewer, and electrical utilities; to personal residences, in some areas requiring evacuation and sheltering of residents; to commercial operations; and to other public and private real and personal property. Public & Individual Assistance provided as well as the 404 Mitigation Program. Added: Gov amendment dated July 12, 2002 added Alakanuk to the State Declaration. Gov declaration dated July 12, 2002 was also made for DOTPF to access FHWA Emergency Relief Funds for damages to roads in the State. Individual Assistance totaled $292K for 60. Public Assistance totaled $4.42 million for 29 applicants with 55 PW's. Hazard Mitigation totaled $725K. The total for this disaster is $6.13 million. (closeout data: $5.1 million total paid out($3.8 mil fed and 1.3 mil state)—includes $419,000 mitigation and $238,000 IA//posted 7/29/08-rbs)

03-201 Northwest Fall Sea Storm Declared October 23, 2002: Coastal storm surge flooding occurred in communities on the Northwestern coast of Alaska commencing on October, 8, 2002. A fall sea storm with 18-20 foot seas, extremely high winds, and strong tidal action caused severe damage. This storm was caused by a low pressure system moving down from the Arctic Ocean and settling over the Chukchi Sea and the Kotzebue Sound resulting in widespread damage and coastal flooding, including damage to public roads and other public real property. The Governor declared a disaster for the cities of Kotzebue and Kivalina in the Northwest Arctic Borough. On November 6, 2002, an amendment was made to the original declaration to include the community of Shishmaref. The Northwest Arctic Borough (NWAB) provided funds to the City of Kotzebue ($10,000) and the City of Kivalina ($5,000). NWAB was provided a grant to reimburse funds given to those communities. Shishmaref did not have any eligible damage or expenses. The total for this disaster is $382K. This is only for Public Assistance totaling $344K for 4 potential applicants with 1 PW.

03-202 Kenai Peninsula Borough Flooding (AK-DR-1445) Declared November 6, 2002 by Governor Knowles then FEMA Declared December 4, 2002. FEMA amended the Declaration to extend the incident period to December 20th: Starting October 23, 2002 through November 12, 2002, heavy rains (from three inches to fifteen inches) caused widespread damage, school closures, road washouts and stranded residents & hunters throughout the Kenai Peninsula Borough, the Kodiak Borough and the Chignik Bay area, including Chignik Lake and Chignik Lagoon. The driving rain continued for an extended time frame with multiple storm fronts. Although damages were widespread, the Kenai Peninsula Borough received the most damages. Damages in the Kenai Peninsula Borough consisted of road washouts, culvert damages, bridge damage at several locations, and private home damages caused by overflowing rivers and streams. The Kodiak Borough damages included road washouts, culvert damages, river spike damage, and damages to a pier caused by sea surge. The Four Dam Pool Power Agency received damages to their facility. The Chignik Bay area, including Chignik Lake and Chignik Lagoon damage consisted of sea surge damage

to docks and piers, damage a fuel of loading facility and dump truck, damage to a bridge in Chignik, and damage to the Department of Transportation-Chignik Lagoon Airport. The Kodiak Borough and Chignik Bay area also experienced private home damages. Federal Disaster Assistance for Individual Assistance, Debris Removal, Emergency Protective Measures and all categories of Permanent Work were provided under the Public Assistance Program. FEMA also authorized 404 Hazard Mitigation funding. Individual Assistance totaled $142K. Public Assistance totaled $16.6 million for 26 applicants with 118 PW's. Hazard Mitigation totaled $582K. The total for this disaster is $17.6 million.

03-203 Denali Fault Earthquake (AK-DR-1440) Declared November 6, 2002 by Governor Knowles then FEMA Declared November 8, 2002: A major earthquake with a preliminary magnitude of 7.9 occurred on the Denali Fault in Interior Alaska on November 3, 2002, with strong aftershocks. The earthquake caused severe & widespread damage and loss of property, and threat to life & property in the Fairbanks North Star Borough, the Denali Borough, the Matanuska-Susitna Borough, and numerous communities within the Delta Greely, Alaska Gateway, Copper River, and Yukon-Koyukuk Regional Education Attendance Areas including the cities of Tetlin, Mentasta Lake, Northway, Dot Lake, Chistochina and Tanacross, and the unincorporated communities of Slana and Tok. The areas experienced severe damage to numerous personal residences requiring evacuations and sheltering of residences; extensive damage to primary highways including the Richardson Highway, the Tok Cutoff, the Parks Highway and road links to communities including the road to Mentasta and Northway. Damage to supports for the Trans-Alaska Pipeline necessitated the shutdown of the pipeline. Additionally; fuel spills from residential storage tanks, significant damage to water, septic, sewer and electrical systems also occurred. Not all of the areas listed in the State disaster were included in the Federal Individual Assistance Program. Assistance to those areas was thought the State Individual Assistance Program. Additionally, not all of the areas listed in the State declaration were eligible for all categories of assistance under the federal Public Assistance Program. Those areas were only eligible for Debris Removal & Emergency Protective Measures under the Federal Public Assistance Program but were eligible for all Permanent Work categories under the State public Assistance Program. FEMA also authorized 404 Mitigation funding. DOT submitted an appeal letter after funding was denied by FEMA for permanent repair of the runways at Northway and Gulkana Airports. On August 10, 2004, FEMA granted the second appeal, which awarded DOT an extra $13.5 million to conduct the repairs. Individual Assistance totaled $67K for 12 applicants. Public Assistance totaled $24.8 million for 17 applicants with 53 PW's.

03-204 Southcentral Windstorm (AK-DR-1461) Declared March 28, 2003 by Governor Murkowski then FEMA declared April 26, 2003: A major windstorm with sustained and severe winds that exceeded 100 mph occurred between March 6 and March 14, 2003. The windstorm affected the Matanuska-Susitna Borough, the Municipality of Anchorage, and the Kenai Peninsula Borough. Severe damage occurred to numerous personal residences and local businesses; extensive damage occurred to public facilities (i.e. schools, libraries, community centers, airports, buildings and utilities) in the Matanuska-Susitna Borough, Municipality of Anchorage and the Kenai Peninsula Borough. Although damages were widespread, Anchorage facilities received the most damages. Federal Disaster Assistance for Debris Removal, Emergency Protective Measures and all Permanent Work categories were approved under the Public Assistance Program. FEMA also authorized 404 Mitigation funding and individual assistance under the Individual and Household Program. Individual Assistance totaled $48K. Public Assistance totaled $2.5 million for 24 potential applicants with 87 PW's. Hazard Mitigation totaled $532K. The total for this disaster is $3.47 million. (closeout data: $2.8 million total paid out (includes $220,000 mitigation and $47,600 State IA///posted 7/29/08 rbs).

03-205 Salcha Flood 2003 State Disaster (AK-03-205) Declared May 21, 2003 by Governor Murkowski: Warm temperatures in Central Alaska triggered an ice blockage on the Tanana River. The subsequent flooding in the unincorporated community of Salcha impacted 100 homes and caused the evacuation of approximately 40 residents. Salcha is located in the jurisdictional boundaries of the Fairbanks North Star Borough (FNSB). Flooding began on April 29, 2003. Flood water continued to rise and fall through May 7, 2003 as the water volume changed and ice jams dislodged and reformed. An emergency

shelter was opened by the American Red Cross at the Salcha School. The Shelter was never used because displaced residents chose to stay with family and friends. The FNSB Emergency Manager requested assistance from the State; an Emergency Management Specialist was dispatched to assist. The Civil Air Patrol was used to gather reconnaissance photos of the ice blockages and flooded area. During the incident period, a community meeting was held to listen to resident's concerns. Participants included the Commissioner for the Department of Transportation, the Commander for the Army corps of Engineers, and the Division of Emergency Management. Damages included residential homes, roads (local and state), culverts (local and state) and damage to a dike. Disaster Assistance for Debris Removal, Emergency Protective Measures and Permanent Work category C were approved under the State Public Assistance Program. No Federal Disaster Assistance was requested. Individual assistance totaled $118k for 43 applicants. Public Assistance totaled $230K for 6 potential applicants with 8 PW's.

04-206 03 July Riverine Flooding (AK-04-206) Administrative Order Number 212 by Governor Murkowski: Heavy flooding during the period July 14, 2003 through August 3, 2003 caused damages to the Department of Transportation roads and bridges, local businesses and some residential homes. The Denali Borough declared a local disaster and requested assistance from the State. An Emergency Management Specialist and Assistant were sent to assess damages. The Division of Homeland Security and Emergency Management procured and provided 2000 sandbags and 24 potable water containers to the Denali Borough for emergency response. The Department of Transportation damages included areas on the Chena Hot Springs Road, the Elliot Hwy, and the Parks Hwy at Honolulu Creek and Carlo Creek. Several businesses in the affected area were damaged. The American Red Cross responded to the area but residents did not require services. The Small Business Administration provided financial counseling to local residents and businesses. The Denali Borough's request for state assistance, beyond what was provided for emergency response, was denied by the Governor. Disaster Assistance for Debris Removal, Emergency Protective Measures and Permanent Work category C were approved under the State Public Assistance Program. No Federal Disaster Assistance was requested. Total for this disaster is $340K. There were 2 applicants and 11 PW's for Public Assistance.

04-207 03 Fall Flood (AK-04-207) Declared November 3, 2003 by Governor Murkowski: Unseasonable amount of rain during the period of September 26 through October 3, 2003 caused heavy flooding in the Lake and Peninsula Borough, the Kenai Borough and the Kodiak Island Borough. The Lake and Peninsula Borough declared a local disaster emergency. The Kenai Borough did not declare a disaster emergency but extended a letter of support for the Lake and Peninsula Borough declaration. The heavy rains resulted in localized flash flooding and some general flooding. The Department of Transportation experienced extensive damage on the Chiniak Hwy in Kodiak and to multiple locations on the Williamsport-Pile Bay road in the Lake & Peninsula Borough and the Kenai Borough. The Department of Transportation requested emergency repair funds for the Chiniak Hwy; they will use Statewide Transportation Improvement Program funds for the permanent repair. Other damage to Department of Transportation facilities included damage at Pedro Bay and South Naknek airports. The Department of Transportation used in-house and deferred maintenance funds to make repairs to the damages at the airports. The Tanalian Electric Cooperative in Port Alsworth experienced damage to overhead power lines resulting in power failures. Disaster Assistance for Emergency Protective Measures and Permanent Work category C were approved under the State Public Assistance Program. No Federal Disaster Assistance was requested. Total estimate for this disaster was $342,136. Actual expenditure was $235,407. This is only for Public Assistance for 2 applicants with 4 PW's.

04-208 03 Kasaan Landslide (AK-04-208) Declared January 29, 2004 by Governor Murkowski: On October 17, 2003 a stream debris basin failure caused a large landslide that damaged the City of Kasaan's potable water system. The land/debris slide caused damage to the water treatment facility by washing out the road to the water treatment plant, filled the stream impoundment with rocks and debris, exposed a buried water transmission line, destroyed a small stringer bridge, and deposited debris around the water treatment plant preventing normal access. The City of Kasaan declared a local disaster emergency and requested State assistance. Although the water treatment plant was still operational, the repair of the system was beyond the ability of the community. The State did send a Department of Transportation hydrologic

engineer to assess the damages. Emergency Protective Measures and Permanent Work-category C were approved under the State Public Assistance Program. No Federal Disaster Assistance was requested. The total for this disaster is $443K. This is only for Public assistance for 2 applicants with 3 PW's.

04-209 03 Fall Sea Storm (AK-04-209) Declared January 29, 2004 by Governor Murkowski: A series of sea storms with high winds and tidal surge during the period of November 1 to November 24, 2003 caused damages in the communities of Unalakleet, Diomede, and Port Heiden. Damage was also reported by the Department of Transportation. The City of Unalakleet and Port Heiden declared local emergencies and Diomede requested assistance in a letter to the Division of Homeland Security and Emergency Management. The Department of Transportation reported damages in Nome on the Nome-Counsel Road (MP 22 and 23.8) and at the Unalakleet airport. The City of Unalakleet had a large quantity of debris deposited throughout the road system. Damages to a gabion protection wall, roads and exposure of a water line were also experienced. Port Heiden experienced tidal erosion that exposed two grave sites, a power line and endangered a road. The US Air Force, under the coordination of the Division of Homeland Security and Emergency Management, addressed the issue of the two grave sites. Disaster Assistance for Emergency Protective Measures and Permanent Work category C for the City of Port Heiden, the Department of Transportation and Unalakleet, category F for Port Heiden and debris removal for Unalakleet were approved under the State Public Assistance Program. No Federal Disaster Assistance was requested. No Hazard Mitigation was applicable. The total for this disaster is approximately $654K. This is for Public Assistance for 4 potential applicants with 5 PW's.

04-210 04 Interior Fires (DNR-Declared): On June 29, 2004 declaration was made for DNR to provide fire suppression activities to prevent continuing and new fires from threatening life and property. On July 1, 2004 the Fairbanks North Star Borough (FNSB), the Alaska Department of Natural Resources (DNR) and the Alaska Interagency Coordination Center (AICC) requested that the Alaska Division of Homeland Security and Emergency Services (DHS&EM) assist with evacuation of local residents threatened by growing wildfires. On July 1, 2004 the Alaska Department of Natural Resources and DHS/EM staff on scene determined that local resources, both within FNSB and the surrounding unorganized borough were becoming overwhelmed by the five major fires burning in the region. Dense smoke has limited visibility, hampered air operations in the region and prompted health warnings for residents of Interior Alaska. The funding and assistance for this disaster is administered by DNR; therefore, DHS/EM has not data on applicants or total amount of funding.

05-211 2004 Bering Strait Sea Storm declared October 28, 2004 by Governor Murkowski then FEMA declared (DR-1571) on November 15, 2004. Amended declaration to extend incident to October 24, 2004: Between October 18 and 20, 2004, a severe winter storm with strong winds and extreme tidal surges occurred along the Western Alaska coastline, which resulted in severe damage and threat to life and property, specifically in the Bering Strait Regional Educational Attendance Area (REAA), including Elim, Nome, Koyuk, Shaktoolik, Unalakleet, and other communities; in the Northwest Artic Borough, including Kivalina, Kotzebue, and other communities; and the City of Mekoryuk; with potentially unidentified damages in adjacent areas, and additional storm surges likely from continuing weather patterns in this area. Northwest Artic Borough's coastal communities included: severe roadway, power distribution systems, and drain field damages. The Bering Strait REAA received severe damage to gabions (used to protect shoreline), major damage to coastal highways and roads, damage to water and septic systems, damage to a bridge, damage to power distribution systems, damage to fuel storage tanks, fuel spills, and property damage. Conditions that exist in the City of Mekoryuk as a result of this disaster: major damage to sea wall and damage to roadways. On November 16, 2004, the declaration was amended to reflect a more accurate timeframe of the disaster. The City of St. George appealed the denial of funding decision for the breakwater. The appeal was granted, which increased the original estimate for total funding of this disaster by more than $3 million. The dates of the severe storm were changed to October 18 through October 24, 2004. Individual assistance totaled $1 million for 271 applicants. Public Assistance total $13 million for 60 potential applicants with 125 PW's. Hazard Mitigation totaled $800K. The total for this disaster is $17 million.

05-212 2005 Kaktovik Winter Storm declared January 15, 2005 by Governor Murkowski then FEMA declared (DR-1584) on March 14, 2005: Over a week-long period beginning on January 7, 2005, a severe winter storm with extremely low temperatures, 60-knot winds, and blizzard conditions enveloped the coastal city of Kaktovik, Alaska. The high winds blew down several power lines and caused the backload and subsequent shut down of the main electrical grid and generators. On January 8, 2005, approximately 60% of the city was without power. Attempts to restore power at the main power plant continued over the next day with intermittent success; however, power was lost to the entire city, including 107 homes, and the airport, by late afternoon on January 9, 2005. At 1700 hours, the North Slope Borough (NSB), which provides all public utilities for the city, notified the State Emergency Coordination Center (SECC) and Division of Homeland Security & Emergency Management (DHS&EM) that the city was in danger of city-wide freezing damage to water and sewer transmission pipelines, and requested emergency transportation of life safety repair technicians and repair equipment to the city of Kaktovik. Individual Assistance total $85K for 63 applicants. Public Assistance totaled $5.6 million for 6 applicants with 19 PW's. Hazard mitigation totaled $455K. The total for this disaster is $6.7 million.

05-213 2005 Spring Floods (AK-05-213) declared July 20, 2005 by Governor Murkowski: Beginning May 13, 2005, a large ice jam blocked the mouth of the Lower Yukon River and caused widespread flooding to the cities of Emmonak and Alakanuk. In both cities, several roads were inundated and eroded by the floodwaters. Floodwaters also inundated city infrastructure to include the above-ground circulating water and vacuum sewage systems which were displaced and/or knocked off their mounting supports. Both cities have submitted local disaster declarations requesting State assistance. There were no life safety issues during this event. Floodwaters subsequently subsided to normal levels within the river banks on or about May 18, 2005. Additionally, in the city of McGrath, beginning on May 3, 2005, ice jam flooding eroded several local roads, including Takotna Avenue and Cranberry Ridge Road, and unusually high water levels threatened city infrastructure and private homes, in the City of McGrath. The city infrastructure at risk included: the City Office building which housed the water plant, health clinic, fire station, laundromat, and State Trooper Office; the utility corridor containing power and water lines; two marine fuel headers and associated tank farms; and Federal and State offices and housing. Several private homes were cut off from emergency services due to impassable roads. Takotna Avenue is a main transportation avenue in town. The road also serves as a levee against rising river water that if breeched, would threaten a large portion of the City of McGrath. The City of McGrath signed a local disaster declaration and requested State assistance on May 13, 2005. The high water levels at McGrath receded slowly from May 14 to 18, 2005. Individual Assistance totaled $300K for 75 applicants. Public Assistance totaled $1.06 million for 3 applicants with 8 PW's. The total for this disaster is $1.55 million.

06-214 2005 Bristol Bay Storm (AK-06-214) declared October 03, 2005 by Governor Murkowski: On August 23, 2005, a strong storm with high winds combined with high tides produced storm surges of 2 to 3 feet above the high tide levels and caused widespread coastal flooding in the upper Bristol Bay area. Public infrastructure, commercial property, and personal property damages were reported in the City of Clark's Point, the nearby unincorporated community of Ekuk, and the City of Togiak. Damages were also reported in Lake and Peninsula Borough, Bristol Bay Borough and the City of Dillingham. Lake and Peninsula Borough, Bristol Bay Borough and the City of Dillingham elected not to declare local disasters and are not seeking assistance. Clark's Point and Togiak have each signed local disaster declarations and are asking for state Individual Assistance and Public Assistance in response and recovery from this storm. Individual Assistance totaled $131,890 for 39 applicants(w/admin =$157,465). Public Assistance totaled $~~157K~~ (final amount was 77,111 + 29,427 admin=$106,539)for 3 applicants and 11 PW's. The total for this disaster is $~~326K~~.(final total $264,004). Administrative closeout on Jan 18, 2008. Formal closeout letter to DMVA/DAS was Nov 6, 2008. (RBS, Nov 7, 008)

06-215 2005 West Coast Storm declared October 24, 2005 by Governor Murkowski then FEMA declared (DR-1618) on December 9, 2005: Beginning on September 22, 2005 and continuing through September 26, 2005, a powerful fall sea storm produced high winds combined with wind-driven tidal surges resulting in severe and widespread coastal flooding and a threat to life and property in the Northwest

Arctic Borough, and numerous communities within the Bering Strait (REAA 7), the Kashunamiut (REAA 55), the Lower Yukon (REAA 32) and the Lower Kuskokwim (REAA 31) Rural Education Attendance Areas including the cities of Nome, Kivalina, Unalakleet, Golovin, Tununak, Hooper Bay, Chevak, Mekoryuk and Napakiak. The following conditions existed as a result of this disaster: sever damage to personal residences requiring evacuation and sheltering of the residents; to businesses; to drinking water systems, electrical distribution systems, local road systems, airports, seawalls, and other public infrastructure; and to individual personal and real property; necessitating emergency protective measures and temporary and permanent repairs. On October 25, 2005, a request for a federal time extension was submitted. On December 9, 2005 a presidential disaster was declared (DR-1618) for Public Assistance for the Northwest Arctic Boro, Bering Strait REAA, Kashunamiut REAA (Chevak) and the Lower Kuskokwim REAA however, they failed to include the Lower Yukon REAA in the federal declaration. The State will write Project Worksheets for the Lower Yukon REAA under or State Public Assistance Declaration. Individual Assistance total is estimated at $209K, with 220 applicants. Public Assistance is around $3.63 million for 16 potential applicants with around 20 PW's. Hazard Mitigation total is $254K. The total cost for disaster is estimated at $5.33 million.

06-216 2005 Southeast Storm (AK-06-216) declared December 23, 2005 by Governor Murkowski: Beginning on November 18, 2005 and continuing through November 26, 2005, a strong winter storm with high winds and record rainfall occurred in the City/Borough of Juneau, the City/Borough of Haines, the City/Borough of Sitka, the City of Pelican, the City of Hoonah, and the City of Skagway, which resulted in widespread coastal flooding, landslides, and severs damage and threat to life and property, with the potential for further damage. The following conditions exist as a result of this disaster: severe damage to personal residences requiring evacuation and relocation of residents; to individuals personal and real property; to businesses; and to a marine highway system dock, the road systems eroded and blocked by heavy debris that prohibited access to communities and residents, and other public infrastructures, necessitating emergency protective measures and temporary and permanent repairs. The total estimated amount of assistance is approximately $1.87 million. This includes the following: Individual Assistance totaling $500K for 52 applicants and Public Assistance totaling $1.1 million for 14 applicants and 31 PW's. There was no hazard mitigation. Nov 21,08 update—Closeout later to DAS total cost of $1,684,311 (included $183,088 for IA, plus IA Admin of $35,748, PA Grantee admin of $133,779, and subgrantee admin allowance of $30,290.) Lapse to DRF was $183,586. RBS-11/28/08.

06-217 2006 South Central Storm (AK-06-217) declared March 13, 2006 by Governor Murkowski: Beginning on February 5, 2006 and continuing through February 11, 2006, a series of strong winter storms with high winds, heavy snow, and freezing rain occurred in the City of Seward and surrounding areas of the Kenai Peninsula Borough in South Central Alaska, causing avalanches that severely damaged power lines and other infrastructures, blocked roads, and threatened further damages. As a result of the disaster, there was severe damage to power transmission and distribution lines supplying the City of Seward and surrounding areas; disruption of normal power supply requiring the prolonged use of emergency backup generators with extraordinary expensive operation costs; and damage and threat to public and private property as a result of power disruption. On March 13, 2006, a letter was submitted to request a federal time extension of 30 days. As of 3/20/06, the decision is pending. Decision made not to seek Federal assistance. Current estimated cost for repairs is $1,254,730; however, this does not include the ongoing cost of line repair. No federal declaration was sought; therefore, the State is limited to public assistance only (no HM or IA). As of 3/20/06, only the City of Seward and Sealife Center are applicants. Disaster administratively closed out and letter sent to applicants on 6/29/07. (7 Nov 08 update)--Formal closeout letter to DMVA/DAS was dated 6 Nov 08 (funds authorized = $1,465,321; funds expended =$1,306.509.72; funds lapsed to DFR = $158,811.28. (7Nov08, R.B. Stewart)

06-218 2006 Spring Floods (AK-06-218) declared June 27,2006 by Governor Murkowski then FEMA declared (DR-1657) on August 04, 2006: Beginning May 5, 2006 continuing through May 30, 2006, the National Weather Service (NWS) issued flooding warnings and watches across the state as excessive snowmelt and ice jams caused flooding along the Yukon, Kuskokwim, and Koyukuk river drainages. The most serious impacts were reported in the communities of Hughes, Koyukuk, Kwethluk,

Alakanuk, and Emmonak, along with substantial damage to State-maintained airports, roads, and highways. In each community, large portions of the village, city infrastructure, and several roads were inundated and eroded by the floodwaters. Total eligible state damages (item V.C. Remaining Costs, $6,704,370) less ineligible repairs for Federal-Aid roads ($469,600), less IA funds ($485,000), less ERFO road costs ($240,500) still leaves approximately $5,509,270 that may be eligible under FEMA's Public Assistance program.

07-220 2006 August Southcentral Flooding (AK-07-220) declared August 29,2006 by Governor Murkowski then FEMA declared (DR-1663) on October 16,2006: Beginning on August 18, 2006 and continuing through August 24, 2006, a strong weather system centered causing severe flooding resulting in severe damage and threats to life and property, in the Southcentral part of the State including the Matanuska-Susitna Borough, the City of Cordova and the Copper River Highway area in the Chugach Rural Education Attendance Area (REAA), the Richardson Highway area in the Copper River REAA and Delta/Greely REAA, the Denali Highway area, and the Alaska Railroad and Parks Highway areas in the Matanuska-Susitna Borough and the Denali Borough. Damage cost estimates are near $21 million in Public Assistance primarily for damage to roads, bridges and rail lines. Individual Assistance estimates are near $2 million.

07-219 2006 Hooper Bay Fire (AK-07-219) declared August 6, 2006 by Governor Murkowski then FEMA declared (DR-1666) on October 27, 2006: Beginning on August 3, 2006 and continuing through August 4, 2006, the Second Class City of Hooper Bay, Alaska sustained severe losses and threats to life and property from a community structure fire that has destroyed the elementary school, the high school, school support facilities, and 14 homes. As a result of this disaster the homes and personal property of 17 families consisting of 66 people are lost and 400 students do not have educational facilities. There are also potential water contamination and air quality issues. The eligible damage estimate is $10 million.

07-221 2006 October Southern Alaska Storm (AK-07-221) declared October 14, 2006 by Governor Murkowski FEMA declared (DR-1669) on December 8, 2006: Beginning on October 8, 2006 and continuing through October 13, 2006, a strong large area of low pressure that developed in the Northern Pacific and moved into the Southwest area of the state, produced hurricane force winds throughout much of the state and heavy rains in the Southcentral and Northern Gulf coast areas, which resulted in severe flooding and wind damage and threats to life in the Southern part of the state, to include the Kenai Peninsula Borough including the Cities of Seward and Seldovia, the Chugach Rural Education Area including the City of Cordova and the City of Valdez, and the Copper River Rural Education Area including the Richardson Highway to the Glennallen and highways and drainages in the McCarthy areas. Initial total damages are estimated at $557,415 with a public assistance estimate of $456,855. Federal declaration was made December 2006 including assistance for Public Assistance and Hazard Mitigation but not including Individual Assistance. Revised State of Alaska Cost estimates are $1,265,000 in Individual Assistance and $38,241,826 in Public Assistance for a total cost of $39,506,826. There is $26,825,918 available from the Federal Highway Administration leaving a requested amount of $13,948,999. A total of 10 individuals or households applied for assistance through the State's IA Temporary Housing program. Six eligible applicants received a total of $93,611.21 for home replacement, major repair and mitigation, and/or for temporary housing accommodations. Each TH applicant involved extensive case management. The temporary housing program closed 3/10/2008.

07-222 2006 October Kivalina Storm, Administrative Order #231, issued November 19, 2006 by Governor Frank H. Murkowski: October 11, 2006 through October 13, 2006 a fall sea storm with sustained high surf and storm surge caused severe wave damage and coastal erosion in the City of Kivalina. Through local declarations on October 19, 2006 the Northwest Arctic Borough and the City of Kivalina requested assistance to repair the seawall and protect community infrastructure. The Alaska village Electric Cooperative also requested state disaster emergency. In accordance with AS 26.23.020(h) assistance from the disaster relief fund was found appropriate by Governor Murkowski to cover eligible emergency response costs and emergency protective measures. Permanent repairs to or replacement of the seawall were not found

to be appropriate for funding. The amount of funding was not to exceed $235,000 including administrative fees. Governor Murkowski also directed the Department of Commerce, Community, and Economic Development (consistent with AO 175) to coordinate with other state and federal agencies to propose long-term solutions to the ongoing erosion issues in Kivalina and other coastal communities in the state of Alaska.

07-223 2007 January Kenai Ice Jam Flood, AK-07-223, issued March 02, 2007 by Governor Sarah Palin: Beginning on January 25 and continuing through February 4, 2007, Skilak glacier-dammed lake breached releasing a four-foot high surge of water into the Kenai River that ultimately dislodged river ice, moved the ice rafts downriver and created ice jams as various points along the river. These ice rafts, some up to 4 feet thick and weighing several tons destroyed or damaged public and private riverbank fishing platforms, stairs, and elevated walkways as they moved downriver. Where ice jams formed, the water and ice rafts overtopped the riverbanks (some up to 15 feet high) and flooded several public campgrounds, fishing parks, and residential homes from the community of Sterling to the City of Soldotna, within the Kenai Peninsula Borough. Approximately 150 homes and riverside businesses in the City of Soldotna and in the Big Eddy, Poacher's Cove, and River Quest portions of the Kenai Borough reported damage to their buildings, fishing structures, and/or docks; another 775 home properties within the borough were also impacted by floodwaters or ice. Some of the damaged fishing platforms were specially designed for handicap access. A voluntary evacuation program was instituted in several areas. Some roads were inundated and impassable due to high water. Ice jams also threatened the temporary highway bridge at Soldotna when the water level rose to 20 feet; however, the water dropped before damage could occur to the bridge or embankment. Preceding the flooding, the National Weather Service issued flood warnings, watches and advisories.

Confirmed damages occurred along the Kenai River in the Kenai Peninsula Borough, especially in the area of the City of Soldotna. Public infrastructure, commercial property, and personal property damages were reported in the metropolitan areas and the borough. The Division of Homeland Security and Emergency Management (DHS&EM) has received local disaster declarations from the City of Soldotna through the Kenai Peninsula Borough, requesting State disaster assistance; and from the Kenai Peninsula Borough, dated Feb 13, 2007, expanding the event date through February 5 and expanding the impacted area to include from Skilak Lake to the mouth of the Kenai River into the Cook Inlet. Due to the severity of the initial damage reports, the Governor inspected the flooding damage on February 3, 2007.

08-224 2007 Beaver Generator Fire, AK-08-224, issued September 14, 2007 by Governor Sarah Palin: On July 29, 2007, during the installation of a new generator in the Beaver Village power plant, a welding spark ignited a fire that completely engulfed and consumed the power plant. The building and all of its contents including the new generator and two backup generators were completely destroyed. The Beaver Village Council had used Legislative Grant funding to purchase the new generator and hired Marsh Creek LLC to install the new generator. An employee of the contractor installing the generator was welding in the building at the time of the fire.

On August 6, 2007, The Division of Homeland Security & Emergency Management (DHS&EM) received a local disaster declaration and request from First Chief of the Beaver Village Council, Selina Petruska seeking State assistance in replacing the Power Plant Building and power generating facilities before the onset of winter.

08-225 2007 Kivalina Storm Admin Order # 239 issued by Governor Palin on January 22, 2008:

On September 12 and 13, 2007, a low pressure system from the Bering Sea generated storm conditions and coastal flood warnings for communities along the Chukchi Sea coast, including the Cities of Kivalina, Shishmaref, and Point Hope. Substantial coastal erosion by high winds, storm surge, and high waves generated by the storm further damaged the existing sea wall adjacent to the Alaska Village Electric Corporation (AVEC) bulk fuel facility. The Northwest Arctic Borough (NWAB) sent a disaster declaration to the Division of Homeland Security and Emergency Management (DHS&EM) on September 25 that included AVEC's response and tank farm relocation costs.

09-226 2008 Tanana Basin Flooding (AK-09-226) declared August 4,2008 by Governor Palin then FEMA declared (DR-1796) on September 26, 2008: Beginning on July 27, 2008 through August 6, 2008, a strong large area of low pressure developed in the Beaufort Sea near the northern border of the state, bringing a series of storms that moved from the northwest coast into the interior. These severe storms caused losses of property and threats to life and property in the Fairbanks North Star Borough, the North Slope Borough including the cities of Wainwright and Kaktovik, the Yukon-Koyukuk Regional Educational Attendance Area (REAA) including the City of Nenana, and the Denali Borough. The preliminary life safety assessments and joint preliminary damage assessments with FEMA indicated the most severe impacts were to highways, roads, buildings, sea walls, runways, water, sewer, and electric utilities, homes, and businesses.

- The City of Nenana, suffered major damages to lift stations which are critical to the city sewer system. All of the lift stations serving the City of Nenana were either operating at reduced capacity or completely inoperable, placing the city at increased risk for public health hazards. The City of Nenana, Nenana City School District and Nenana Native Tribal Council all experienced significant impacts to buildings and/or equipment requiring major repairs or total replacement.
- The Fairbanks North Star Borough (FNSB) experienced damages to local roads and flood waters caused many homes and businesses to be inaccessible.
- Golden Valley Electric Association's supply routes in the borough were impacted, leaving some residents without power for several days.
- The North Slope Borough suffered extensive damages to its sea-wall located in Wainwright leaving the community susceptible to severe flooding associated with fall sea storms which typically occur this time of year. The North Slope Borough also experienced major damages to the seawall and runway located in Kaktovik preventing complete use of the runway by larger aircraft, which normally supply food and other essential items to the community.
- The Denali Borough experienced damages to local roads and bridges preventing access to homes, requiring transient accommodations until access could be re-established.
- The Department of Transportation and Public Facilities (DOT&PF), Department of Natural Resources (DNR), and the Alaska Rail Road Corporation (ARRC) suffered damages to their facilities as a direct result of this event. DOT&PF damages were limited to roads located within the FNSB and to some equipment and supplies in Nenana. DNR damages were also restricted to locations within the FNSB and consisted of damages to roads and recreational areas. ARRC damages were more extensive requiring total shutdown of all northbound freight and passenger service due to track failures in Nenana and in the Healy Canyon in the Denali Borough.

09-227 2009 Spring Flood declared by Governor Palin on May 6, 2009 then FEMA declared under DR-1843 on June 11, 2009: Extensive widespread flooding due to snow melt and destructive river ice jams caused by rapid spring warming combined with excessive snow pack and river ice thickness beginning April 28, 2009 and continuing. The ice jams and resultant water backup along with flood waters from snow melt left a path of destruction along 3,000 miles of interior rivers, destroying the Native Village of Eagle and forcing the evacuation of multiple communities. The following jurisdictions and communities in Alaska have been impacted: Alaska Gateway Rural Regional Educational Attendance Area (REAA) including the City of Eagle and Village of Eagle; the Copper River REAA including the Village Community of Chisotchina; the Matanuska-Susitna Borough; the Yukon Flats REAA including the City Community of Circle, and City of Fort Yukon, the Villages Communities of Chalkyistik, Beaver, Stevens Village, and Rampart; the Yukon-Koyukuk REAA including the Cities of Tanana, Ruby, Galena, Koyukuk, Nulato, and Kaltag; the Iditarod Area REAA including the Cities of McGrath, Grayling, Anvik, and Holy Cross; the Northwest Arctic Borough including the Cities of Kobuk, and Buckland; the Lower Yukon REAA including the Cities of Russian Mission, Marshall, Saint Mary's, Mountain Village, Emmonak, Alakanuk and Pilot Station and the Community of Ohogamiut; the Lower Kuskokwim REAA including the Cities of Bethel, Kwethluk, Napakiak, Napaskiak, and the Village Community of Oscarville; the Yupiit REAA including the City of

Akiak, and the Villages of Akiachak, and Tuluksak; the Kuspuk REAA including the Cities of Aniak, Upper Kalskag, Lower Kalskag, and the Villages Communities of Stony River, Sleetmute, Red Devil, Crooked Creek, and Napaimute; the Fairbanks North Star Borough including the City of North Pole and Community of Salcha; the Bering Strait REAA including the City of Nome area.

09-228 Pelican Admin Order (AO 259) signed by Governor Parnell on September 29, 2009: Beginning on August 16, 2009, the City of Pelican, Alaska experienced an extreme rainfall event with approximately 10 inches of rain over a 48-hour period. The event caused severe flooding that overwhelmed and weakened the primary water supply flume for the Pelican hydroelectric and the drinking water supply systems. Excessive debris entered the dam's water intake, caused several breaks in the water distribution system, and clogged supply lines. Four days later, approximately 30 feet of the flume collapsed disrupting the water supply to the community.

The reservoir, flume, and distribution systems are shared infrastructure between the City of Pelican and the Pelican Utility District (PUD). The City of Pelican water utility provides drinking water for community residents and cooling water for the refrigeration system at the Pelican Seafood fish-processing facility. The Pelican Seafood facility is now abandoned; however, cooling water is still supplied to the facility to maintain the freezers. PUD uses the same infrastructure to generate hydroelectric power for the community.

09-229 2009 October Kodiak Storms declared by Governor Sean Parnell on November 5, 2009 then FEMA declared on December 18, 2009 (DR-1865): Beginning on October 9, 2009 and continuing, the Kodiak Island Borough, Kodiak, Alaska experienced a series of storms producing extreme rainfall within the Borough. Within 24-hours, the precipitation reached approximately 6.4 inches. On October 21, 2009 the Borough experienced another significant rainfall of 5.5 inches causing additional road failures and closures. The event caused severe rock/mudslides, road washout/sloughing, and flooding. Excessive debris clogged several culverts causing the water to flow over the roads and wash them out in several locations. Alaska Department of Transportation (DOT) closed roads and the airport. The hydroelectric plant was closed due to flooding; necessitating the use of the diesel generators in order to supply power to the community.

09-230 2009 Seward Storm Surge declared by Governor Parnell on December 31, 2009: On December 1, 2009 the City of Seward experienced a winter storm event that caused damage to the shoreline and an important roadway within the community. High winds, 3 plus inches of rainfall, and a 12.6 foot tide, caused extensive damage to the wave barrier along Lowell Point Road, the Seward Greenbelt area and the seawall at the Alaska Sea Life Center.

10-231 2010 July Interior Flooding declared by Governor Parnell on July 26, 2010: Beginning on July 10, 2010 and continuing through at least July 13, 2010, heavy rainfall through the Upper Tanana and Yukon River Basins caused severe flooding along several creeks along the Taylor Highway, Nabesna Road and the Alaska Highway. The damages are located within the Alaska Gateway Rural Education Attendance Area (REAA 3) and the Copper River Rural Education Attendance Area (REAA 11). There are no official jurisdictions in the areas.

Heavily damaged areas are primarily between MP 64 near Chicken MP 160 in Eagle. Damages include: landslides, washouts, erosion and bridge abutment and culvert damage. Minor damages are flood related on the Tok Cutoff at MP 123 and the Alaska Highway at MP 164.

11-232 2010 Savoonga Power Outage declared by Governor Parnell on January 14, 2011: Beginning on December 26, 2010 and continuing through January 6, 2011, a severe winter storm with extremely low temperatures, 60 mph winds, wind chills to minus 50 degrees Fahrenheit, and blizzard conditions enveloped the coastal city of Savoonga, Alaska. The severe weather blew ice-laden transmission lines together and the resulting arcing shorted out the electrical system causing a community-wide power outage.

Approximately 60% of the city was without power including several public buildings, the ANICA store, health clinic, fire hall, the airport runway lighting and telecommunication systems, and most of approximately 160 private homes. On December 27, the Mayor of Savoonga notified the Governor's Office

that the city was out of power and in danger of city-wide freezing damage to water and sewer transmission pipelines, and requested assistance. The outage caused water and sewer lines in several buildings and private homes to freeze requiring the evacuation and sheltering of up to 147 of the city's 721 residents (over 20% of the population) for six days. As a result of the freezing temperatures and/or warming after power and heat were restored, the frozen lines ruptured and flooded the interior of several buildings.

11-233 2011 Spring Flooding declared by Governor Parnell on May 17, 2011 then FEMA declared on June 10, 2011 (DR-1992): Beginning on May 8, 2011 and continuing through May 9, 2011, the Villages of Red Devil and crooked Creek sustained flooding because of an ice jam that formed on the Kuskokwim River, which resulted in 54 residents being evacuated and extensive damage to homes and public infrastructure. A total of 15 homes were destroyed or otherwise not habitable. Middle Kuskokwim Electric Cooperative sustained approximately $80,000 in damages to the electrical power distribution infrastructure.

- Labor Support of Volunteers (PW not written)- $50,000.00
- Bus Barn cleaning
- Porta-Potty Maintenance
- Washeteria agreement
- Phone Line for SP
- Labor, equipment and fuel for building material movement and staging
- Equipment Support of Volunteers (PW not written)- $20,000.00
- Fuel and maintenance costs for CCTC equipment to build housing pads
- Power extension to home sites (PW not written) - $25,000.00
- Road repair necessary due to damage from heavy equipment usage (PW not written) - $20,000.00
- School utilization in support of volunteers (PW not written) - $25,000.00
- Bus Barn for sleeping/storage
- Cooking/feeding of volunteers

12-234 2011 Birch Creek Fire declared by Governor Parnell on August 9, 2011: On May 26, 2011 the tribal office building in Birch Creek caught fire. The fire spread and destroyed the community's power plant, tribal office, potable watering point, and telephone building. On June 2, 2011, The Division of Homeland Security & Emergency Management (DHS&EM) received a local disaster declaration and request from the Tribe seeking State disaster assistance for emergency protective measures, temporary and permanent repairs to village infrastructure, and technical and funding assistance needed to repair or replace damaged facilities. Since the fire, temporary power has been restored to the village. Alaska Energy Authority (AEA) has delivered and installed a 28kw generator at the old school that is providing power for the community. A satellite telephone was provided to the community as United Utilities attempts to restore some local and long distance telephone service. Arctic Resources Group, LLC, and Tanana Chiefs Conference Division of Environmental Health have provided bottled water for the community, and are working on a temporary water source.

12-235 2011 Dot Lake Fire declared by Governor Parnell on October 4, 2011: At approximately 11:00 PM, August 28, 2011, a fire at the village utility building occurred. Local efforts to suppress the fire with available equipment were unsuccessful and the entire building and its contents were destroyed. The building housed the local washeteria and showers. The facility also provided water and heat for several home homes in the community through an underground utilidor and is utilized as a watering point for other residents in the area. Due to the fire, electrical power has been lost to the local community building and the clinic. Six families are without water and five families are without adequate heat. Two families have Toyo stoves and two families have wood stoves as back up, these backup systems will not prevent their water lines from freezing nor is there any method of preventing the water lines in the underground system from freezing. This facility served 55 people in Dot Lake Village and the immediate area.

12-236 2011 West Coast Storm declared by Governor Parnell on December 5, 2011 then FEMA declared December 22, 2011 (DR-4050): On November 7, 2011 the National Weather Service (NWS) issued the first of several coastal flood warnings for the western coastline of Alaska from Hooper Bay to the North Slope. The NWS warned of "a rapidly intensifying storm…expected to be an extremely powerful and dangerous storm…one of the worst on record." Over the next three days additional warnings in response to the 942 millibar (mbar) low pressure system were issued for coastal villages as the storm moved northerly from the Aleutian Islands into the Bering and Chukchi Seas. The west coast was impacted with hurricane force winds exceeding 85 mph, high tidal ranges, and strong sea surges up to 10-ft above mean sea level (msl). Before the first storm had passed, a second equally-low pressure system (e.g., 942 mbar) impacted the western coastline from the Yukon-Kuskokwim Delta south to Bristol Bay. This combined weather extended the incident period for the state to November 13, 2011. The FEMA declaration was limited to the incident period from November 8 – 10, 2011.

12-237 2011 Kenai Peninsula Windstorm declared by Governor Parnell on December 12, 2011 then FEMA declared February 2, 2012 (DR-4054): On November 1, 12, and 15, 2011, a series of major windstorms caused widespread power outages threatening life and property. Power was disrupted to 17,300 homes and businesses. Local utilities, Homer Electric Association (HEA) and Chugach Electric employed several work crews to restore power to the area. Public Infrastructure, commercial property, and personal property damages were reported in the metropolitan areas and throughout the borough. DHS&EM received local declarations from the Kenai Peninsula Borough (KPB) requesting state disaster assistance to cover immediate response, public and individual costs and from the City of Seward through the KPB requesting State assistance.

12-238 2012 Prince William Sound Winter Storm declared by Governor Parnell on February 9, 2012: Beginning in mid-December, 2011 and continuing through January 2012, the City of Cordova and Prince William Sound area began receiving snowfall that put them on a pace to approach or break record seasonal precipitation accumulations. On December 12, the City of Cordova began working in emergency snow removal status. The Cities of Valdez and Yakutat had been facing similar challenges. Avalanches across roadways and extreme conditions have limited or cut off access to airports and other critical infrastructure and endangered public, private and commercial facilities throughout the communities.

12-239 Kivalina Water Issue declared by Governor Parnell on September 7, 2012: On August 13th, a week of record rainfall began in Kivalina which resulted in record flows on the Wulik River. The high water washed several sections of the surface water piping into the river and overtopped the City's landfill, washing landfill debris into the community. The City of Kivalina and NWAB declared a disaster emergency to make repairs "to the water and landfill infrastructure" and "technical assistance and funding to evaluate damage and perform needed repairs."

12-240 2012 September Storm declared by Governor Parnell on October 17, 2012 then FEMA declared November 27, 2012 (DR-4094): Beginning on September 4, 2012, and continuing, a strong weather system produced high winds and heavy rains, resulting in severe and widespread wind damage and flooding throughout much of South-central and Interior Alaska. The series of storms created a threat to life and property in the Matanuska-Susitna Borough, Kenai Peninsula Borough, Alaska Gateway Regional Educational Attendance Area (REAA), and the Chugach area. The magnitude of the storm resulted in wind damages and flooding which necessitated debris clearance, emergency protective measures, damage to public facilities including roads, bridges, railroad, electrical distribution and water systems; and damage to private residences to include losses of personal property.

12-241 2012 October Kuskokwim Delta Flood declared by Governor Parnell on November 26, 2012: On October 5, 2012, a strong Fall storm moved north into the Bering Sea and produced severe winds, heavy rain, and storm surges up to 4 feet above mean tide levels in the Kuskokwim Delta, with severe impact to the Native Village of Napaskiak. The impact of the storm resulted in floodwaters surrounding the tribal-owned maintenance garage undermining and shifting the building and foundation; damage to the driveway ramp to the maintenance yard; and substantial damage to community boardwalks.

13-242 2013 Spring Floods declared by Governor Parnell on May 30, 2013 then FEMA declared on June 25, 2013 (DR-4122): Beginning on May 17, through June 10 2013, excessive snow pack and ice thickness, combined with rapid spring warming caused ice jams and severe flooding. The following jurisdictions and communities in Alaska have been impacted: Alaska Gateway Rural Regional Educational Attendance Area (REAA) including the City and Village of Eagle; the Copper River REAA including the Village Communities of Chisotchina and Gulkana; the Yukon Flats REAA including the Community of Circle, and City of Fort Yukon; the Yukon-Koyukuk REAA including the Cities of Galena; the Lower Yukon REAA including the Cities of Emmonak and Alakanuk. The impact of the flooding resulted in severe damage to approximately 194 homes (requiring evacuations and sheltering) to include loss and damage to personal property, multiple businesses (including loss of revenue), and public infrastructure to include: hazardous and non-hazardous debris removal, emergency protective measures (leading to ongoing mass care operations), damage to city and state roads, bridges, water and sewer systems, electrical generation and distribution systems, recreation areas and fuel storage facilities.

13-F-243 2013 October KPB Flood Disaster declared by Governor Parnell on November 18, 2013 then FEMA declared January 16, 2014 (DR-4161): Beginning October 27, 2013, the Kenai Peninsula received substantial amounts of rain following several weather systems that had previously inundated low-lying areas. On October 26, the National Weather Service issued a flood watch for areas around Western Prince William Sound due to a slow moving system which brought widespread rainfall to the mainland. The forecast was calling for local amounts in excess of 5 inches of rain. Seward, Homer, and other areas of the Kenai Peninsula received heavy rain and flooding which caused landslides, bridge, and airport and road closures. Damages were reported in Seward, Homer, Kenai, Anchor Point, and the Tyonek area along Beluga Road. Flood damages affecting many individual homes were reported and several businesses were also impacted. Disaster Declarations were received from the Kenai Peninsula Borough and the City of Seward on October 29, 2013.

13-S-244 2013 November Storm Disaster declared by Governor Parnell on November 16, 2013 then FEMA declared January 23, 2014 (DR-4162): On November 5, 2013 the National Weather Service (NWS) issued the first of several coastal flood and winter storm warnings ranging from the central Aleutians to and including the western coastline of Alaska from Bristol Bay to the North Slope. In their published message the NWS warned of very strong low pressure system south of Shemya, moving to the central Bering and Chukchi Sea's bringing a combination of gale, high surf, high wind, freezing spray, coastal flooding and sea surge warnings and watches. The west coast was impacted with hurricane force winds exceeding 85 mph, high tidal ranges, and strong sea surges. The resultant impact culminated to, damage to public facilities including roads, seawalls, bridges, airports, and public buildings; damage to electrical distribution systems and drinking water systems; damages to private residences and the losses of personal and real property; and coastal flooding and power outages which necessitated evacuation and sheltering operations. Overall, the series of storms created a threat to life and property in 23 cities and villages in the Bering Strait Regional Educational Attendance Area (REAA), Lower Yukon REAA, and Lower Kuskokwim REAA, and the Fairbanks North Star Borough.

13-Z-245 2013 December Kwethluk Power Outage, Administrative Order # 267 signed by Governor Parnell on December 27, 2013: On December 12, 2013, the City of Kwethluk suffered a power system failure after its two main generators failed due to extreme cold winter temperatures approaching negative 15 degrees Fahrenheit. The City rationed power using a single small auxiliary generator, which restored limited power to all but 12 structures in the community. Upon request, the Alaska Energy Authority (AEA) provided technical assistance to remotely repair the system. After several unsuccessful attempts, it was determined the damage to the system was too severe to affect remote repairs. AEA contacted the State Emergency Operations Center (SEOC) for emergency authorization to deploy electrical workers and supplies to the City to affect repairs and also to avoid further damage to the power system and other infrastructure in the community.

13-Z-246 2013 December Diomede Power Issues, Administrative Order # 268 signed by Governor Parnell on December 27, 2013: On December 18, 2013, the City of Diomede suffered a complete power system failure after the last of three generators failed due to extreme cold winter temperatures approaching negative15 degrees Fahrenheit. Due to a lack of a community power plant operator, the City requested technical assistance from the Alaska Energy Authority (AEA) to instruct the mayor to restart one of the three generators. After the mayor restarted one of the generators, the limping generator continued to have distribution and cooling problems. AEA continued to provide remote assistance however, they were not able to stabilize the generators and restore full power to the community. After several unsuccessful attempts, it was determined the damage to the system was too severe to affect remote repairs. AEA contacted the State Emergency Operations Center (SEOC) for emergency authorization to deploy electrical workers and supplies to the City to affect repairs and to avoid further damage to the power system and other infrastructure in the community.

AK-15-247 2015 Alatna Washeteria Fire declared by Governor Walker on April 25, 2015: On the morning of 15 April, 2015, the Multi-Purpose Building in Alatna caught fire in the boiler room. The building houses the water treatment facility, Washeteria, and clinic. The fire was extinguished, but not before it caused substantial damage to the water treatment facility and heating components, rendering both inoperable. The Washeteria and clinic sustained substantial smoke damage. Extensive damage to the electrical wiring in the Multi-Purpose Building has been reported and the entire building is without power. Damage to the water treatment facility has cut off the supply of potable water to the village. The cause of the fire is unknown at this time. Currently, village residents are able to drive across the Koyukuk River to Allakaket, five miles away on the other bank, and access potable water and the clinic; however, this option will not be viable for long as break-up is imminent.

AK-15-248 2015 North Slope Borough Flooding declared by Governor Walker on May 21, 2015: Beginning the week of March 13, 2015, the Sagavanirktok (Sag) River near the Dalton Highway began overflowing the highway between Mile 390 and Mile 405, reaching up to 30 inches above road level in several areas. This flooding continued for over a month disrupting normal traffic and commerce between Fairbanks and the petroleum facilities on the North Slope near Deadhorse. On April 7, Governor Walker declared a disaster for the Alaska Department of Transportation and Public Facilities (DOT&PF) for their emergency protective measures to reopen and repair the highway.

After two weeks of record-high temperatures accelerated spring snow melt in the Brooks Range, the additional runoff overflowed the Sag, Kuparuk and Colville rivers, causing additional flooding along Mile 335 to Mile 415 of the Dalton Highway, Deadhorse Airport and nearby facilities. The flooding has severely impacted and damaged highway infrastructure, including the road surface, embankments, and drainage structures; as well as restricted or prohibited travel, causing economic hardship to local regional and international business; and created an urgent need for immediate road repairs and flow diversion efforts to alleviate future threats to that infrastructure.

AK-15-249 2015 Sockeye Wildfire declared by Governor Walker on June 15, 2015: Beginning on June 14, 2015, a large urban interface wildfire exacerbated by record high temperatures caused widespread damage to the community of Willow and surrounding areas of the Matanuska Susitna Borough. The response to the wildfire is hampered by red flag warnings for record warm temperatures, strong winds, low humidity, and dry thunderstorms this month that affects the entire central portion of the state, including the Matanuska Susitna Borough. The wildfire has damaged or destroyed at least 50 private homes and/or secondary structures and damaged several more, and resulted in 175 residents seeking refuge in temporary shelters, although these numbers are expected to rise. The following conditions exist as a result of this disaster: a robust emergency response and management operation requiring substantial additional labor, equipment, and support costs to combat the fire; activation of the emergency operations center; damage or destruction of at least 50 homes and other structures; evacuation and sheltering of 175 residents and hundreds of pets/work animals to date; severe damage to personal and real property; disruption of power, natural gas, communications, and other utility infrastructure requiring

temporary and permanent repairs. A federal FMAG was authorized to assist with suppression costs.

AK-15-250 2015 Kenai Wildfire declared by Governor Walker on June 19, 2015: Beginning on June 15, 2015 a series of wildfires have occurred in the Kenai Peninsula Borough as a result of prolonged hot, dry weather and human error. The most significant of these is the Card Street Wildfire which began on June 15 and damaged 11 buildings in Sterling, including 3 primary residences. The fire moved away from residences into the Kenai Wildlife Refuge but is not yet fully contained. The Alaska Division of Forestry, local firefighters, and national wildland firefighter teams are currently working to gain control of the Card Street fire and numerous other fires within the Borough. A federal Fire Management Grant (FMAG) has been authorized to assist in the cost of suppression. The SEOC has been fully activated to support firefighting efforts. In addition, the AK National Guard and DOD are providing fire suppression support with troop and resource deployments as well as supporting SEOC operations.

AK-15-251 2015 Summer Alaska Wildfires declared by Governor Walker on June 26, 2015: Beginning on June 14, 2015 and continuing, wildland fires have impacted multiple communities throughout the state requiring emergency response, evacuations, and sheltering. Due to ongoing fire growth and new fire starts, the number of communities that will be impacted or threatened and the extent of community fire damage is unknown. Current and forecasted weather including warm temperatures, strong winds, low humidity, and dry thunderstorms indicate a continued wildland fire threat to the state. The following conditions exist as a result of this disaster: a robust emergency response and management operation requiring substantial additional labor, equipment, and support costs to combat the fire; activation of the emergency operations center; evacuation and sheltering of over 200 residents from five different communities.

AK-15-252 2015 Fort Yukon Flooding declared by Governor Walker on June 26, 2015: Warmer than normal temperatures in mid-May caused rapid snowmelt in the highlands of northeastern Alaska causing a corresponding rise in runoff in the Yukon and Porcupine Rivers. On May 19, the National Weather Service (NWS) issued a flood advisory for the Fort Yukon area due to rising water levels in the upper portions of the Porcupine River. By May 20, the water levels in the Porcupine River had risen to bank full in some locations and low-lying areas and roads near the main channel were inundated with up to two feet of water. Water levels in Fort Yukon remained high for about a week. After the water levels receded, the City of Fort Yukon began a damage assessment of the area and discovered flood-related damage to three roads, and the embankment of the sewage lagoon. The following information provides a more detailed view of the damages incurred by the event: Flood waters caused sloughing and erosion to all of the outside sections of the constructed sewage lagoon. This weakens and greatly undermines the integrity of the outside berms. The Landfill Road was flooded and has washed out sections; culverts are plugged with grave, mud and debris. The Gravel Pit Road has several washed out sections; culverts are plugged with grave, mud and debris. The Airport Access Road which is owned and maintained by DOT&PF Northern Region has several washed out sections; culverts are plugged with grave, mud and debris.

AK-15-253 2015 Dalton Highway Flooding declared by Governor Walker on April 7, 2015: Beginning on March 13, 2015 and continuing, the Sagavanirktok (Sag) River experienced a major ice jam that resulted in unprecedented Dalton Highway flooding between Mile 390 and 415; about 25 to 30 miles south of Deadhorse. Road clearing and overflow diversion work has been ongoing since mid-March, was hampered by very cold temperatures, high winds, and low- to no-visibility conditions. The flooding and emergency work has disrupted normal commercial and private traffic along the Dalton Highway, including critical fuel shipments to the petroleum production and distribution facilities at Deadhorse. The flooding has severely impacted and damaged highway infrastructure: to road surfaces, embankments, and drainage structures; restricted or prohibited travel, causing economic hardship to local regional and international business; and has created an urgent need for immediate road repairs and flow diversion efforts to alleviate future threats to that infrastructure. The Department of Transportation and Public Facilities (DOT&PF) requires this State Disaster Declaration to request Federal Highway Administration (FHW A) funding. Additionally, the Declaration waives State permitting necessary for response and repair activities for the 30-day emergency period of the declaration. If response and recovery efforts

require permit waivers beyond this period a disaster declaration extension will be required. Per AS 26.23 .202(c) an extension requires approval by the Legislature through a concurrent resolution.

AK-15-254 2015 August Southeast Raines declared by Governor Walker on August 27, 2015: Commencing on August 14, 2015, the City and Borough of Sitka received almost three inches of rain in six hours. This intense rainfall was accompanied by heavy wind and came on the heels of an unusually wet summer. Due to ground saturation and the wind, the hillsides within the borough failed resulting in **three deaths**, seven landslides and a sinkhole. The landslides and heavy rain, damaged homes, roads, and other infrastructure. The City and Borough of Sitka, along with state staff and contracted engineers, are monitoring slope stability to ensure safety of search and rescue and assessment efforts. On August 18, the City and Borough of Sitka declared a local disaster and requested state assistance. They have been fully engaged in debris removal operations since August 19th. After the failure of the slope on August 18, the Borough activated and staffed an emergency operations center to coordinate the response efforts and provide guidance to first responders, with utility and engineering specialists conducting body recovery as well as evaluating the slopes and affected residential areas.

AK-15-255 2015 August North Slope Borough Sea Storm declared by Governor Walker on October 14, 2015 then FEMA declared on October 30, 2015 (DR-4244): Beginning the week of August 27, 2015, a strong arctic coastal sea storm along the Northern Arctic Coast produced high waves and accelerated beach erosion that redeposited much of this beach gravel atop seven miles of borough roads, as well as loss of material along road surfaces and embankments. There is also reported damage to portions of the community water and sewer infrastructure that services both residential and commercial areas within Barrow in the North Slope Borough. This event most severely affected roads located within the community of Barrow; however, some minor damage was reported in the community of Wainwright.

The North Slope Borough Resolution 53-2015, entitled A Resolution Ratifying the Mayor's Declaration of Emergency for Barrow as a Result of the August 27, 2015 Fall Storm Surges, which includes a request for state assistance, dated September 11, 2015, was received by the State of Alaska Division of Homeland Security and Emergency Management (DHS&EM) on September 14, 2015. The initial damages reported by the Borough exceeded $7.2 million. The Borough has refined their estimated response and recovery costs over the past few weeks and this amount has dropped slightly to $6,844,431.

AK-15-256 2015 December Bering Sea Storm declared by Governor Walker on January 29, 2016 then FEMA declared on February 17, 2016 (DR-4257): Beginning December 12, 2015 and continuing for several days, the low pressure system reached 933 mbars moving northeast from the Central and Western Aleutian Islands past the Pribilof Islands, and into the Yukon-Kuskokwim Delta region. These communities were impacted by hurricane force winds exceeding 100 miles per hour (mph) and gusts of up to 122 mph, high tidal ranges, and strong sea surges up to 10 feet above mean sea level (msl). Island communities also experienced extreme wave heights of 40–50 feet. This combined weather system began on December 15, 2015 and extended the incident period to December 19, 2015.

As a result of this storm, the Cities of Adak and St. George have each issued local disaster declarations and requested State assistance. The State Emergency Operations Center (SEOC) was contacted by the President of the Kipnuk Native Village about storm damage to their community-wide boardwalk system and a few surrounding homes. Other minor storm damage has been reported in the Native Villages of Atka and Kwingillingok.

AK-15-257 2015 December Windstorm declared by Governor Walker on January 29, 2016: On December 24, 2015, a storm moved from the Pribilof Island area northeasterly to the mainland. The storm damaged the City of Togiak's protective sea wall, city dock, power distribution lines, City building roof tops, and residential home roof tops. Subsequent sea surges dislodged road surface material from City roads.

On December 30, 2015, The City of Togiak's Mayor, signed a local disaster emergency specifically requesting individual disaster relief for homeowners with flooded homes and damaged personal, real, and subsistence property. The declaration also requested our public assistance program aid for emergency protective measures, technical assistance to evaluate damage, and financial assistance for temporary and

permanent repairs to public infrastructure including the sea wall and City water collection and transmission lines.

Our damage assessment conducted in partnership with community leadership shows damage to 750 feet of the 1,500 foot long seawall. Damage includes sections that have heaved and bowed, as well as the separation of sections from the main wall. Damage to the dock is also evident.

AK-16-258 2016 Mat-Su River Erosion declared by Governor Walker on August 22, 2016: During the week of August 14 through 20, 2016 there was imminent threat of flooding in the Matanuska-Susitna Borough from the Matanuska River along the Old Glenn Highway from mile 12 through mile 15. Flooding in this area had the potential to cause substantial damage to the highway, infrastructure, and local homes. The Alaska Department of Transportation and Public Facilities (DOT&PF) was immediately called to accomplish the necessary emergency protective measures to prevent damaging flooding from public and private infrastructure.

AK-16-259 2016 Kotlik Fire Disaster declared by Governor Walker on October 4, 2016: On August 18, 2016, a structural fire destroyed the old school facility and several nearby buildings in the Lower Yukon River community of Kotlik. Since construction of a new school in Kotlik in 2003, the old school was boarded up and utilities shut off to preserve it for future use. The fire also destroyed: a small city building used by the Native Village of Hamilton as their tribal office; a 100-foot section of boardwalk; and the teacher housing, a generator building, and two storage buildings owned by the Lower Yukon School District (LYSD).

The City of Kotlik Local Government submitted a local Disaster Declaration with Request for State Assistance, dated September 9, 2016 which was received by the DHS&EM on September 12, 2016. In their declaration, the City of Kotlik specifically requested disaster relief for debris removal/clean up, technical assistance and funding to reconstruct the City gymnasium, public disaster assistance for emergency protective measures, temporary and permanent repairs to school water and sewer pipe lines and electrical systems.

AK-16-260 2016 West Coast Storm Disaster declared by Governor Walker on February 1, 2017: Beginning on December 28, 2016 and continuing through January 1 2017, a series of back-to-back strong winter sea storms with extremely low temperatures, hurricane-force winds, and 4 – 9 foot storm surges moved into the Bering Sea and impacted the St. Lawrence Island, Yukon-Kuskokwim Delta, Bering Strait Sea Coast, Norton Sound, Seward Peninsula, and Kotzebue Sound regions of the State of Alaska. At one point, approximately 1,500 miles of Alaska's Coastline and about 50% of the State, including the Alaska Interior, was under a Winter Weather Warning. Several communities within the affected area reported storm-related impacts (e.g., roof and siding lost, porches blown from doorways, coastal flooding, deposition of ice blocks onto roads and runways, power outages, movement and sheltering of residents in the local school, etc.

Although several communities reported minor storm-related impacts, only the communities on St. Lawrence Island (Savoonga, and Gambell) reported damages beyond their local capabilities to handle. On January 1, 2017, Mr. Myron Kingeekuk, Mayor of Savoonga, reported power was out or disrupted to 18 homes, 30 homes and two community buildings had sustained roof damage, and 90 persons were being sheltered at the school. On January 8. Mr. Curtis Silook, Mayor of Gambell also declared a local declaration with request for state assistance for damage to nine homes and lost and/or damaged insulation on the community water tanks in Gambell.

AK-17-261 2017 September North Slope Borough (NSB) Storm Disaster declared by Governor Walker on November 14, 2017, FEMA declared December 12, 2017 (DR-4351): Beginning September 28 and continuing through the morning of September 30, 2017, a strong arctic coastal sea storm along the Northern Arctic Coast produced high winds up to 47 miles per hour (mph), strong waves, and a storm surge of one to two feet above normal high tide levels that overtopped and breached protective berms flooding roads and low-lying areas within the community of Utqiagvik (formerly known as Barrow) within the North Slope Borough (NSB). As a result, the community sustained widespread erosion and severe damages to several miles of coastal beach berms, Borough roads, and cultural and historical areas. The Borough also performed emergency protective measures to protect residential areas, the community freshwater supply, the local access road to whaling and subsistence areas, and other important facilities from flooding and erosion.

On September 29, the NSB Mayor declared a local disaster emergency and request State technical and financial assistance. The Borough also provided an initial cost estimate for temporary and permanent repairs for this storm exceeding $10 million. This declaration was continued by North Slope Borough Resolution 61-2017 entitled A Resolution Ratifying the Mayor's Declaration of Emergency for Utqiagvik as a Result of the September 28-30, 2017 Fall Storm Surges, and Extending the Condition of the Emergency, dated October 5, 2017.

AK-17-262 2017 December KPB Storm declared by Governor Walker on January 19, 2018 then FEMA declared on June 8, 2018 (DR-4369):. On December 4, 2017 a fast moving storm system moving northward out of the Gulf of Alaska brought widespread high winds to coastal areas on both the east and west sides of the Kenai Peninsula. These high winds, gusting 30-40 mph, produced 3-4 foot waves that lasted for 4-8 hours in Seward, coinciding almost perfectly with the highest astronomical tide of the year, causing significant wave action damage to occur. Resurrection Bay in Seward experienced a 13.4 foot-high tide in conjunction with high southerly winds on December 4. This combination of events caused serious erosion to the Lowell Point Road that connects South Seward with the community of Lowell Point and the Lowell Point State Recreation Area (SRA). In the summer, this is the second highest travelled road in the area. Much of the armor rock on Lowell Point Road has been washed free of the roadside. In some areas, 10 feet or more of road has been washed away by wave action. The road, through an easement, has critical city sewer and electric infrastructure buried under the surface. The city's waterfront RV/camping areas also experienced erosion.

In the Lower Cook Inlet area, this storm system created high winds gusting 30-40 mph, reaching a maximum wind speed of 58 mph, producing 7-10 foot waves that impacted the Cook Inlet coastline from Homer to Kenai. Two SRAs, the Anchor River SRA and the Deep Creek SRA, each sustained extensive damages to campgrounds, parking areas, boat launches, and beach areas.

EXPLANATION OF THE DISASTER COST INDEX

To date this Disaster Cost Index includes a total of 261 incidents.

The index presents cost data related to these incidents in nine columns. Column one indicates the disaster, which resulted in the expenditure of public funds; column two indicates the disaster number. In column two, the first two numbers indicate the State fiscal year based on the declared date signed by the Governor and the second set of numbers indicate the number of declared disasters since the creation of the disaster relief fund. Column three indicates the total amount of funds disbursed in the form of grants to individuals and families; column four indicates the number of grants awarded for each disaster; while column five gives the average amount of each grant. In column six, the amount of public assistance provided to the community is indicated; column seven indicates the cost to DHS&EM in expenditures related to the administration of the assistance program. Column eight summarizes the cost data, giving the total cost of both Federal and State expenditures for each disaster emergency. Column nine represents the total federal contribution for the disaster.

REFERENCES

- AS 26.23.010 Alaska Disaster Act.
- AS 26.23.300 Disaster Relief Fund.
- State of Alaska Administrative Plan for Disaster Public Assistance, all applicable.
- State of Alaska Individual Assistance Disaster Grant Program Administrative Plan, all applicable.

17-262 2017 December KPB Storm, 1/19/18, 6/8/18 (DR-4369)
17-261 2017 September NSB Storm, 11/14/17, 12/12/18 (DR-4351)
16-260 2016 2016 West Coast Storm, 2/1/17
16-259 2016 August Kotlik Fire, 10/04/16
16-258 2016 Mat-Su River Erosion, 8/22/16
15-257 2015 December Windstorm, 1/29/16

15-256 2015 December Bering Sea Storm, 1/29/16, 2/17/16 (DR-4257)
15-255 2015 August NSB Sea Storm, 10/14/15, 10/30/15 (DR-4244)
15-254 2015 August Southeast Rains, 8/27/15
15-253 2015 Dalton Highway Flooding, 4/7/15
15-252 2015 Fort Yukon Flooding, 6/26/15
15-251 2015 Summer Alaska Wildfires, 6/26/15
15-250 2015 Kenai Wildfires, 6/19/15
15-249 2015 Sockeye Wildfires, 6/15/15
15-248 2015 North Slope Borough Flooding, 5/21/15
15-247 2015 Alatna Washeteria Fire, 4/25/15
13-246 2013 December Diomede Power, 12/27/13
13-245 2013 December Kwethluk Power, 12/27/13
13-244 2013 November Storms, 11/16/13, 1/23/14 (DR-4162)
13-243 2013 October KPB Floods, 11/18/13, 1/16/14 (DR-4161)
13-242 2013 Spring Floods, 5/30/13, 6/25/13 (DR-4122)
12-241 2012 October Kuskokwim Delta Flood, 11/26/12
12-240 2012 September Storm, 10/17, 11/27/12 (DR-4094)
12-239 Kivalina Water Issue, 9/7/12
12-238 2012 Prince William Sound Winter Storm, 2/9/12
12-237 2011 KPB Windstorm, 12/12/11, 2/12/12 (DR-4054)
12-236 2011 West Coast Storm, 12/5/11, 12/22/11 (DR-4050)
12-235 2011 Dot Lake Fire, 10/4/11
12-234 2011 Birch Creek Fire, 8/911
11-233 2011 Spring Flooding, 5/17/11, 6/10/11 (DR-1992)
11-232 2010 Savoonga Power Outage, 1/14/11
10-231 2010 July Interior Flooding, 7/26/10
09-230 2009 Seward Storm, 12/31/09
09-229 09 October Kodiak Storms, 11/5/09, 12/18/09 (DR-1865)
09-228 2009 Pelican Water System Failure (AO 251) 9/29/09
09-227 2009 Spring Flood Declared 5/6/09
09-226 2008 Tanana Basin Flood Declared 8/4/08 (DR-1796)
08-225 2007 Northwest Storm (AO 239) 1/22/08
08-224 2007 Beaver Fire State Declared 9/14/07
07-223 2007 Kenai River Flood 3/2/07 Declared
07-222 2006 Kivalina Seawall 11/29/06 (AO)
07-221 2006 Oct Southern Storm State Dec 10/14/06
07-220 2006 South Central Flood State 8/19/06
07-219 2006 Hooper Bay Fire Declared 8/6/06 (DR-1666)
06-218 2006 Spring Flood Declared 6/27/06 Fed 8/4/06
06-217 06 South Central Storm State Declared 3/13/06
06-216 2005 Southeast Storm State Declared 12/23/05
06-215 2005 West Coast Storm State Declared 10/24/05
06-214 2005Bristol Bay Storm 10/3/05 State Declared
06-213 2005 Spring Flood 7/20/05
05-212 2005 Kaktovik Power Loss 1/15/05
05-211 2004 Bering Strait Sea Storm 10/18/04
04-210 2004 July Interior Fires Declared DNR 5/29/04
04-209 2003 Fall Sea Storm Declared 1/29/04
04-208 2004 Kasaan Landslide Declared 1/29/04
04-207 2003 Fall Flood 11/3/03
04-206 2003 Riverine Flood 7/30/03
03-205 2003 Salcha Flood 4/29/03
03-204 2003 South-Central Windstorm 3/13/03
03-203 Denali Earthquake AK-1440-DR 11/6/02
03-202 2002 Kenai Flood AK-1445-DR 11/6/02
03-201 2002 Northwest Fall Sea Storm 10/23/02
02-200 2002 Interior AK-1423-Drdeclared 5/29/02

02-199 2002 Sleetmute Core Facility Fire (AO 196) 5/24/02
02-198 2001 Shishmaref Seawall (AO 194) 10/27/01
02-197 2001 Kotzebue Am Radio (AO 191) 9/24/01
01-196 2001 Middle Yukon Flood 5/31/01
01-195 20000 Kake Water Containment Failure, 7/31/00
01-194 2000 Operation Renew Hope Yukon 7/19/00
00-193 2000 Fire Suppression #2 6/00
00-192 2000 Fire Suppression #1 5/24/00
00-191 2000 Central Gulf Coast Storm 2/4/00, 2/8/00, 3/17/00
99-190 1998 Southeastern Storm10/27 & 11/24/98
99-189 1998 Western Alaska Fisheries 7/30/98, 9-16-98, 10/16/98
98-188 1998 Endicott Mountains Flood 06/18/98
98-187 1998 DNR Fire Suppression 06/05/98
98-186 1997 Shishmaref Sea Storm 10/06/97
98-185 1997 Eastern Tanana River 08/26/97
98-184 1997 Bristol Bay Distressed Salmon 07/18/97
98-183 1997 DNR Fire Suppression 07/14/97
97-182 1996 Southeast Storm (Pelican/Elfin Cove) 01/13/97
96-181 1997 Miller's Reach Fire 1119 06/04/97
96-180 1995 South-Central Fall Floods 10/21/95-DR 1072
95-179 1995 Statewide Fire Suppression 06/22/95
95-178 1995 Bethel Sinkhole Erosion 06/05/95
95-177 1995 Aniak Ice Jam Flood 06/05/95
95-176 1995 Yukon Kuskokwim Delta 06/05/95
95-175 Skagway Submarine Landslide 11/16/94
95-174 1995 Metlakatla Sea Storm 11/10/95
95-173 1994 Fall Flood 09/27/94 FEMA 1039
95-172 1994 Matanuska River Erosion 07/01/94
95-171 1994 Cummings Road Flood 08/2/94
94-170 1994 Galena Flood
94-169 1994 McGrath Road Disaster 05/23/94
94-168 Hazard Mitigation - 909
94-167 1993 Prince of Wales Island 10/29/93
94-166 1993 Shaker IV
94-165 1993 DNR 08/04/93
94-164 1993 Tenakee Springs07/19/93
94-163 1993 Kuskokwim Chum 07/19/93
93-162 1992 Nome Hwy 10/12/92
93-161 1992 Mt. Spurr 09/21/92
93-160 1992 Haines Highway 08/14/92
93-159 1992 Norton Sound Fishery 07/13/92
93-158 1992 Fire Disaster 07/07/92
92-157 1992 Yukon River 06/17/92 (92 Spring Flood)
92-156 1992 Response 06/09/92
92-155 1992-Galena Flood 06/04/92
92-154 1992 Eagle City 05/19/92
92-153 1992 Eagle Village 05/19/92
92-152 1991 Seward Sewage 11/20/91
92-151 1991 Earthquake Mitigation 11/07/91
92-150 1991 Kodiak 11/02/91
92-149 1991 New Koliganek 10/14/91
92-148 1991 Diomede Fire 09/20/91
92-147 1991 Aniak Loan 08/07/91
92-146 1991 Little Diomede 07/25/91
92-145 1991 Whitestone Farms 07/27/91
92-144 1991 Mat-Su Borough 07/18/91
92-143 1991 DNR 07/11/91
92-142 1991 Galena 91 S.F. 06/01/91
91-141 1991 Shageluk 05/23/91
91-140 1991 Alakanuk 05/23/91
91-139 1991 Holy Cross 05/23/91
91-138 1991 Emmonak 05/23/91
91-137 1991 Grayling 05/16/91
91-136 1991 Anvik 05/16/91
91-135 1991 Red Devil 05/13/91
91-134 1991 McGrath 05/10/91 (FEMA 0909)
91-133 1991 Aniak 05/13/91

91-132	1991 FMSB/07/91 (91 Spring Flood)
91-131	1991 Angoon 05/03/91
91-130	1991 Marshall 02/25/91
91-129	1991 Karluk 02/22/91
91-128	1991 Larsen Bay 02/14/91
91-127	1991 Togiak 02/08/91
91-126	1990 Eagle 12/28/90
91-125	1990 Diomede 11/21/90
91-124	1990 Lowell Creek Tunnel 09/27/90
91-123	1990 Teller 10/10/90
91-122	1990 Nome 10/10/90
91-121	1990 Kotzebue 09/04/90
91-120	1990 Lower Kuskokwim 09/04/90
91-119	1990 Hazard Mitigation Cold Weather
91-118	1990 Statewide Fires 07/04/90
91-117	1990 Bethel 06/02/90
90-116	1990 Teklanika Fire 05/31/90
90-115	1990 Fire Suppression 05/29/90
90-114	1990 Kobuk 05/17/90
90-113	1990 McGrath 05/16/90
90-112	1990 Snow & Ice Removal 1990 Dec
90-111	1990 Haz Mit 89 Spring Floods 04/14/90 (FEMA 0832)
90-110	1990 Stebbins 04/09/90
90-109	1990 Manokotak 04/05/90
90-108	1990 Moose 03/28/90
90-107	1990 Kongiganak 03/02/90
90-106	1990 Broadcasting 02/22/90
90-105	1990 Tatitlek 01/31/90
90-104	1990 Kenai Mt. Redoubt 01/11/90
90-103	1989 Mt. Redoubt 12/20/89
90-102	1989 Search & Rescue 09/13/89
90-101	1989 Richardson Highway 09/13/89
90-100	1989 Kenai Peninsula 08/30/89
90-99	1989 Anchorage 08/30/89
90-98	1989 Whittier 08/08/89
90-97	1989 Mat-Su 08/04/89
90-96	1989 FNSB 08/01/89
90-95	1989 Klawock 06/19/89
89-94	1989 Spring Floods 06/10/89
89-93	1989 Fort Yukon 05/06/89
89-92	1989 Circle 05/06/89
89-91	1989 Glennallen 05/06/89
89-90	1989 Galena 04/20/89
89-89	1989 Valdez 03/26/89
89-88	1989 North Slope 03/08/89
89-87	1989 Ahkiok 03/02/89
89-86	1989 Sand Point 02/27/89
89-85	1989 St. George 02/09/89
89-84	1989 NWAB 02/01/89
89-83	1989 Statewide Cold 01/28/89
89-82	1988 Yukon Flats 11/10/88
89-81	1988 Klawock 10/17/88
89-80	1988 Shishmaref 08/05/88
89-79	1988 Eagle 07/22/88
89-78	1988 Kaltag 05/26/88
88-77	1988 Napakiak/Napaskiak 05/24/88
88-76	1988 Crooked Creek 05/12/88
88-75	1988 Nondalton 04/05/88
88-74	1988 Pitka's Point 03/29/88
88-73	1988 Chenega Bay 03/25/88
88-72	1988 Chefornak 03/23/88
88-71	1988 Beaver 03/08/88
88-70	1988 Haines 02/29/88
88-69	1988 Barrow 02/16/88
88-68	1987 Klehini 11/09/87
88-67	1987 Togiak 10/87
88-66	1987 Angoon 11/06/87
88-65	1987 Wainwright 10/06/87
88-64	1987 Richardson Highway 07/24/87
87-63	1987 Buckland 06/16/87
87-62	1987 Aniak 05/29/87
87-61	1987 Delta Junction 05/28/87
87-60	1987 Sleetmute/Red Devil 05/22/87
87-59	1987 Kotzebue 02/05/87
87-58	1987 Venetie 01/09/87
87-57	1987 Aniak 10/27/87
87-56	1986 Southcentral Alaska 10/12/86
87-55	1986 North Slope 09/25/86
86-54	1986 Napakiak 05/15/86
86-53	1986 Crown Point 05/01/86
86-52	1986 Pelican 03/19/86

86-51	1986 Venetie 03/03/86
86-50	1986 Thorne Bay 02/03/86
86-49	1985 Unalaska 12/13/85
86-48	1985 Metlakatla 12/10/85
86-47	1985 Thorne Bay 12/05/85
86-46	1985 Manokotak 11/22/85
86-45	1985 Cordova 10/31/85
86-44	1985 Gambell 08/31/85
86-43	1985 Bethel 07/10/85
86-42	1985 Pitka's Point 07/09/85
85-41	1985 Upper Kuskokwim River 06/18/85
85-40	1985 Pilot Station 06/18/85
85-39	1985 Emmonak 06/11/85
85-38	1985 Anvik 06/05/85
85-37	1985 Kobuk 05/30/85
85-36	1985 Buckland 05/30/85
85-35	1985 Gambell 05/17/85
85-34	1985 Savoonga 02/26/85
85-33	1985 Haines 01/25/85
85-32	Southeast Alaska
85-31	Russian Mission
85-30	Cold Bay
84-29	Emmonak
84-28	Alakanuk
84-27	Cold Bay
84-26	Kotzebue
84-25	Elim
84-24	Mountain Village
84-23	Unalakleet
84-22	Chefornak
84-21	Cordova
84-20	Ketchikan
83-19	Aniak
83-18	Kipnuk
83-17	Takotna
83-16	Russian Mission/Aniak/Akiachak
82-15	Fort Yukon
82-14	Emmonak
82-13	Southcentral
81-12	Angoon
81-11	Copper Center
81-10	Bristol Bay
80-9	Anchorage
80-8	Kodiak Island
80-7	Willow Creek
80-6	West Coast Storm
79-5	Delta Fire
79-4	Matanuska Susitna Borough
79-3	Wrangell/Craig
78-2	Campbell Creek Anchorage
78-1	Karluk

APPENDIX 13.19 2018 AGENCY MITIGATION CAPABILITY SELF-ASSESSMENTS

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Appendix 13-18 2018 Alaska State Hazard Mitigation Plan (SHMP) Update; Mitigation Capability Assessment Questionnaire

The State of Alaska is currently updating the State Hazard Mitigation Plan (SHMP). The State is required to revise and update our plan every three years in order to continue to be eligible for almost all FEMA funding. The purpose of the SHMP is to identify hazards, complete a risk assessment and vulnerability analysis, identify and coordinate needed mitigation efforts with State, Federal, and local partners and fulfill the requirements set forth in the Federal 44 CFR 201.4 DMA 2000 legislation (http://www.fema.gov/pdf/help/fr02-4321.pdf).

State and Federal partnerships are one mechanism used to accomplish mitigation tasks. In Alaska there are multiple Federal agencies with programs, projects, data and staff expertise that contribute to decision making concerning hazard mitigation in Alaska. In many cases these partnerships have been identified in the hazard specific sub-sections (earthquake, volcanic eruption, flood, snow avalanche, weather, etc.) of section five of the current, 2007, SHMP (also see table included). However, we are aware that there are additional Federal agency ventures concerning hazard mitigation that are absent from the existing Plan. We would like the 2010 update of the SHMP to reflect, identify and recognize all of your agency's contributions (programs, projects and staff areas of expertise) in providing local data and guidance with a goal of reducing future disaster losses in the State of Alaska.

In order to most appropriately and accurately identify these contributions we are asking you to read and respond to the questions below. We also welcome links, digital documents, and images which illustrate and/or support these programs, projects, and your agencies expertise. Our goal in this process is to compile and present a comprehensive, accurate, and up-to-date narrative that defines the State's capability to manage and fulfill existing SHMP related policies, procedures, and programs.

Please highlight any activities initiated, implemented, integrated into other policies, procedures, or processes during the legacy 2013 SHMP's three-year life cycle.

Please enter your contributions and answers directly into this MS Word document and return back to me by May 21, if possible.

Please feel free to contact me anytime with comments and questions.

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Introduction:

Hazard mitigation is any action taken to reduce or eliminate the long-term risk to human life and property from natural and human-caused hazards. The purpose of the Alaska State Hazard Mitigation Plan is to identify hazards, complete a risk assessment and vulnerability analysis, identify and coordinate needed mitigation efforts with State, Federal, and local partners and fulfill the requirements set forth in the federal 44 CFR 201.4 DMA 2000 legislation.

The 2016 Alaska Emergency Operations Plan describes the Role of the Disaster Policy Cabinet:

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> - *Department of Military and Veterans Affair (Chair)*
> - *Department of Natural Resources*
> - *Department of Public Safety*
> - *Department of Transportation and Public Facilities*

Additional federal, state, borough, city, and educational agencies who have historically participated in SHMP development include:

Federal

- *Denali Commission*
- *United States (US) Department of Agriculture (USDA)*
  - *Disaster Resource Center*
  - *Housing and Urban Development (HUD)*
    - *Natural Resource Conservation Service (NRCS)*
    - *Rural Development (RD)*
    - *US Forest Service (USFS)*
- *US Department of Commerce (DOC)*
  - *National Oceanic & Atmospheric Administration (NOAA)*
    - *National Ocean Science*
    - *National Weather Service (NWS)*
      - *National Tsunami Warning Center (NTWC)*
- *US Department of Health and Human Services (DHSS)*
- *US Department of Homeland Security (DHS)*
  - *Federal Emergency Management Agency (FEMA)*
  - *US Coast Guard (USCG)*
- *US Geological Surveys (USGS)*
- *US Environmental Protection Agency (EPA)*
- *US Army Corps of Engineers (USACE)*

State:

- *Office of the Governor*

- *Department of Administration (DOA)*
  - *Risk Management (RM)*
- *Department of Commerce, Community and Economic Development (DCCED)*
  - *Division of Community and Regional Affairs (DCRA)*
    - *Floodplain Management*
    - *Alaska Climate Change Impact Mitigation Program (ACCIMP)*
- *Department of Corrections (DOC)*
- *Alaska Court System*
- *Department of Education and Early Development (DEED)*
- *Department of Environmental Conservation (DEC)*
  - *Division of Spill Prevention and Response (DSPR)*
  - *Village Safe Water (VSW)*
- *Department of Fish and Game (F&G)*
- *Department of Labor and Workforce Development (DLWD)*
- *Department of Military and Veterans Affair (DMVA)*
  - *Alaska State Defense Force (ADF)*
  - *Alaska National Guard (ANG)*
  - *Division of Homeland Security and Emergency Management (DHS&EM)*
- *Department of Natural Resources (DNR)*
  - *Division of Forestry (DOF)*
  - *Division of Geological and Geophysical Surveys (DGGS)*
  - *Division of Mining, Land, and Water (DMLW)*
    - *Dam Safety and Construction Unit*
  - *Alaska Volcano Observatory (AVO*
- *Department of Revenue (DOR)*
- *Alaska Railroad Corporation*
- *Alaska Department of Public Safety (DPS)*
- *Alaska Department of Transportation and Public Facilities (DOT/PF)*
- *University of Alaska Anchorage (UAA)*
- *University of Alaska Fairbanks (UAF)*

You or your agency has been identified as an acting or new member of the State Hazard Mitigation Advisory Committee (SHMAC). The SHMAC has been in-place since 2002 to assist with identifying, supporting, and prioritizing statewide hazard mitigation initiatives. Selected SHMAC members make recommendations that fulfill statewide mitigation goals to the Governor's DMVA Disaster Policy Cabinet.

Would you please review the questions, confer with your agency policy makers and summarize your agency's initiatives reflect your organization mitigation mission?

1. What programs, projects and/or expertise does your agency have that contributes to long-term mitigation efforts to reduce disaster losses in the State?

   ARRC collaborates with many programs and agencies to improve mainline rail bed stability and resiliency, with a look toward secondary benefits within, to, and for railbelt communities. Many of our success projects are Pre-Disaster or Hazard Mitigation Projects supported by FEMA and State of Alaska funding.

   a. Include references to any of your agency's existing State-Federal partnerships that address, long-term hazard mitigation.

   ARRC has many partnerships to facilitate long-term hazard mitigation, such as; Federal Emergency Management Agency (FEMA), U.S. Department of Homeland Security (DHS), U.S. Forest Service (USFS), National Weather Service (NWS), National Oceanic & Atmospheric Administration (NOAA), U.S. Army corps of Engineers (USACE), Alaska Department of Fish and Game (ADF&G), U.S. Fish and Wildlife Service (USFWS), Division of Homeland Security and Emergency Management (DHS&EM), U.S. Geological Survey (USGS), Department of Natural Resources (DNR), Federal Transit Administration (FTA), Federal Railroad Administration (FRA), and others as necessary.

   b. Include any of your agency's activities that enhance understanding of hazards and vulnerability in the State (hazard identification, mapping, etc.)

   Recent projects include: Willow area flood inundation mapping (Silver Jackets Project, 2017); development of "Skookum Creek Long Term Sediment Management Alternatives; final Hydrologic and Hydraulic Analysis" (November, 2017); Snow River Flood Hydraulics and Geomorphology study (Currently underway in 2018).

   c. Include references to any established (written) mitigation polices or procedures that your organization uses to reduce disaster losses or that your organization intends to develop through State-Federal partnerships.

   d. Include specific examples of programs or activities directly related to the following hazards specified in the State Hazard Mitigation Plan (including: detection, retrofit, building codes, hazard maps, gauges, models, forecasts, historic data, and dynamic data).

2. Are there any other ongoing or developing initiatives or ideas that your agency can suggest that would enhance the State's effort to reduce future disaster losses?

   Allocate funding for planning studies, hydrology studies, and bed-load accumulation to expand information available for pre-disaster mitigation project identification and facilitate funding, to prevent future disasters.

3. Do you have any suggestions on how the State can more effectively use or deliver the mitigation programs you identified?

4. Do you have a mechanism to assess, design and build your agency's infrastructure to withstand particular natural disasters? If so, how and which hazards? For example are air traffic control towers, piers, docks, office buildings, warehouses built or retrofitted to withstand a significant earthquake event? Please explain.

   Infrastructure is and was designed to meet government and industry standards at the date of construction. In some cases, older infrastructure has since been altered to meet more restrictive requirements, based largely on unsatisfactory performance in a natural disaster. In other cases, modifications have been made due to changes in infrastructure use or decay, associated government regulations and industry standards, or ARRC recognized a risk to be mitigated. Hazards include: earthquake, wind, fire and flooding.

5. Please list what mitigation activities your organization has undertaken to reduce future disaster losses throughout the State?

   ARRC implements mitigation activities to improve mainline rail bed stability and resiliency by: raising track bed, armoring embankments, installing bridges, improving drainage, and realigning track where possible.

   a. Please identify "new" statutory or regulatory authorities that address hazard mitigation.

   b. Include any activities that enhance avoiding future hazard impacts and reducing infrastructure and population vulnerabilities (hazard identification, mapping, etc.)

   c. Include references to any established (written) mitigation polices or procedures that your organization uses to reduce disaster losses or that your organization intends to develop.

      - Willow area flood inundation mapping (Silver Jackets Project, 2017).
      - "Skookum Creek Long Term Sediment Management Alternatives; final Hydrologic and Hydraulic Analysis" (November 2017).
      - Snow River Flood Hydraulics and Geomorphology study (Currently underway in 2018).

   d. Include any activities related to public hazard mitigation including regulating development, developing building codes, written standards, public education presentations, and training opportunities, etc.

   e. Include specific examples of programs or activities directly related to the following hazards profiled in the State Hazard Mitigation Plan.

A. Natural Hazards

Earthquake: Inspect track and bridge structures for all earthquakes over 5.0 magnitude. Design and construct facilities and structures to meet seismic requirements.

Ground Failure: (includes Avalanche, Landslide, Mudslide, Permafrost & Wind Erosion etc.): Install avalanche/slide detection systems, armoring embankment, track surfacing maintenance, drainage maintenance and improvements, and support remote video monitoring.

Tsunami: (includes Seiche)

Water, (includes Riverine & Coastal flood, erosion, storm surge, ice-jam, ice run-up aufeis [overflow], etc.): Raise track bed, armoring embankment, realign track where possible, maintain proper drainage, etc…

Weather, (includes Drought, Storms, Temperature, & Wind, etc.): Monitor weather systems, support video monitoring, and inspect track infrastructure regularly.

Volcano, (includes Ash, Lahar, etc.): Maintain and implement Ash Plan, when necessary.

Wildland Fire, (includes Tundra, Urban Interface etc.): Work with communities, fire and forestry agencies, and emergency responders to respond to wildfire or man-made fire threats to railbelt communities and to operations and infrastructure within the railroad right-of-way.

B. Other Hazards:

Economic, (includes Urban Conflagration and other large scale income losses due to natural or man induced events):

Infectious Disease, (includes epidemics, biological, consumables contamination, & Nuclear, Biological, Chemical (NBC) exposure):

Invasive Species, (includes Flora & Fauna infestation): Annual herbicide spraying program. Work with University of Alaska Fairbanks, Extension Services to pull invasive and noxious weeds along the ARRC rail line. (Inattention to organic population within the railbed destabilizes the inherent strength of the structure profile and increases the risk to railbed damage from weather hazards.

Hazardous Materials, (HazMat, Oil Spills, etc.): Annual Oil Spill Contingency Plan (C-plan) drills, SPCC and Storm Water Pollution Prevention Plan (SWPPP) training, employee maintained hazardous-waste certification(s), and ensure hazardous material response contracts are in place, if assistance is required.

Terrorism, (includes Civil Disorder/Disturbance, Infrastructure Threats, Active Shooter, & Bombing, Cyber Threats, Nuclear Attack/Materials.): ARRC Police and Security, as

well as additional local and federal military and security agencies, provide direct and joint assistance as needed.

Technological, (includes long duration Utilities & Transportation Disruptions):): ARRC and the State of Alaska work cooperatively to provide communities along the railbelt with redundant communication paths to minimize the risk of long term loss of communication through the area, in the event of a technological outage.

6. Does your organization own or operate property located in any areas subject to the hazards listed in #5e above:

   - Would you list those properties?
     - What is their approximate location,
     - Are they State owned or leased) and
     - What specific mitigation measures or actions your organization has taken to protect these properties and operations (please list relevant hazards)?

   ARRC property reserves, yards, and mainline and branch track right-of-way area are primarily directly ARRC owned. Additional industry track, next to ARRC ROW is typically privately owned. ARRC implements track infrastructure (#1 above) mitigation activities to provide stability and resiliency along the ROW and in yards. Managing risk to activities occurring within ARRC reserves, on property under lease to private or commercial parties, is the responsibility of the lessee.

7. Please list other Federal, State, Local, non-profit or private agencies your organization works with to reduce disaster losses from the hazards listed in #5e and…:

   - Briefly describe the cooperative programs, projects, or mitigation work.
   - What challenges (staffing, remote location, data, mapping, etc.) your organization has faced in cooperating with other agencies in hazard mitigation.
   - How you have overcome these challenges.

   ARRC works with many Federal, state, and local agencies during disaster relief, pre-disaster and hazard mitigation, and risk evaluation efforts. Some of these agencies include FTA, FRA, FEMA, USACE, ADF&G, ADEC, USFWS, DNR, DHS, DHS&EM, USFS, State Troopers, FBI, local police and fire departments, etc… (see 1.a.)

   Challenges include lack of data and mapping, high costs to develop and deliver projects in remote areas, fiscal constraints, resourcing/staffing planning as an additive effort, and frequently changing requirements for hazard mitigation grant fund sources. Efforts to overcome these challenges include leveraging the Silver Jackets program to support data collection and more proactive efforts to identify highest risk areas to concentrate our limited resources.

8. How did your agency integrate the 2013 legacy SHMP concepts, priorities and initiatives within new or existing legislation, regulation, programs, policies, or procedures?

   - Are there any legacy State statutes, authorities, regulations or programs that were particularly effective in assisting your organization in reducing future disaster losses?
   - Are there any new or amended State statutes, authorities, regulations, or programs that would enhance your organization's ability to reduce future disaster losses?
   - Were any State statutes, authorities, regulations, or programs rescinded that would now prevent or hinder your organization's ability to reduce future disaster losses?

9. What role does public opinion and opportunities for public involvement play in your organization's effort to reduce future disaster losses?

   ARRC has a public website with Project Fact Sheets available but also provides public notices in local newspapers or publications requesting public comments as required per NEPA guidelines. Specific and direct public involvement and outreach occurs on a project specific basis. Because ARRC provides critical access to numerous remote areas, ongoing public involvement and consideration of public opinion is routine.

10. What challenges does your organization face in efforts to reduce future disaster losses.

    The majority of the ARRC railbelt is within a rural and/or remote area.

    Low population density, extensive and continuing hydrology effect to the ARRC ROW, and limited historical and environmental impact studies, and resource constraints reduces our ability to pursue pre-disaster or hazard mitigation type funding sources.

    In addition, a 500+ mile area / distance stretches ARRC equipment, personnel, and material placement and availability resources in responding to developing pre-incident indicators.

    - Staffing: Increase track inspections, stage response materials, etc…
    - Funding: Limited budget and opportunities for funding assistance.
    - Remote community locations: Rural areas only accessible via rail.
    - Data: Poor historical data and limited hydrology.
    - Mapping: Rely on outside resources.

11. Are there any other State-level initiatives or ideas that your organization can suggest that would enhance the State's effort to reduce future disaster losses?

    Allocate funding for planning studies, hydrology studies, bed-load accumulation, and pre-disaster mitigation projects to prevent future disasters.

Appendix 13-18 2018 Alaska State Hazard Mitigation Plan (SHMP) Update; Mitigation Capability Assessment Questionnaire

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Would you please review the questions, confer with your agency policy makers and summarize your agency's initiatives reflect your organization mitigation mission?

1. What programs, projects and/or expertise does your agency have that contributes to long-term mitigation efforts to reduce disaster losses in the State?

   Broad-based scientific expertise in geohazards affecting Alaska. In many areas, Alaska lacks the fundamental geologic data needed to guide the proper development and implementation of building codes, land-use zoning, right-of-way siting, and contingency planning for natural hazards events. Maps and reports produced by DGGS are the front-line source of information about where damage is likely to be greatest and where mitigation efforts should be concentrated. Contribute agency technical input and comment on a wide variety of permit applications, development plans, land use, local and state Hazard Mitigation Plans, Environmental Impact Statements, Resource Management Plans, FEMA RiskMAP products, and Best Interest Findings.

   - Administer and participate in the Alaska Seismic Hazards Safety Commission. http://www.seismic.alaska.gov/
   - Member organization of the Alaska Volcano Observatory. https://avo.alaska.edu/about/index.php
   - Member of the Western States Seismic Policy Council. https://www.wsspc.org/
   - Collaborating partner with Alaska Earthquake Center (https://earthquake.alaska.edu/) in the National Tsunami Hazard Mitigation Program. https://nws.weather.gov/nthmp/index.html
   - Member of the Alaska State Hazard Mitigation Advisory Committee (SHMAC).
   - Member of the Alaska Silver Jackets. https://silverjackets.nfrmp.us/State-Teams/Alaska
   - Partner with the Alaska Climate Adaptation Science Center. https://casc.alaska.edu/
   - Federal Emergency Management Agency (FEMA) Cooperating Technical Partner. https://www.fema.gov/cooperating-technical-partners-program

   Hazard research programs include the Climate and Cryosphere Hazards Program (http://dggs.alaska.gov/sections/engineering/profiles/climatehazards.html), Coastal Hazard Program (http://dggs.alaska.gov/sections/engineering/profiles/coastalhazards.html), Tsunami Inundation Mapping Program (http://dggs.alaska.gov/pubs/tsunami), and Volcanology Program (http://dggs.alaska.gov/sections/volcanology/), with additional research activities focusing on mapping and understanding hazards associated with earthquakes, flooding, erosion, permafrost, slope instability (including landslides), radon, and arsenic contamination.

   a. Include references to any of your agency's existing State-Federal partnerships that address, long-term hazard mitigation.

      See above.

   b. Include any of your agency's activities that enhance understanding of hazards and vulnerability in the State (hazard identification, mapping, etc.)

      See above.

c. Include references to any established (written) mitigation polices or procedures that your organization uses to reduce disaster losses or that your organization intends to develop through State-Federal partnerships.

   N/A

d. Include specific examples of programs or activities directly related to the following hazards specified in the State Hazard Mitigation Plan (including: detection, retrofit, building codes, hazard maps, gauges, models, forecasts, historic data, and dynamic data).

   See above.

2. **How did your agency integrate the 2013 legacy SHMP concepts**, priorities and initiatives within new or existing legislation, regulation, programs, policies, or procedures?
   - Are there any legacy State statutes, authorities, regulations or programs that were particularly effective in assisting your organization in reducing future disaster losses?

     N/A

   - Are there any new or amended State statutes, authorities, regulations, or programs that would enhance your organization's ability to reduce future disaster losses?

     Participation in the National Coastal Management Program

   - Were any State statutes, authorities, regulations, or programs rescinded that would now prevent or hinder your organization's ability to reduce future disaster losses?

     N/A

3. **Are there any other ongoing or developing initiatives or ideas** that your agency can suggest that would enhance the State's effort to reduce future disaster losses?

   N/A

4. **Do you have any suggestions** on how the State can more effectively use or deliver the mitigation programs you identified?

   N/A

5. **Do you have mechanisms** to assess, design and build your agency's infrastructure to withstand particular natural disasters? If so, how and which hazards? For example are air traffic control towers, piers, docks, office buildings, warehouses built or retrofitted to withstand a significant earthquake event? Please explain.

   Agency offices and facilities have been seismically mitigated by securing furniture and stabilizing shelving racks. Geologic Materials Center warehouse racks are specifically designed and reinforced to withstand seismic shaking.

6. **Please list what mitigation activities your organization has undertaken** to reduce future disaster losses throughout the State?

   Map and assess geohazards throughout Alaska, including:

   - Tsunami inundation maps for Skagway, Haines, Juneau, Kodiak, Sand Point, Chignik, Chignik Lagoon, Nikolski, King Cove, Cold Bay, Yakutat, Dutch Harbor, Akutan, Elfin Cove, Gustavus, Hoonah, Chenega Bay, Sawmill Bay, Cordova, Tatitlek, Sitka, Valdez (With UAF-AEC)
   - Potential maximum permanent earthquake-related flooding maps of Valdez, Chignik, Chignik Lagoon, Chenega, Unalaska, Akutan (With UAF-AEC)
   - Compilation of active faults and seismic hazards in Alaska (With ASHSC)
   - Maps of historic volcanic ashfall
   - Report on glacial lake outburst flooding at Valdez Glacier
   - Flooding elevation maps for flood-vulnerable communities in western Alaska
   - Investigation of potentially active tectonic faults along the route of the proposed Alaska Stand Alone Pipeline
   - Photogrammetric digital surface models and orthoimagery for 26 coastal communities of western Alaska
   - Alaska shoreline change online tool, http://doi.org/10.14509/shoreline and http://doi.org/10.14509/29504
   - Volcano-hazard assessment for Fisher volcano, Unimak Island
   - Database of Quaternary volcanic vents in Alaska, http://doi.org/10.14509/27357
   - Report on shoreline retreat rates at Meshik, Port Heiden
   - Inventory and preliminary assessment of geologic hazards in the Passage Canal-Portage Valley area
   - Report on Cathedral Rapids and Dot "T" Johnson faults, Interior Alaska
   - Geologic and geotechnical evaluation of Yukon River bridge landslide
   - Quaternary Faults and Folds online database, http://doi.org/10.14509/qff and http://doi.org/10.14509/24956
   - Evaluation of coastal geomorphology and geohazards on Kigiqtam Iglua, Shishmaref
   - Engineering - geologic map of the Alaska Highway corridor, Tetlin Junction to Canada border

   a. Please identify “new” statutory or regulatory authorities that address hazard mitigation.

      N/A

   b. Include any activities that enhance avoiding future hazard impacts and reducing infrastructure and population vulnerabilities (hazard identification, mapping, etc.)

      See above.

   c. Include references to any established (written) mitigation polices or procedures that your organization uses to reduce disaster losses or that your organization intends to develop.

N/A

d. Include any activities related to public hazard mitigation including regulating development, developing building codes, written standards, public education presentations, and training opportunities, etc.

   See above

e. Include specific examples of programs or activities directly related to the following hazards profiled in the State Hazard Mitigation Plan.

1. Natural Hazards

Earthquake: See item "1" above

Flood, (includes Riverine & Coastal flood, erosion, storm surge, ice-jam, ice run-up aufeis [overflow], etc.): See item "1" above

Ground Failure: (includes Avalanche, Landslide, Mudslide, Permafrost & Wind Erosion etc.): See item "1" above

Tsunami: (includes Seiche) See item "1" above

Volcano, (includes Ash, Lahar, etc.) See item "1" above

Weather, (includes Drought, Storms, Temperature, & Wind, etc.) N/A

Wildland Fire, (includes Tundra, Urban Interface etc.) N/A

2. Other Hazards:

These hazards will no longer be tracked within the SHMP because they are either subsequent disaster impacts, not "action" mitigatable, or other regulatory agency oversight and funding capabilities:

- *Economic: (includes Urban Conflagration and other large scale income losses due to natural or man induced events):*
- *Dam Failure (TBD)*
- *Hazardous Materials: (Included HazMat, EHS, Oil Spills, etc. . Managed by the SERC, regulatory agencies, and LEPCs)*
- *Terrorism: (Included Civil Disorder/Disturbance, Infrastructure Threats, & Bombing, Cyber Threats, Nuclear Attack/Materials, did not include Active Shooter.)*
- *Technological: (Formerly combined with Public Health and Human-Caused. Included epidemics, biological, consumables contamination, & Nuclear, Biological, Chemical (NBC) exposure):*

7. **Does your organization own or operate property** located in any areas subject to the hazards listed in #5e above:
    - Alaska Geologic Materials Center (GMC), State-owned, 3651 Penland Pkwy, Anchorage, AK 99508
    - Alaska Division of Geological & Geophysical Surveys office (Denali Building), leased, 3354 College Road, Fairbanks, AK 99709

- Would you list those properties?
    - What is their approximate location,
    - Are they State owned or leased) and
    - What specific mitigation measures or actions your organization has taken to protect these properties and operations (please list relevant hazards)?

      See item "5" above

8. **Please list other Federal, State, Local, non-profit or private agencies** your organization works with to reduce disaster losses from the hazards listed in #5e and…:

   Alaska Institute for Justice, Alaska Ocean Observing Systems (AOOS), NOAAA/National Weather Service, U.S. Geological Survey, University of Alaska, Alaska Earthquake Center, Alaska Volcano Observatory, Alaska Seismic Hazards Safety Commission, National Aeronautics and Space Administration (NASA), Sitka Sound Science Center, Alaska Sea Grant, St. Lawrence University, University of Washington, Oregon State University, Bristol Bay Native Association, U.S. Bureau of Indian Affairs, Alaska Division of Mining, Land and Water, Alaska State Pipeline Coordinator, Alaska Division of Homeland Security and Emergency Management, Nation al Park Service, National Forest Service, City of Sitka, City of Valdez, Alaska Department of Transportation and Public Facilities, National Tsunami Warning Center, Alaska Department of Commerce, Community and Economic Development, and many others.

- Briefly describe the cooperative programs, projects, or mitigation work.

  All work is in support of mapping, assessing, and understanding geohazards to facilitate mitigation.

- What challenges (staffing, remote location, data, mapping, etc.) your organization has faced in cooperating with other agencies in hazard mitigation.

  Baseline data remains sparse; many of our efforts go toward narrowing the data gap, but funding is always an issue.

- How you have overcome these challenges.

  Partnering with other organizations; seeking external sources of funding; pooling resources and expertise.

9. **What challenges does your organization face** in efforts to reduce future disaster losses.

- Staffing: We have technical experts, but lack sufficient support staff to maximize their efforts
- Funding: Collecting necessary data in Alaska is expensive and time-consuming
- Remote community locations: We make it work
- Data: Baseline data remains sparse
- Mapping: We are actively working on producing this critical information

10. Are there any other State-level initiatives or ideas that your organization can suggest that would enhance the State's effort to reduce future disaster losses?
    - Bring back the Alaska Coastal Management Program (ACMP)
    - Support development/collection of baseline data
    - Support hazards research and mapping
    - Enforce building codes
    - Make seismic retrofitting of schools, hospitals, and other public buildings a priority
    - Recognize and push for support and funding for mitigation and relocation of Alaska communities threatened by unique, Alaska-specific catastrophic permafrost hazards that are not currently covered by FEMA and the Stafford Act

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Appendix 13-18 2018 Alaska State Hazard Mitigation Plan (SHMP) Update; Mitigation Capability Assessment Questionnaire

Would you please answer the following questions about your organization's activities and role in reducing future disaster losses in the State and provide any suggestions you may have for improving State-level disaster mitigation. Please highlight any activities initiated, implemented, integrated into other policies, procedures, or processes during the legacy 2013 SHMP's three-year life cycle.

This questionnaire is in MSWord so that you may type your answers directly into the document and return it to:

Scott Simmons	AECOM
Emergency Management Planner	c/o Scott Simmons
Scott.simmons@aecom.com	700 G Street, Suite 500
	Anchorage, AK 99501
	Phone: 907.261.9706
	Toll Free: 800.909.6787
	Fax: 907.562.1297

Introduction:

Hazard mitigation is any action taken to reduce or eliminate the long-term risk to human life and property from natural and human-caused hazards. The purpose of the Alaska State Hazard Mitigation Plan is to identify hazards, complete a risk assessment and vulnerability analysis, identify and coordinate needed mitigation efforts with State, Federal, and local partners and fulfill the requirements set forth in the federal 44 CFR 201.4 DMA 2000 legislation.

The 2016 Alaska Emergency Operations Plan describes the Role of the Disaster Policy Cabinet:

> ***Disaster Policy Cabinet***
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> - *Department of Law*
> - *Department of Military and Veterans Affair (Chair)*
> - *Department of Natural Resources*
> - *Department of Public Safety*
> - *Department of Transportation and Public Facilities*

Additional state, borough, city, and educational agencies who have historically participated in SHMP development include:

State:

- *Office of the Governor*
- *Department of Administration (DOA)*
- *Department of Commerce, Community and Economic Development (DCCED)*
  - *Division of Community and Regional Affairs (DCRA)*
- *Department of Corrections (DOC)*
- *Alaska Court System*
- *Department of Education and Early Development (DEED)*
- *Department of Fish and Game (F&G)*
- *Department of Labor and Workforce Development (DLWD)*
- *Department of Military and Veterans Affair (DMVA)*
  - *Alaska State Defense Force (ADF)*
  - *Alaska National Guard (ANG)*
  - *Division of Homeland Security and Emergency Management (DHS&EM)*
- *Department of Natural Resources*
  - *Alaska Volcano Observatory*
- *Department of Revenue*

Federal

- *Denali Commission*
- *University of Alaska Anchorage (UAA)*
- *University of Alaska Fairbanks (UAF)*
- *United States (US) Department of Agriculture (USDA)*
  - *Disaster Resource Center*
  - *Housing and Urban Development (HYD)*
  - *Natural Resource Conservation Service (NRCS)*
  - *Rural Development (RD)*
  - *US Forest Service (USFS)*
- *US Department of Commerce (DOC)*
  - *US Coast Guard (USCG)*
  - *National Oceanic & Atmospheric Administration (NOAA)*
  - *National Tsunami Warning Center (NTWC)*
  - *National Weather Service (NWS)*
- *US Department of Health and Human Services (DHSS)*
- *US Department of Homeland Security (DHS)*
  - *Federal Emergency Management Agency (FEMA)*
- *US Geological Surveys (USGS)*
- *US Environmental Protection Agency (EPA)*
- *US Army Corps of Engineers (USACE)*

You or your agency has been identified as an acting or new member of the State Hazard Mitigation Advisory Committee (SHMAC). The SHMAC has been in-place since 2002 to assist with identifying, supporting, and prioritizing statewide hazard mitigation initiatives. Selected SHMAC members make recommendations that fulfill statewide mitigation goals to the Governor's DMVA Disaster Policy Cabinet.

Would you please review the questions, confer with your agency policy makers and summarize your agency's initiatives reflect your organization mitigation mission?

1. Please list what mitigation activities your organization has undertaken to reduce future disaster losses throughout the State?
   a. Please identify "new" statutory or regulatory authorities that address hazard mitigation.
   b. Include any activities that enhance avoiding future hazard impacts and reducing infrastructure and population vulnerabilities (hazard identification, mapping, etc.)
   c. Include references to any established (written) mitigation polices or procedures that your organization uses to reduce disaster losses or that your organization intends to develop.
   d. Include any activities related to public hazard mitigation including regulating development, developing building codes, written standards, public education presentations, and training opportunities, etc.
   e. Include specific examples of programs or activities directly related to the following hazards profiled in the State Hazard Mitigation Plan.

A. Natural Hazards

Earthquake:

A. Reviewed agency facilities in terms of potential earthquake falling hazards.

Flood, (includes Riverine & Coastal Erosion, storm surge, ice run-up etc.):

Ground Failure:(includes Avalanche, Landslide, Mudslide, Permafrost & Wind Erosion etc.):

Tsunami: (includes Seiche)

Weather, (includes Drought, Storms, & Wind, etc.)

Volcano, (includes Ash, Lahar, etc.)

Wildland Fire, (includes Tundra, Urban Interface etc.):

B. Work with Alaskan citizens to reduce wildland fire risks.

C. Community Wildland Fire Protection Plans (CWPP)

D. Public Service Announcements (PSA): Wildland Fire Prevention

E. Hazardous Fuels Mitigation Treatment projects

F. Wildland Urban Interface (WUI) homeowner plans

G. Volunteer Fire Department funding through VFA (Federal funds)

H. Red Card Training and Refresher training

B. Manmade and Technological Hazards:

Economic, (includes Urban Conflagration and other large scale income losses due to natural or man induced events):

Infectious Disease, (includes epidemics, biological, consumables contamination, & Nuclear, Biological, Chemical (NBC) exposure):

Invasive Species, (includes Flora & Fauna infestation):

1. Policies and Regulations to help prevent the spread of invasive flora and fauna

    A. Helicopter buckets, Retardant plane tanks – steamed washed prior to being utilized on Alaskan wildland fires.

    B. Identification of Elodea infested waterways

Hazardous Materials, (HazMat, Oil Spills, etc.):

A. Hazardous Materials Training for personnel

Terrorism, (includes Civil Disorder/Disturbance, Infrastructure Threats, Active Shooter, & Bombing, Cyber Threats, Nuclear Attack/Materials,.)

Technological, (includes long duration Utilities & Transportation Disruptions):

2. If your organization owns or operates property located in any areas subject to the hazards listed in #1e above:
    - Would you list those properties
        - Their approximate location,
        - Whether state owned or leased) and
        - Why specific mitigation measures or actions your organization has taken to protect these properties and operations from specific hazards?

            A. Southwest Area Office (McGrath): potential flooding due to river and ice jams

            B. Facilities include both state owned and Federal agreement.

            C. Fairbanks and Northern DNR Region Office is located within the flood plains (next to the Chena River)

            D. All facilities are located within a potential earthquake zone. Ensure furniture i.e. tall bookshelves are bolted to wall.

3. Please list other Federal, State, Local, non-profit or private agencies your organization works with to reduce disaster losses from the hazards listed in #1e and…:
    - Briefly describe the cooperative mitigation work.
    - What challenges your organization has faced in cooperating with other agencies in hazard mitigation.

- How you have overcome or provide suggestions for overcoming these challenges.
    A. Federal (DOI, USFS, DNR) Master Cooperative Wildland Fire Management and Stafford Act Response Agreement
    B. Federal Funding: Western States WUI grant funds hazard-fuels treatments, Information and Educational programs such as Firewise, Ready Set Go and Planning such as Community Wildland Fire Protection Programs (CWPP)
    C. USFS funds for Crew: Type 1 Pioneer Peak; Crew has worked on various hazardous fuels mitigation projects.
    D. Sharing resources for wildland fire suppression/ Hazard mitigation
    E. Cooperative Agreement with local governments: Municipality of Anchorage; Fairbanks North Star Borough, Kenai Peninsula Borough
    F. Cooperative Agreements with Native Corporations: Hazardous Fuels Mitigation: Kenai All Hands All Lands and US Fish and Wildlife Service for Hazard Fuels Reduction. Currently Kenai Kodiak Forestry has an agreement with $386K funding.
    G. Fire Departments (both paid and volunteer): Firewise projects, education, training. Fairbanks North Star Borough grant (federal funds) worked with the Fire Departments to conduct local Firewise evaluations on local homes and residences.
    H. VFA grants funding for fire departments to use for supplies, training

4. How did your agency integrate the 2013 legacy SHMP concepts, priorities and initiatives within new or existing legislation, regulation, programs, policies, or procedures?
    - Are there any legacy State statutes, authorities, or regulations that were particularly effective in assisting your organization in reducing future disaster losses?
    - Are there any new or amended State statutes, authorities, or regulations that would enhance your organization's ability to reduce future disaster losses?
    - Were any State statutes, authorities, or regulations that were rescinded that now prevent or your organization's ability to reduce future disaster losses?
        A. Alaska Wildland Fire protection Statutes and Regulations were updated February 2015
        B. Sec 41.15.050 Fire Season April 1 to August 31.
        C. 2018 House Bill 155 update and reorganize Division of Forestry fire prevention laws and penalties to improve compliance and permit enforcement.

5. What role does public opinion and opportunities for public involvement play in your organization's effort to reduce future disaster losses?
        A. Host local community meeting inviting nearby residences prior to conducting hazardous fuels reduction projects.
        B. Host Firewise events at local home shows

6. What challenges does your organization face in efforts to reduce future disaster losses.

A. Staffing: crews and personnel are needed for fire suppression activities during the summer months. Most of the staff is seasonally employed.
B. Funding: rely on Federal funds
C. Remote community locations: Some of the remote communities do not have an organized government
D. Data:
E. Mapping: it costs monies to obtain the latest satellite imagery. Funding is needed to support the GIS personnel

7. Are there any other State-level initiatives or ideas that your organization can suggest that would enhance the State's effort to reduce future disaster losses?
    A. A: Ensuring that public citizens take ownership/ responsibility in reducing their wildland fire risk through Firewise.

2013 Alaska State Hazard Mitigation Plan Update
Federal Agency Mitigation Questionnaire

The State of Alaska is currently updating the State Hazard Mitigation Plan (SHMP). The State is required to revise and update our plan every three years in order to continue to be eligible for almost all FEMA funding. The purpose of the SHMP is to identify hazards, complete a risk assessment and vulnerability analysis, identify and coordinate needed mitigation efforts with State, Federal, and local partners and fulfill the requirements set forth in the Federal 44 CFR 201.4 DMA 2000 legislation (http://www.fema.gov/pdf/help/fr02-4321.pdf).

State and Federal partnerships are one mechanism used to accomplish mitigation tasks. In Alaska there are multiple Federal agencies with programs, projects, data and staff expertise that contribute to decision making concerning hazard mitigation in Alaska. In many cases these partnerships have been identified in the hazard specific sub-sections (earthquake, volcanic eruption, flood, snow avalanche, weather, etc.) of section five of the current, 2007, SHMP (also see table included). However, we are aware that there are additional Federal agency ventures concerning hazard mitigation that are absent from the existing Plan. We would like the 2010 update of the SHMP to reflect, identify and recognize all of your agency's contributions (programs, projects and staff areas of expertise) in providing local data and guidance with a goal of reducing future disaster losses in the State of Alaska.

In order to most appropriately and accurately identify these contributions we are asking you to read and respond to the questions below. We also welcome links, digital documents and images which illustrate and/or support these programs, projects and areas of expertise. Our goal in this process is to simply compile and present a comprehensive, accurate and up-to-date representation of these existing programs in the SHMP.

Please return your contributions and answers to the provided questions back to me by May 21, if possible. Please feel free to contact me anytime with comments and questions.

R. Scott Simmons, CFM, CPM

Senior Emergency Management Planner

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Personal Cell: 907.841.1832

The legacy 2013 SHMP Plan is available as a PDF (17.6 MB) at:
http://ready.alaska.gov/plans/documents/Alaskas%20HMP%202016.pdf

State of Alaska Department of Homeland Security and Emergency Management
2018 Update State Hazard Mitigation Plan
Federal Agency Mitigation Questionnaire

1. What programs, projects and/or expertise does your agency have that contributes to long-term mitigation efforts to reduce disaster losses in the State?

    A. Hazardous Fuels Reduction projects
    B. Prevention and Firewise Education activities
    C. Burn Permit Program

f. Include references to any of your agency's existing State-Federal partnerships that address, long-term hazard mitigation.

    A. Kenai All Lands All Hands see below for success story.

    B. Partnership with the State of Alaska and USDA Forest Service: State and Private Forestry Cooperative Programs provide technical, educational and financial assistance to landowners, resource managers and communities with a primary goal of maintaining and improving the health, sustainability and productivity of Alaska's urban and rural forests and related economies.

g. Include any of your agency's activities that enhance understanding of hazards and vulnerability in the State (hazard identification, mapping, etc.)

    A. Division of Forestry Geographic Information Systems: http://forestrymaps.alaska.gov/AK_DOF_Fire_App/ Hazardous Fuels mitigation projects completed are depicted on the GIS map. The mapping program also links to nearby borough/municipality property database to assist in identifying potential values at risk.

    B. Alaska Fire Service Interagency Know Sites Data Base: password protected site that identifies values. The site is being updated to the National program.

h. Include references to any established (written) mitigation polices or procedures that your organization uses to reduce disaster losses or that your organization intends to develop through State-Federal partnerships.

    A. Kennicott/ McCarthy Community Wildfire Protection Plan (CWPP) was developed through the coordination of Federal, State and local agencies.

    B. Master Cooperative Wildland Fire Management and Stafford Act Response Agreement – DOI agencies (BLM, BIA, FWS, NPS), Department of Agriculture (USFS) and State of Alaska Division of Forestry. The purpose is to document the commitment to improve efficiency by facilitating the coordination and exchange of personnel, equipment, supplies, services and funds in sustaining wildland fire management such as prevention, preparedness, communication and education, fuels

treatment and hazard mitigation, fire planning, response strategies, tactics, suppression and post fire rehabilitation and restoration.

i. Include specific examples of programs or activities directly related to the following hazards specified in the State Hazard Mitigation Plan (including: detection, retrofit, building codes, hazard maps, gauges, models, forecasts, historic data, and dynamic data).

- Flood
- Wildland Fire

  A. Wildland Fire season – updated Statutes Regulations

    - April 1st to recognized that there is an increase human caused early season fires
    - Current Legislation HB155
      - Education/ Training:
        - Advance Wildland Fire Academy scheduled 2018 in McGrath; leadership training
        - Fire Modules 2017 on the job training for three modules (VCRA, Southwest and Mat Su Areas). Individuals had on the job training in operating fire engines, fire-fighting, and helicopter experience.

  B. Hazard Maps: identify high risk areas due to flammable vegetation, terrain and infrastructure/ population. In cooperation with local governments and through grant funding obtain imagery to help identify values and fire risks. Identifying hazardous fuel treatments on maps aids in wildland fire suppression activities.

  C. Alaska Interagency Coordination Center (Alaska Fire Service AICC) current and historical fire map website.

  D. Mesowest/ National Weather Service website on AICC webpage. Tracks and displays fire weather indices.

  E. Integrated Fire Management (Dispatch Computer Aided program) and Mobile IFM. The program was developed by Selkirk Systems Inc. The Dispatch program allows dispatchers to track suppression resources i.e. air tankers, plot fire locations and identify nearby values at risk. The mobile IFM allows fire protection and jurisdictional managers to identify weather (fire danger) and fires within their areas.

- Earthquake
- Volcanoes
- Snow Avalanche

- Tsunami
- Severe Weather
- Ground Failure
- Erosion
- Oil Spill and Hazardous Materials
- Terrorism
- Technological, Human caused
- Health (pandemic flu, Bird flu, Swine flu, H1N1…)

2. Please list other Federal, State, local, non-profit and/or private organizations your agency works with to reduce disaster losses from the hazards in the bulleted list above and briefly describe the cooperative program or project. Please include any challenges, success stories and protocols that may have come from each program or project.

   A. Kenai All Lands All Hands initially started with the need to mitigate the impacts of spruce beetle. The Action plan for FY 2005-2009 was developed for fire protection and prevention, and hazardous fuels reduction from back porch out (concept for homeowners to take steps 3) insect and disease suppression and 4) forest health restoration and rehabilitation and 5) Community assistance.

   B. The work had four goals and three guiding principles of the National Fire Plan 10 year Comprehensive Strategy. Priority was to work collaboratively with communities within the WUI and the need for the communities to complete a community wildfire protection plan. The Kenai Forest, Wildfire Protection and Fuels Management Coordinating Committee was formed in 2003. Representatives of the Forest Service, Kenai Peninsula Borough, State of Alaska Division of Forestry, Chugachmuit Inc., USFWS Kenai National Wildlife Refuge, Bureau of Land Management, The Bureau of Indian Affairs, the Kenai Fjords National Park and other cooperators.

   C. In 2011 a Community Wildfire Protection Plan was completed for the Kennicott/McCarthy area. The plan was in collaboration with the local fire department, National Park Service and Division of forestry. In 2012 the Division of Forestry received a competitive Western WUI grant to reduce the hazardous fuels in and around the community through a landowner cost share grant program, the construction of shaded fuel break and a Firewise educational outreach campaign. National Firewise Communities /USA recognition was achieved on August 14, 2014.

3. What role does public opinion and opportunities for public involvement play in your organization's effort to reduce future disaster losses?

   A. Public opinion and public participation is critical. If the public expect that the Division of Forestry will always be there to protect their remote cabin nestled in black

spruce, there will be a time when it is not safe, or there is not enough resources. Ensuring that everyone plays a role in protecting their community and property is paramount in the success. Firewise is a cooperative effort among local, state, federal and private agencies to promote fire safety.

4. What challenges (staffing, remote location, data, mapping, etc.) does your organization face in efforts to reduce future disaster losses?

   A. Most if not all of the programs are federally funded. Even the Borough/Municipality are federally funded through federal grants. As the federal dollars lessen, there is more competition for these funds. Currently the federal funds do not cover maintenance thus hazardous fuel projects may lose their effectiveness.

   B. In some places, the easy hazardous fuel treatments sites have been completed. The next priority sites may have complications i.e. multiple land ownership.

   C. Changing values and risks. Changing landownership; limited resources: As residences move into the wildland urban setting and recreate in remote areas- the threat from wildland fires can increase. However, if these sites are not identified, if suppression forces are few there may not be a “fire engine” at every driveway. For the remote cabins, it may not be safe to place firefighters onsite to protect the cabin.

5. Are there any other ongoing or developing initiatives or ideas that your agency can suggest that would enhance the State’s effort to reduce future disaster losses?

   A. Incorporate Firewise principles for State owned and or leased facilities. A program that teaches people how to adapt to live with wildfire. This will assist in getting the firewise message to homeowners and businesses.

   B. Ensure structures are built with flame resistant material i.e. metal roof; clear off dead and dry vegetation from rooflines, gutters, porches. Screen and seal openings that could allow embers, trim back shrubs and tree that are closer than 5 feet, Store away flammable items. Rake out any landscaping mulch at least 5 feet away. Remove anything flammable such as woodpiles, vehicles within 30 feet that could act as a large fuel source. Incorporate outside sprinklers around the facilities to reduce the chance of embers igniting.

6. Do you have any suggestions on how the State can more effectively use or deliver the mitigation programs you identified?

   A. Practice what we teach (educate). Identify (signage) hazardous fuels treatment areas; use scannable signs that if the person has a smart phone links to a Firewise page with more information. Signs with phone numbers that play a taped PSA about the benefits of hazardous fuels reduction projects and Firewise.

7. Do you have a mechanism to assess, design and build your agency’s infrastructure to withstand particular natural disasters? If so, how and which hazards? For example are air traffic control towers, piers, docks, office buildings, warehouses built or retrofitted to withstand a significant earthquake event? Please explain.

A. Wildland fire – Ensure Firewise principles are followed around the facilities including reduce flammable vegetation.

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Please highlight any activities initiated, implemented, integrated into other policies, procedures, or processes during the legacy 2013 SHMP's three-year life cycle.

Please enter your contributions and answers directly into this MS Word document and return back to me by May 21, if possible.

Please feel free to contact me anytime with comments and questions.

Scott Simmons
Emergency Management Planner
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> - *Department of Natural Resources*
> - *Department of Public Safety*
> - *Department of Transportation and Public Facilities*

Additional federal, state, borough, city, and educational agencies who have historically participated in SHMP development include:

Federal

- *Denali Commission*
- *United States (US) Department of Agriculture (USDA)*
  - *Disaster Resource Center*
  - *Housing and Urban Development (HUD)*
    - *Natural Resource Conservation Service (NRCS)*
    - *Rural Development (RD)*
    - *US Forest Service (USFS)*
- *US Department of Commerce (DOC)*
  - *National Oceanic & Atmospheric Administration (NOAA)*
    - *National Ocean Science*
    - *National Weather Service (NWS)*
      - *National Tsunami Warning Center (NTWC)*
- *US Department of Health and Human Services (DHSS)*
- *US Department of Homeland Security (DHS)*
  - *Federal Emergency Management Agency (FEMA)*
  - *US Coast Guard (USCG)*
- *US Geological Surveys (USGS)*
- *US Environmental Protection Agency (EPA)*
- *US Army Corps of Engineers (USACE)*

State:

- *Office of the Governor*

- *Department of Administration (DOA)*
  - *Risk Management (RM)*
- *Department of Commerce, Community and Economic Development (DCCED)*
  - *Division of Community and Regional Affairs (DCRA)*
    - *Floodplain Management*
    - *Alaska Climate Change Impact Mitigation Program (ACCIMP)*
- *Department of Corrections (DOC)*
- *Alaska Court System*
- *Department of Education and Early Development (DEED)*
- *Department of Environmental Conservation (DEC)*
  - *Division of Spill Prevention and Response (DSPR)*
  - *Village Safe Water (VSW)*
- *Department of Fish and Game (F&G)*
- *Department of Labor and Workforce Development (DLWD)*
- *Department of Military and Veterans Affair (DMVA)*
  - *Alaska State Defense Force (ADF)*
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  - *Division of Homeland Security and Emergency Management (DHS&EM)*
- *Department of Natural Resources (DNR)*
  - *Division of Forestry (DOF)*
  - *Division of Geological and Geophysical Surveys (DGGS)*
  - *Division of Mining, Land, and Water (DMLW)*
    - *Dam Safety and Construction Unit*
  - *Alaska Volcano Observatory (AVO*
- *Department of Revenue (DOR)*
- *Alaska Department of Public Safety (DPS)*
- *Alaska Department of Transportation and Public Facilities (DOT/PF)*
- *University of Alaska Anchorage (UAA)*
- *University of Alaska Fairbanks (UAF)*

You or your agency has been identified as an acting or new member of the State Hazard Mitigation Advisory Committee (SHMAC). The SHMAC has been in-place since 2002 to assist with identifying, supporting, and prioritizing statewide hazard mitigation initiatives. Selected SHMAC members make recommendations that fulfill statewide mitigation goals to the Governor's DMVA Disaster Policy Cabinet.

Would you please review the questions, confer with your agency policy makers and summarize your agency's initiatives reflect your organization mitigation mission?

Please refer to the Department of Military and Veterans Affairs as they handle all State of Alaska disaster mitigation and response.

1. What programs, projects and/or expertise does your agency have that contributes to long-term mitigation efforts to reduce disaster losses in the State?
   a. Include references to any of your agency's existing State-Federal partnerships that address, long-term hazard mitigation.

   b. Include any of your agency's activities that enhance understanding of hazards and vulnerability in the State (hazard identification, mapping, etc.)

   c. Include references to any established (written) mitigation polices or procedures that your organization uses to reduce disaster losses or that your organization intends to develop through State-Federal partnerships.

   d. Include specific examples of programs or activities directly related to the following hazards specified in the State Hazard Mitigation Plan (including: detection, retrofit, building codes, hazard maps, gauges, models, forecasts, historic data, and dynamic data).

2. Are there any other ongoing or developing initiatives or ideas that your agency can suggest that would enhance the State's effort to reduce future disaster losses?

3. Do you have any suggestions on how the State can more effectively use or deliver the mitigation programs you identified?

4. Do you have a mechanism to assess, design and build your agency's infrastructure to withstand particular natural disasters? If so, how and which hazards? For example are air traffic control towers, piers, docks, office buildings, warehouses built or retrofitted to withstand a significant earthquake event? Please explain.

5. Please list what mitigation activities your organization has undertaken to reduce future disaster losses throughout the State?

   a. Please identify "new" statutory or regulatory authorities that address hazard mitigation.

   b. Include any activities that enhance avoiding future hazard impacts and reducing infrastructure and population vulnerabilities (hazard identification, mapping, etc.)

   c. Include references to any established (written) mitigation polices or procedures that your organization uses to reduce disaster losses or that your organization intends to develop.

d. Include any activities related to public hazard mitigation including regulating development, developing building codes, written standards, public education presentations, and training opportunities, etc.

e. Include specific examples of programs or activities directly related to the following hazards profiled in the State Hazard Mitigation Plan.

A. Natural Hazards

Earthquake:

Ground Failure: (includes Avalanche, Landslide, Mudslide, Permafrost & Wind Erosion etc.):

Tsunami: (includes Seiche)

Water, (includes Riverine & Coastal flood, erosion, storm surge, ice-jam, ice run-up aufeis [overflow], etc.):

Weather, (includes Drought, Storms, Temperature, & Wind, etc.)

Volcano, (includes Ash, Lahar, etc.)

Wildland Fire, (includes Tundra, Urban Interface etc.)

B. Other Hazards:

Economic, (includes Urban Conflagration and other large scale income losses due to natural or man induced events):

Infectious Disease, (includes epidemics, biological, consumables contamination, & Nuclear, Biological, Chemical (NBC) exposure):

Invasive Species, (includes Flora & Fauna infestation):

Hazardous Materials, (HazMat, Oil Spills, etc.):

Terrorism, (includes Civil Disorder/Disturbance, Infrastructure Threats, Active Shooter, & Bombing, Cyber Threats, Nuclear Attack/Materials,.)

Technological, (includes long duration Utilities & Transportation Disruptions):

6. Does your organization own or operate property located in any areas subject to the hazards listed in #5e above:
   - Would you list those properties?

Attached separately is a master list of insured state-owned properties. The Division of Risk Management maintains this list and administers the self-insurance program for each state agency, covering all sudden and accidental property and casualty claims. This is not a complete list of state-owned properties. You can contact General Services to request a list of <u>all</u> state-owned <u>and</u> leased properties.

- What is their approximate location,
- Are they State owned or leased) and
- What specific mitigation measures or actions your organization has taken to protect these properties and operations (please list relevant hazards)?

7. Please list other Federal, State, Local, non-profit or private agencies your organization works with to reduce disaster losses from the hazards listed in #5e and…:
   - Briefly describe the cooperative programs, projects, or mitigation work.
   - What challenges (staffing, remote location, data, mapping, etc.) your organization has faced in cooperating with other agencies in hazard mitigation.
   - How you have overcome these challenges.

8. How did your agency integrate the 2013 legacy SHMP concepts, priorities and initiatives within new or existing legislation, regulation, programs, policies, or procedures?
   - Are there any legacy State statutes, authorities, regulations or programs that were particularly effective in assisting your organization in reducing future disaster losses?
   - Are there any new or amended State statutes, authorities, regulations, or programs that would enhance your organization's ability to reduce future disaster losses?
   - Were any State statutes, authorities, regulations, or programs rescinded that would now prevent or hinder your organization's ability to reduce future disaster losses?

9. What role does public opinion and opportunities for public involvement play in your organization's effort to reduce future disaster losses?

10. What challenges does your organization face in efforts to reduce future disaster losses.
    - Staffing:
    - Funding: **Insure State Assets**
    - Remote community locations:
    - Data:
    - Mapping: **Will include GIS insured property mapping in future RMIS RFP.**

11. Are there any other State-level initiatives or ideas that your organization can suggest that would enhance the State's effort to reduce future disaster losses?

Please place an "x" in the following table that reflects the agency and/or programs your agency partners with.

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Appendix 13-18 2018 Alaska State Hazard Mitigation Plan (SHMP) Update; Mitigation Capability Assessment Questionnaire

The State of Alaska is currently updating the State Hazard Mitigation Plan (SHMP). The State is required to revise and update our plan every three years in order to continue to be eligible for almost all FEMA funding. The purpose of the SHMP is to identify hazards, complete a risk assessment and vulnerability analysis, identify and coordinate needed mitigation efforts with State, Federal, and local partners and fulfill the requirements set forth in the Federal 44 CFR 201.4 DMA 2000 legislation (http://www.fema.gov/pdf/help/fr02-4321.pdf).

State and Federal partnerships are one mechanism used to accomplish mitigation tasks. In Alaska there are multiple Federal agencies with programs, projects, data and staff expertise that contribute to decision making concerning hazard mitigation in Alaska. In many cases these partnerships have been identified in the hazard specific sub-sections (earthquake, volcanic eruption, flood, snow avalanche, weather, etc.) of section five of the current, 2007, SHMP (also see table included). However, we are aware that there are additional Federal agency ventures concerning hazard mitigation that are absent from the existing Plan. We would like the 2010 update of the SHMP to reflect, identify and recognize all of your agency's contributions (programs, projects and staff areas of expertise) in providing local data and guidance with a goal of reducing future disaster losses in the State of Alaska.

In order to most appropriately and accurately identify these contributions we are asking you to read and respond to the questions below. We also welcome links, digital documents, and images which illustrate and/or support these programs, projects, and your agencies expertise. Our goal in this process is to compile and present a comprehensive, accurate, and up-to-date narrative that defines the State's capability to manage and fulfill existing SHMP related policies, procedures, and programs.

Please highlight any activities initiated, implemented, integrated into other policies, procedures, or processes during the legacy 2013 SHMP's three-year life cycle.

Please enter your contributions and answers directly into this MS Word document and return back to me by May 21, if possible.

Please feel free to contact me anytime with comments and questions.

Scott Simmons
Emergency Management Planner
Scott.simmons@aecom.com

AECOM
c/o Scott Simmons
700 G Street, Suite 500
Anchorage, AK 99501
Phone: 907.261.9706
Toll Free: 800.909.6787
Fax: 907.562.1297

Introduction:

Hazard mitigation is any action taken to reduce or eliminate the long-term risk to human life and property from natural and human-caused hazards. The purpose of the Alaska State Hazard Mitigation Plan is to identify hazards, complete a risk assessment and vulnerability analysis, identify and coordinate needed mitigation efforts with State, Federal, and local partners and fulfill the requirements set forth in the federal 44 CFR 201.4 DMA 2000 legislation.

The 2016 Alaska Emergency Operations Plan describes the Role of the Disaster Policy Cabinet:

> ***Disaster Policy Cabinet***
>
> *The role of the Disaster Policy Cabinet (DPC) when convened is to provide expeditious, coordinated state agency recommendations to the governor in response to emergencies resulting from major disaster events and homeland security events.*
>
> ***Disaster Policy Cabinet Composition***
>
> - *Department of Administration*
> - *Department of Commerce, Community and Economic Development*
> - *Department of Corrections*
> - *Department of Environmental Conservation*
> - *Department of Health and Social Services*
> - *Department of Law*
> - *Department of Military and Veterans Affair (Chair)*
> - *Department of Natural Resources*
> - *Department of Public Safety*
> - *Department of Transportation and Public Facilities*

Additional federal, state, borough, city, and educational agencies who have historically participated in SHMP development include:

Federal

- *Denali Commission*
- *United States (US) Department of Agriculture (USDA)*
  - *Disaster Resource Center*
  - *Housing and Urban Development (HUD)*
    - *Natural Resource Conservation Service (NRCS)*
    - *Rural Development (RD)*
    - *US Forest Service (USFS)*
- *US Department of Commerce (DOC)*
  - *National Oceanic & Atmospheric Administration (NOAA)*
    - *National Ocean Science*
    - *National Weather Service (NWS)*
      - *National Tsunami Warning Center (NTWC)*
- *US Department of Health and Human Services (DHSS)*
- *US Department of Homeland Security (DHS)*
  - *Federal Emergency Management Agency (FEMA)*
  - *US Coast Guard (USCG)*
- *US Geological Surveys (USGS)*
- *US Environmental Protection Agency (EPA)*
- *US Army Corps of Engineers (USACE)*

State:

- *Office of the Governor*

- *Department of Administration (DOA)*
  - *Risk Management (RM)*
- *Department of Commerce, Community and Economic Development (DCCED)*
  - *Division of Community and Regional Affairs (DCRA)*
    - *Floodplain Management*
    - *Alaska Climate Change Impact Mitigation Program (ACCIMP)*
- *Department of Corrections (DOC)*
- *Alaska Court System*
- *Department of Education and Early Development (DEED)*
- *Department of Environmental Conservation (DEC)*
  - *Division of Spill Prevention and Response (DSPR)*
  - *Village Safe Water (VSW)*
- *Department of Fish and Game (F&G)*
- *Department of Labor and Workforce Development (DLWD)*
- *Department of Military and Veterans Affair (DMVA)*
  - *Alaska State Defense Force (ADF)*
  - *Alaska National Guard (ANG)*
  - *Division of Homeland Security and Emergency Management (DHS&EM)*
- *Department of Natural Resources (DNR)*
  - *Division of Forestry (DOF)*
  - *Division of Geological and Geophysical Surveys (DGGS)*
  - *Division of Mining, Land, and Water (DMLW)*
    - *Dam Safety and Construction Unit*
  - *Alaska Volcano Observatory (AVO*
- *Department of Revenue (DOR)*
- *Alaska Department of Public Safety (DPS)*
- *Alaska Department of Transportation and Public Facilities (DOT/PF)*
- *University of Alaska Anchorage (UAA)*
- *University of Alaska Fairbanks (UAF)*

You or your agency has been identified as an acting or new member of the State Hazard Mitigation Advisory Committee (SHMAC). The SHMAC has been in-place since 2002 to assist with identifying, supporting, and prioritizing statewide hazard mitigation initiatives. Selected SHMAC members make recommendations that fulfill statewide mitigation goals to the Governor's DMVA Disaster Policy Cabinet.

Would you please review the questions, confer with your agency policy makers and summarize your agency's initiatives reflect your organization mitigation mission?

1. What programs, projects and/or expertise does your agency have that contributes to long-term mitigation efforts to reduce disaster losses in the State?
    - Emergency Watershed Protection Program
    - Watershed Mitigation
    - Private land conservation planning
    - Engineer

    a. Include references to any of your agency's existing State-Federal partnerships that address, long-term hazard mitigation.

    b. Include any of your agency's activities that enhance understanding of hazards and vulnerability in the State (hazard identification, mapping, etc.)

    c. Include references to any established (written) mitigation polices or procedures that your organization uses to reduce disaster losses or that your organization intends to develop through State-Federal partnerships.

    d. Include specific examples of programs or activities directly related to the following hazards specified in the State Hazard Mitigation Plan (including: detection, retrofit, building codes, hazard maps, gauges, models, forecasts, historic data, and dynamic data).

2. Are there any other ongoing or developing initiatives or ideas that your agency can suggest that would enhance the State's effort to reduce future disaster losses?

3. Do you have any suggestions on how the State can more effectively use or deliver the mitigation programs you identified?

4. Do you have a mechanism to assess, design and build your agency's infrastructure to withstand particular natural disasters? If so, how and which hazards? For example are air traffic control towers, piers, docks, office buildings, warehouses built or retrofitted to withstand a significant earthquake event? Please explain.

5. Please list what mitigation activities your organization has undertaken to reduce future disaster losses throughout the State?

    a. Please identify "new" statutory or regulatory authorities that address hazard mitigation.

    No new regs, but the next Farm Bill could bring changes.

    b. Include any activities that enhance avoiding future hazard impacts and reducing infrastructure and population vulnerabilities (hazard identification, mapping, etc.)

NRCS (Emergency Watershed Protection program (EWP) Projects since 2013:

- McGrath – armored river bank to protect city from erosion
- Village of Tetlin – removed woody debris from river following wildfire
- City of Seward – mitigation of glacial outflow damage to protect critical infrastructure
- Village of Huslia – moved homes and business away from eroding river
- City of Galena – armored riverbank to protect the runway
- City of Valdez – armored riverbank to protect communications tower from erosion
- City of Mekoryuk – schedule project, armoring of barge landing area to allow docking, and protect the fuel header from erosion

c. Include references to any established (written) mitigation polices or procedures that your organization uses to reduce disaster losses or that your organization intends to develop.

NA

d. Include any activities related to public hazard mitigation including regulating development, developing building codes, written standards, public education presentations, and training opportunities, etc.

NA

e. Include specific examples of programs or activities directly related to the following hazards profiled in the State Hazard Mitigation Plan.

The EWP program protects watershed function, so pretty much all of the below listed natural hazards may be eligible if they impact watersheds or waterways. Maybe not drought, but, it could happen.

A. Natural Hazards

Earthquake:

Ground Failure: (includes Avalanche, Landslide, Mudslide, Permafrost & Wind Erosion etc.):

Tsunami: (includes Seiche)

Water, (includes Riverine & Coastal flood, erosion, storm surge, ice-jam, ice run-up aufeis [overflow], etc.):

Weather, (includes Drought, Storms, Temperature, & Wind, etc.)

Volcano, (includes Ash, Lahar, etc.)

Wildland Fire, (includes Tundra, Urban Interface etc.)

B. Other Hazards:

NRCS has a Disaster Mitigation Plan, and a COOP plan with considerations for man-made hazards, but they are mostly for continuing our operations. Our plans are attached to the email.

Economic, (includes Urban Conflagration and other large scale income losses due to natural or man induced events):

Infectious Disease, (includes epidemics, biological, consumables contamination, & Nuclear, Biological, Chemical (NBC) exposure):

Invasive Species, (includes Flora & Fauna infestation):

Hazardous Materials, (HazMat, Oil Spills, etc.):

Terrorism, (includes Civil Disorder/Disturbance, Infrastructure Threats, Active Shooter, & Bombing, Cyber Threats, Nuclear Attack/Materials,.)

Technological, (includes long duration Utilities & Transportation Disruptions):

6. Does your organization own or operate property located in any areas subject to the hazards listed in #5e above:
   - Would you list those properties?
     - What is their approximate location,
     - Are they State owned or leased) and
     - What specific mitigation measures or actions your organization has taken to protect these properties and operations (please list relevant hazards)?

   GSA owns the buildings we use.
7. Please list other Federal, State, Local, non-profit or private agencies your organization works with to reduce disaster losses from the hazards listed in #5e and…:
   - Briefly describe the cooperative programs, projects, or mitigation work.
   - What challenges (staffing, remote location, data, mapping, etc.) your organization has faced in cooperating with other agencies in hazard mitigation.
   - How you have overcome these challenges.

   The EWP requires a project sponsor, which is usually a municipality, but could be any entity.
8. How did your agency integrate the 2013 legacy SHMP concepts, priorities and initiatives within new or existing legislation, regulation, programs, policies, or procedures?
   - Are there any legacy State statutes, authorities, regulations or programs that were particularly effective in assisting your organization in reducing future disaster losses?
   - Are there any new or amended State statutes, authorities, regulations, or programs that would enhance your organization's ability to reduce future disaster losses?

- Were any State statutes, authorities, regulations, or programs rescinded that would now prevent or hinder your organization's ability to reduce future disaster losses?

The USDA and its subdivision NRCS have historically participated in SHMP meetings. However, as a federal agency, we operate independently. We offer our technical assistance as requested due to our extensive watershed disaster mitigation expertise.

9. What role does public opinion and opportunities for public involvement play in your organization's effort to reduce future disaster losses?

   EWP does not require public participation for individual projects; however, NRCS often holds public notices if the project will impact a community. Juneau is an example. The municipality of Juneau approached NRCS for assistance on the Mendenhall River, but the project would impact several private lots. NRCS held a public meeting to inform the residents about the proposed mitigation work.

10. What challenges does your organization face in efforts to reduce future disaster losses.
    - Staffing: NRCS is severely short staffed on our conservation planning staff, but not our engineering staff.
    - Funding: EWP is not a line item in the appropriations budget. Congress approves funding sporadically, usually following a disaster. Alaska usually received funding only after a major disaster when there are excess funds available.
    - Remote community locations: EWP projects are usually in remote locations. This is nothing new for NRCS.
    - Data: NA
    - Mapping: NA

11. Are there any other State-level initiatives or ideas that your organization can suggest that would enhance the State's effort to reduce future disaster losses?

    A revolving fund that all municipalities pay into?

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Appendix 13-18 2018 Alaska State Hazard Mitigation Plan (SHMP) Update; Mitigation Capability Assessment Questionnaire

Would you please answer the following questions about your organization's activities and role in reducing future disaster losses in the State and provide any suggestions you may have for improving State-level disaster mitigation. Please highlight any activities initiated, implemented, integrated into other policies, procedures, or processes during the legacy 2013 SHMP's three-year life cycle.

This questionnaire is in MSWord so that you may type your answers directly into the document and return it to:

Scott Simmons	AECOM
Emergency Management Planner	c/o Scott Simmons
Scott.simmons@aecom.com	700 G Street, Suite 500
	Anchorage, AK 99501
	Phone: 907.261.9706
	Toll Free: 800.909.6787
	Fax: 907.562.1297

Introduction:

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> - *Department of Environmental Conservation*
> - *Department of Health and Social Services*
> - *Department of Law*
> - *Department of Military and Veterans Affair (Chair)*
> - *Department of Natural Resources*
> - *Department of Public Safety*
> - *Department of Transportation and Public Facilities*

Additional state, borough, city, and educational agencies who have historically participated in SHMP development include:

State:

- *Office of the Governor*
- *Department of Administration (DOA)*
- *Department of Commerce, Community and Economic Development (DCCED)*
  - *Division of Community and Regional Affairs (DCRA)*
- *Department of Corrections (DOC)*
- *Alaska Court System*
- *Department of Education and Early Development (DEED)*
- *Department of Fish and Game (F&G)*
- *Department of Labor and Workforce Development (DLWD)*
- *Department of Military and Veterans Affair (DMVA)*
  - *Alaska State Defense Force (ADF)*
  - *Alaska National Guard (ANG)*
  - *Division of Homeland Security and Emergency Management (DHS&EM)*
- *Department of Natural Resources*
  - *Alaska Volcano Observatory*
- *Department of Revenue*

Federal

- *Denali Commission*
- *University of Alaska Anchorage (UAA)*
- *University of Alaska Fairbanks (UAF)*
- *United States (US) Department of Agriculture (USDA)*
  - *Disaster Resource Center*
  - *Housing and Urban Development (HYD)*
  - *Natural Resource Conservation Service (NRCS)*
  - *Rural Development (RD)*
  - *US Forest Service (USFS)*
- *US Department of Commerce (DOC)*
  - *US Coast Guard (USCG)*
  - *National Oceanic & Atmospheric Administration (NOAA)*
  - *National Tsunami Warning Center (NTWC)*
  - *National Weather Service (NWS)*
- *US Department of Health and Human Services (DHSS)*
- *US Department of Homeland Security (DHS)*
  - *Federal Emergency Management Agency (FEMA)*
- *US Geological Surveys (USGS)*
- *US Environmental Protection Agency (EPA)*
- *US Army Corps of Engineers (USACE)*

You or your agency has been identified as an acting or new member of the State Hazard Mitigation Advisory Committee (SHMAC). The SHMAC has been in-place since 2002 to assist with identifying, supporting, and prioritizing statewide hazard mitigation initiatives. Selected SHMAC members make recommendations that fulfill statewide mitigation goals to the Governor's DMVA Disaster Policy Cabinet.

Would you please review the questions, confer with your agency policy makers and summarize your agency's initiatives reflect your organization mitigation mission?

1. Please list what mitigation activities your organization has undertaken to reduce future disaster losses throughout the State?
   a. Please identify "new" statutory or regulatory authorities that address hazard mitigation.

      No new regs, but the next Farm Bill could bring changes.

   b. Include any activities that enhance avoiding future hazard impacts and reducing infrastructure and population vulnerabilities (hazard identification, mapping, etc.)

      NRCS EWP Projects since 2013:

      - McGrath – armored river bank to protect city from erosion
      - Village of Tetlin – removed woody debris from river following wildfire
      - City of Seward – mitigation of glacial outflow damage to protect critical infrastructure
      - Village of Huslia – moved homes and business away from eroding river
      - City of Galena – armored riverbank to protect the runway
      - City of Valdez – armored riverbank to protect communications tower from erosion
      - City of Mekoryuk – schedule project, armoring of barge landing area to allow docking, and protect the fuel header from erosion

   c. Include references to any established (written) mitigation polices or procedures that your organization uses to reduce disaster losses or that your organization intends to develop.

      NA

   d. Include any activities related to public hazard mitigation including regulating development, developing building codes, written standards, public education presentations, and training opportunities, etc.

      NA

   e. Include specific examples of programs or activities directly related to the following hazards profiled in the State Hazard Mitigation Plan.

      The Emergency Watershed Protection program protects watershed function, so pretty much all of the below listed natural hazards may be eligible if they impact watersheds or waterways. Maybe not drought, but, it could happen.

A. Natural Hazards

Earthquake:

Flood, (includes Riverine & Coastal Erosion, storm surge, ice run-up etc.):

Ground Failure:(includes Avalanche, Landslide, Mudslide, Permafrost & Wind Erosion etc.):

Tsunami: (includes Seiche)

Weather, (includes Drought, Storms, & Wind, etc.)

Volcano, (includes Ash, Lahar, etc.)

Wildland Fire, (includes Tundra, Urban Interface etc.)

B. Manmade and Technological Hazards:

NRCS has a Disaster Mitigation Plan, and a COOP plan with considerations for man-made hazards, but they are mostly for continuing our operations. Our plans are attached to the email.

Economic, (includes Urban Conflagration and other large scale income losses due to natural or man induced events):

Infectious Disease, (includes epidemics, biological, consumables contamination, & Nuclear, Biological, Chemical (NBC) exposure):

Invasive Species, (includes Flora & Fauna infestation):

Hazardous Materials, (HazMat, Oil Spills, etc.):

Terrorism, (includes Civil Disorder/Disturbance, Infrastructure Threats, Active Shooter, & Bombing, Cyber Threats, Nuclear Attack/Materials,.)

Technological, (includes long duration Utilities & Transportation Disruptions):

2. If your organization owns or operates property located in any areas subject to the hazards listed in #1e above:
   - Would you list those properties
     - Their approximate location,
     - Whether state owned or leased) and
     - Why specific mitigation measures or actions your organization has taken to protect these properties and operations from specific hazards?

   A: GSA owns the buildings we use.

3. Please list other Federal, State, Local, non-profit or private agencies your organization works with to reduce disaster losses from the hazards listed in #1e and…:
   - Briefly describe the cooperative mitigation work.
   - What challenges your organization has faced in cooperating with other agencies in hazard mitigation.
   - How you have overcome or suggestions for overcoming these challenges.

   A: the EWP requires a project sponsor, which is usually a municipality, but could be any entity.

4. How did your agency integrate the 2013 legacy SHMP concepts, priorities and initiatives within new or existing legislation, regulation, programs, policies, or procedures?
   - Are there any legacy State statutes, authorities, or regulations that were particularly effective in assisting your organization in reducing future disaster losses?
   - Are there any new or amended State statutes, authorities, or regulations that would enhance your organization's ability to reduce future disaster losses?
   - Were any State statutes, authorities, or regulations that were rescinded that now prevent or your organization's ability to reduce future disaster losses?

     A: NRCS keeps up with SHMP meetings, but we operate independently. We offer our technical assistance if requested. We have expertise in disaster mitigation within watersheds.

5. What role does public opinion and opportunities for public involvement play in your organization's effort to reduce future disaster losses?

   A: EWP does not require public participation for individual projects; however, NRCS often holds public notices if the project will impact a community. Juneau is an example. The municipality of Juneau approached NRCS for assistance on the Mendenhall River, but the project would impact several private lots. NRCS held a public meeting to inform the residents about the proposed mitigation work.

6. What challenges does your organization face in efforts to reduce future disaster losses.
   - Staffing: NRCS is severely shot staffed on our conservation planning staff, but not our engineering staff.
   - Funding: EWP is not a line item in the appropriate budget. Congress approves funding sporadically, usually following a disaster. Alaska usually received funding only after a major disaster when there are excess funds available.
   - Remote community locations: EWP projects are usually in remote locations. This is nothing new for NRCS.
   - Data: NA
   - Mapping: NA

7. Are there any other State-level initiatives or ideas that your organization can suggest that would enhance the State's effort to reduce future disaster losses?

   A: A revolving fund that all municipalities pay into?

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APPENDIX 13.20 SHMP PERTINENT STATE AND FEDERAL AGENCIES

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Appendix 13.20 State and Federal Agencies and Additional Organizations

Within Alaska there are an abundance of state and federal agencies responsible for issuing disaster warnings, collecting and distributing data and information, preparing for or responding to disaster s, and providing technical and monetary grant assistance to communities and individuals.

State of Alaska

Department of Administration

The Mission of the Department of Administration (DOA) is to provide consistent and efficient support services to State agencies so that they may better serve Alaskans. http://doa.alaska.gov/home.html

Division of Risk Management

The Objective of the Division of Risk Management is to protect the financial assets and operations of the State of Alaska from accidental loss through a comprehensive self-insurance program for normal and expected property and casualty claims of high frequency and low severity combined with high limit broad form excess insurance protection for catastrophic loss exposures. http://doa.alaska.gov/drm/

Department of Commerce, Community and Economic Development

The Mission Statement of the Department of Commerce, Community and Economic Development (DCCED) is to promote a healthy economy, strong communities, and protect consumers in Alaska. http://www.commerce.state.ak.U.S. /

Division of Community and Regional Affairs

The mission of the Division of Community and Regional Affairs (DCRA) is to promote strong communities and healthy economies. DCRA is the Local Government Agency named in the Constitution of the State of Alaska (AK. Constitution, Article 10, §14) charged with advising and assisting Alaska's local governments on a broad range of issues. https://www.commerce.alaska.gov/web/dcra/

Among the Division's authorities, DCRA fulfills DCCED's charge as:

- The designated state coordinating agency for floodplain management, the National Flood Insurance Program, and the State of Alaska Erosion Management Policy (Alaska Administrative Order (AAO) 175).

  https://gov.alaska.gov/admin-orders/175.html and https://gov.alaska.gov/admin-orders/175extra.html
- The designated state agency directed to coordinate with other state and federal agencies to propose long-term solutions to the ongoing erosion issues in affected coastal communities in Alaska (AAO 231 and 239). https://gov.alaska.gov/admin-orders/231.html and https://gov.alaska.gov/admin-orders/239.html
- The designated state agency authorized to provide planning assistance to Alaska's local governments (AS 44.33.782-788). http://www.akleg.gov/basis/statutes.asp#44.33.782

Risk Mapping, Assessment and Planning (Risk MAP) Program

DCRA provides outreach, coordination and technical assistance to Alaskan communities involved with the Risk Map Program, a FEMA program that provides high quality flood maps, hazard data, and risk assessment tools to help communities understand their natural hazard risk and take action to reduce risk. The Risk MAP process is intended to inform local planning and development activities to increase resilience to natural hazards and disasters.
https://www.commerce.alaska.gov/web/dcra/PlanningLandManagement/RiskMAP.aspx

As part of implementing the Risk Map Program in Alaska:

- The Division maintains and updates the ***Alaska Mapping Business Plan*** which sets priorities for new Risk MAP studies in Alaska. A new focus of Risk MAP is on imminently- threatened Alaska Native villages.

  https://www.commerce.alaska.gov/web/dcra/PlanningLandManagement/RiskMAP/AlaskaMappingBusinessPlan.aspx
- DCRA updated the handbook, Understanding and Evaluating Erosion Problems, which is intended to assist Alaskan property owners and communities in understanding and evaluating erosion problems and alternative solutions. https://www.commerce.alaska.gov/web/portals/4/pub/Understanding&EvaluatingErosionPub.pdf

Floodplain Management and the National Flood Insurance Program (NFIP)

DCRA provides training and technical assistance to Alaska local governments that participate in the NFIP, a FEMA program that aims to reduce the impact of flooding on private and public structures. It does so by providing affordable insurance to property owners and by encouraging communities to adopt and enforce floodplain management regulations.
https://www.commerce.alaska.gov/web/dcra/PlanningLandManagement/FloodplainManagement.aspx

Community Resilience and Climate Adaptation Programs

DCRA's Community Resilience and Climate Adaptation Programs provide Alaskan communities with technical assistance, tools, training and funding to become healthier, stronger and more resilient to natural hazards and to adapt to the impacts of climate change.
https://www.commerce.alaska.gov/web/dcra/CommunityResilienceandClimateAdaptationPrograms.aspx

- *Alaska Community Coastal Protection Project:* DCRA helped the communities of Newtok, Kivalina, Shaktoolik and Shishmaref develop comprehensive Strategic Management Plans to increase resilience to environmental threats. https://www.commerce.alaska.gov/web/dcra/PlanningLandManagement/alaskacommunitycoastalprotectionproject.aspx
- *Alaska Climate Change Impact Mitigation Program (ACCIMP):* Through the ACCIMP, DCRA has provided technical assistance and funding to communities imminently threatened by climate-related natural hazards. The program helps impacted communities develop a planned approach to shoreline protection,

building relocation and/or eventual relocation of the village. https://www.commerce.alaska.gov/web/dcra/PlanningLandManagement/ACCIMP.aspx

- *Inter-Agency Coordination on Flooding, Erosion and other Hazard Issues*
  - DCRA has coordinated inter-agency working groups focused on assisting imminently-threatened communities for more than a decade:
    - The Newtok Planning Group was formed by DCRA in 2006 to assist the village of Newtok with its relocation effort. https://www.commerce.alaska.gov/web/dcra/planninglandmanagement/newtokplanninggroup.aspx
    - DCRA has coordinated Inter-agency Planning Committees for the villages of Kivalina, Shaktoolik and Shishmaref to assist these communities.
      - https://www.commerce.alaska.gov/web/dcra/PlanningLandManagement/KivalinaInter-AgencyPlanningWorkGroup.aspx
      - https://www.commerce.alaska.gov/web/dcra/PlanningLandManagement/ShaktoolikInter-AgencyPlanningWorkGroup.aspx
      - https://www.commerce.alaska.gov/web/dcra/PlanningLandManagement/ShishmarefInter-AgencyPlanningWorkGroup.aspx

Community Profile Maps

DCRA provides accurate, high-quality digital community profile maps for Alaskan communities with less than 1,500 population, and which are not located in a borough with mapping capability. Each profile includes maps at two scales. One map focuses on the developed area of a community and the other map focuses on the area surrounding the community. Information presented on the profiles includes topography, land use, land ownership, and areas subject to flooding and erosion. http://dcced.maps.arcgis.com/apps/webappviewer/index.html?id=18fdb060875740fdad22099ca779d637

Alaska Community Database Online

DCRA maintains the Alaska Community Database Online (CDO), which provides comprehensive information on each community in Alaska. The CDO has detailed information on the location, history, culture, economy, facilities, transportation, climate and demographic characteristics of Alaska communities. During times of disaster, the CDO can provide vital information on community and regional contacts, population, critical infrastructure and more. https://www.commerce.alaska.gov/dcra/DCRAExternal

Community Climate Change Portal

Because the Division is on the forefront of serving Alaskan communities, DCRA staff have seen first- hand evidence of the effects of climate change. The Community Climate Change Portal compiles information on many of these observed changes. https://www.commerce.alaska.gov/web/dcra/ClimateChange.aspx

Community Development Block Grant Program

The Division administers the Community Development Block Grant (CDBG) program funds, enhancement grants to address coastal hazards, mini-grants and administers various flood mitigation planning and project grants, including the acquisition of flood-prone homes and businesses, throughout the State.
https://www.commerce.alaska.gov/web/dcra/GrantsSection/CommunityDevelopmentBlockGrants.aspx

Local Government Assistance

In addition to the Anchorage and Juneau offices, DCRA maintains offices in the regional hubs of Bethel, Dillingham, Kotzebue and Nome serving the remote villages in each region. Every community in Alaska has a DCRA Local Government Specialist (LGS) assigned to it. DCRA's LGS staff travel frequently to Alaska's rural and remote communities, providing onsite governmental and technical assistance for cities, boroughs, tribal governments, and non-profit community associations. Assistance can be provided or arranged on just about any aspect of local government. LGS staff often see first-hand the effects of natural hazards in Alaska's remote communities and bring these issues to the attention of those who can help. The deep knowledge LGS staff have of Alaska's communities can provide emergency managers and first responders with critical information during times of disaster.
https://www.commerce.alaska.gov/web/dcra/LocalGovernmentAssistance.aspx

Division of Insurance

AS 21.06.080 gives the Director of the Division of Insurance (DOI) has the authority to take action deemed necessary to assurance that contracts of insurance already issued will be honored during a catastrophe. Actions can include emergency orders permitting the immediate licensing of adjusters to facilitate handling of claims, permitting a licensee to move or remove a record as required by the existence of the catastrophe, or permit the issuance by the insurance company of checks or drafts on out-of-state banks to pay a claim.
http://www.commerce.state.ak.U.S. /insurance/

Department of Education and Early Development

The Department of Education and Early Development (EED) is responsible for developing life-long learners. The State Board EED is the executive board of the department. The board develops educational policy, promulgates regulations governing education, appoints the Commissioner of EED with the Governor's approval, and is the channel of communication between state government and the public for educational matters. Education policies are determined by the board and administrated by the Commissioner through department divisions. Programs administered include: public school funding, early childcare, teacher certification, school construction and major maintenance grant program, debt reimbursement program for school facilities and student assessment. The only State operated school is Mt. Edgecumbe High School in Sitka.

The EED also administers the state libraries, archives, records and museum services, provides grants to the arts community. However, the EED does not have statutory responsibility in overseeing planning or education around crisis response plans or emergency drills. AS 14.33.100 (crisis response plans) and AS 14.03.140 (emergency drills) both assign all of these

responsibility to individual school districts. http://www.mehs.educ.state.ak.U.S. / and http://www.eed.state.ak.U.S. /

Department of Environmental Conservation

It is the policy of the State Department of Environmental Conservation (DEC) to conserve, improve, and protect its natural resources and environment and control water, land, and air pollution, in order to enhance the health, safety, and welfare of the people of the state and their overall economic and social well being. http://www.dec.state.ak.U.S. /

Division of Spill Prevention and Response

The DEC's Division of Spill Prevention and Response (SPAR) is responsible for protecting Alaska's land, waters, and air from oil and hazardous substance spills. Alaskans have made a concerted effort to prevent and clean up spills. Significant progress has been made in the safe handling, storage and transportation of oil and chemicals and the cleanup of historic contamination. We will never totally eliminate the risk of spills, but we are constantly learning how to better manage that risk. http://www.dec.state.ak.U.S. /spar/

Division of Environmental Health

The Division of Environmental Health (EH) deals with the basics: safe drinking water, food and sanitary practices. Our goal is to provide businesses with clear standards so that they can protect our environment and provide safe food and drinking water to Alaskans. http://www.dec.state.ak.U.S. /eh/

Drinking Water Program

The Drinking Water Program requires public water systems to be in compliance with state and federal regulations, for drinking water, for the public health protection of the residents and visitors to the State of Alaska. http://www.dec.state.ak.U.S. /eh/dw/

Division of Air Monitoring & Quality Assurance

The Division of Air Quality, Air Monitoring & Quality Assurance Program operates and oversees air quality monitoring networks throughout Alaska. Our primary services include:\

- Operating ambient air quality monitoring networks to assess compliance with the National Ambient Air Quality Standards (NAAQS) for carbon monoxide, particulates, nitrogen dioxide, sulfur oxide, and lead.
- Assessing ambient air quality for ambient air toxics level.
- Providing technical assistance in developing monitoring plans for air monitoring projects.

Issuing Air Advisories to inform the public of hazardous air conditions. http://www.dec.state.ak.U.S. /air/am/index.htm

Department of Health & Social Services

http://www.hss.state.ak.U.S. /

Division of State Health Planning and Systems Development

Health Planning and Systems Development (HPSD) runs programs that strengthen health care access with a focus on rural areas and underserved populations. We also conduct

statewide health planning to help sustain organized and efficient health care delivery in Alaska. HPSD Programs focus on:

- Health Care Delivery
- Workforce Development
- Health Care Financing and Reimbursement Strategies
- Facility Planning

http://www.hss.state.ak.U.S. /dhcs/healthplanning/

Community Health and Emergency Medical Services

The Community Health and Emergency Medical Services (CHEMS) is a section within Division of Public Health within the DHSS. One of CHEMS' responsibilities is developing, implementing, and maintaining a statewide comprehensive emergency medical services system. The department's statutory mandate (AS 18.08.010) requires it to:

1. Coordinate public and private agencies engaged in the planning and delivery of emergency medical services, including trauma care, to plan an emergency medical services system;
2. Assist public and private agencies to deliver emergency medical services, including trauma care, through the award of grants in aid;
3. Conduct, encourage, and approve programs of education and training designed to upgrade the knowledge and skills of health personnel involved in emergency medical services, including trauma care
4. Establish and maintain a process under which hospitals and clinics can represent themselves to be trauma centers because they voluntarily meet criteria adopted by the department which are based on an applicable national evaluation system.

In addition to these responsibilities, the section is heavily involved in planning and responding to bioterrorist events. http://www.chems.alaska.gov/

Department of Law

http://www.law.state.ak.U.S. /

Office of the Attorney General

Provides legal advice to the governor and other state officers and has the duties and powers listed in AS 44.23.020. Apart from advising other state agencies, the Department of Law is not engaged in activities and programs to decrease vulnerability to hazards identified in the State Hazard Mitigation Plan.

Department of Military & Veterans Affairs

http://www.dmva.alaska.gov/

Division of Homeland Security & Emergency Management

Has responsibility for disaster preparedness including preparation of a comprehensive state emergency plan, assisting local governments in designing emergency response plans, distribution of food and supplies during disasters, and establishing public information education programs. DHS&EM is responsible for recommending land-U.S. e and building regulations to communities to reduce the impacts and cost of disasters. DHS&EM

coordinates with Tsunami Warning Center, Alaska State Troopers, State Emergency Response Commission, and local communities. Included in DHS&EM duties are the preparation and maintenance of a state emergency plan which shall include recommendations for zoning, building and other land U.S. e controls; safety measures for securing mobile homes and other nonpermanent or semi-permanent structures; and other preventive and preparedness measures designed to eliminate or reduce disasters or their impact. http://www.ready.alaska.gov/

Department of Natural Resources

The Department of Natural Resources (DNR) Mission is to develop, conserve and enhance natural resources for present and future Alaskans. http://dnr.alaska.gov/

Division of Geological & Geophysical Surveys

The Division of Geological & Geophysical Surveys (DGGS) collects, evaluates, and distributes geologic data and information on earthquakes, volcanoes, and engineering geology. DGGS conducts geological and geophysical studies to determine potential geological hazards to buildings, roads, bridges and other installations and structures. Publishes maps and reports on the geology of Alaska, including location and severity of geologic hazards. http://www.dggs.alaska.gov/

Division of Forestry

The Division Forestry (referred to as Forestry) protects water quality, fish and wildlife habitat, and other forest values through appropriate forest practices and administration of the Forest Resources and Practices Act. In cooperation with federal agencies, Forestry manages a wildland fire program on 150 million acres of land. Forestry is responsible to oversee and control the fire protection obligation on all state, private, and municipal lands in the State of Alaska on behalf of the Department.

Alaska is the only state with an interagency fire plan. This plan divides the state into fire protection levels based on major natural firebreaks and the objectives of land managers. Firefighting resources can be allocated to the highest priority areas--those areas where communities and valuable resources are located. It also gives options for lower cost strategies in remote and unpopulated areas.

Urban interface areas are growing as the population increases. This will present increased potential for losses from wildland fire. Increased fire prevention activities continue to educate the public on its responsibility to be prepared for fire.

Authority for managing wildland fire is derived from AS 41.15.10. - 41.15.170. http://forestry.alaska.gov/

Department of Public Safety

AS 18.76.010 Statutory responsibility for Alaska Avalanche Warning System, part of the Alaska Avalanche and Fire Weather Forecast System. Located within Alaska Department of Public Safety, in cooperation with a municipality or federal agency, shall participate in the development and implementation of a statewide avalanche warning system. The statewide system shall:

- Establish & maintain a service center and primary and supplementary field stations to gather information and data concerning ground water conditions, snow pack and avalanche activity

- Forecast snow avalanche conditions statewide
- Coordinate a public awareness program
- Catalog a comprehensive atlas of avalanche paths and slide occurrences; and assist local governments and state agencies in identifying hazardous zones and in developing snow avalanche zoning regulations

The Department of Public Safety provides legal counsel to DHS&EM for mitigation and other emergency management related issues, as needed. http://www.dps.state.ak.U.S. /

Division of Alaska State Troopers

The Division of Alaska State Troopers (AST) is charged with statewide law enforcement, prevention of crime, pursuit and apprehension of offenders, service of civil and criminal process, prisoner transportation, central communications, and search and rescue. http://www.dps.alaska.gov/AST/

Division of Fire and Life Safety

The mission of the Division of Fire and Life Safety is to prevent the loss of life and property from fire and explosion. We are composed of three Bureau's: Life Safety Inspection; Plan Review; and Training and Education. AS 18.70 states that:

(a) The Department of Public Safety shall adopt regulations for the purpose of protecting life and property from fire and explosion by establishing minimum standards for:

- Fire detection and suppression equipment;
  - Fire and life safety criteria in commercial, industrial, business, institutional, or other public buildings, and buildings used for residential purposes containing four or more dwelling units;
  - Any activity in which combustible or explosive materials are stored or handled in commercial quantities;
  - Conditions or activities carried on outside a building described in (2) or (3) of this subsection likely to cause injury to persons or property.

(b) The commissioner of public safety may establish by regulation and the department may charge reasonable fees for fire and life safety plan checks made to determine compliance with regulations adopted under (a)(2) of this section. http://www.dps.state.ak.U.S. /fire/default.aspx

Fish and Wildlife Safeguard

Fish and Wildlife Safeguard is a non-profit volunteer citizen's organization that works in cooperation with the Alaska Wildlife Troopers. By providing a toll-free hotline phone number which citizens may call to report a resource law violation, the organization gives the public an opportunity to become involved in protecting Alaska's natural resources. http://www.dps.state.ak.U.S. /AWT/Safeguard.aspx

Department of Transportation & Public Facilities

The Alaska Department of Transportation and Public Facilities (DOT&PF) is typically the first response agency for disasters that affect Alaska's transportation system, working as a partner with DHS&EM. In addition, DOT&PF collaborates and coordinates with State and Federal

Agencies in transportation infrastructure planning, design, construction, maintenance, and operations to build resiliency into the transportation system.

DOT&PF's mission is to "Keep Alaska moving through service and infrastructure. DOT&PF uses division resources to identify hazards, plan, and initiate mitigation activities to address Alaska's transportation needs using its core services to modernize, preserve, and operate. DOT&PF, in partnership with DHS&EM, budgets for temporary repairs to highway, marine and aviation infrastructure necessary to keep the multi-model transportation system operational following a natural disaster. http://www.dot.state.ak./

Alaska Railroad Corporation

The Alaska Railroad Corporation (ARRC) is a full-service railroad serving ports and communities from the Gulf of Alaska to Fairbanks. Owned by the State of Alaska since 1985, the Railroad is governed by a seven-member Board of Directors appointed by the Governor of Alaska.

The Alaska Railroad is a self-sustaining corporation that operates without state subsidy, and provides year-round passenger, freight and real estate services. The Alaska Railroad carries nearly 500,000 passengers annually. The ARRC rail line covers over 500 miles of Alaska through very diverse environments. To assist in freight and passenger response planning; the rail line is broken into thirteen geographical sections based on local environment factors (topography and geography). This facilitates emergency planning specific to the characteristics for each section (i.e. wildlife issues, local public safety response contacts, logistical resources and requirements, environmental and seasonal conditions, passenger emergency response strategies).

http://www.alaskarailroad.com and http://www.alaskarailroad.com/corporate/Corporate/FreightServices/RoutesMap/tabid/392/Default.aspx

Other State Entities

There are a number of Boards and Commissions which can assist in refining hazard mitigation strategies for communities including the Alaska Coastal Policy Council, State Emergency Response Commission, Safety Advisory Council, Alaska Science and Technology Council, and Alaska Water Resources Board.

University of Alaska Fairbanks, Geophysical Institute

At the Geophysical Institute (GI; also known as the University of Alaska Fairbanks Geophysical Institute [UAF/GI]) the diversity of research focus is reflected in their disciplinary-based, functional groupings of faculty and research staff. These divisions are:

- Space physics
- Remote Sensing
- Atmospheric sciences
- Snow, ice, and permafrost
- Seismology
- Volcanology
- Tectonics and Sedimentation

http://www.gi.alaska.edu/

Alaska Satellite Facility

The largest facility at the UAF/GI is a satellite ground station and associated processing and archiving center called the Alaska Satellite Facility (ASF) which is funded by various federal, local, and private entities. Radar images produced there enable the all-weather study of sea ice, earthquakes, volcanoes, and regularly provide hazard-management products for agencies such as the National Oceanic and Atmospheric Administration (NOAA) and the National Ice Center. Through the International Observatory of the North, optical images of the Arctic from NASA and NOAA satellites are received and processed to support remote sensing research and data services to the state. http://www.asf.alaska.edu/home

Alaska Earthquake Center

The Alaska Earthquake Center (AEC) operates a regional network of over 300 seismometers and reports more than 50 earthquakes a day occurring within the state. In addition, the AEC conducts research on tsunami dynamics and tsunami hazard analysis (http://earthquake.alaska.edu/tsunamis) in cooperation with the DGGS.

The AEC is a cooperative project with USGS and the UAFGI. http://earthquake.alaska.edu/

Federal

Federal Emergency Management Agency Region X

Headquartered in Bothell, Washington, Federal Emergency management Agency (FEMA) Region X (Ten) works with the emergency management agencies in Alaska, Idaho, Oregon and Washington. FEMA's mission is to support our citizens and first responders to ensure that as a nation we work together to build, sustain, and improve our capability to prepare for, protect against, respond to, recover from, and mitigate all hazards.

The states served by FEMA Region X experience a variety of hazards including earthquakes, wild fires, volcanic eruptions, landslides and tornados as well as weather emergencies like snow, ice, wind and heavy rain.

To help accomplish FEMA's mission Region X maintains strong partnerships through its Regional Advisory Council and Regional Interagency Steering Committee. http://www.fema.gov/about/regions/regionx/

U.S. Department of the Interior

The Department of the Interior protects and manages the Nation's natural resources and cultural heritage; provides scientific and other information about those resources; and honors its trust responsibilities or special commitments to American Indians, Alaska Natives, and affiliated island communities. http://www.doi.gov/

U. S. Geological Survey

Alaska Science Center

The mission of the Alaska Science Center (ASC) is to provide objective and timely data, information, and research findings about the earth and its flora and fauna to Federal, State,

and local resource managers and the public to support sound decisions regarding natural resources, natural hazards, and ecosystems in Alaska and circumpolar regions.

The U.S. Geological Survey (USGS), the Nation's largest water, earth, and biological science and civilian mapping agency, has studied the natural features of Alaska since its earliest geologic expeditions in the 1800s. The complexity of Alaska's unique landscapes and ecosystems requires USGS expertise from many science disciplines to conduct thorough, integrated research.

In Alaska each year, natural hazards may cause deaths and can cost millions of dollars due to the disruption of commerce, and the destruction of critical infrastructure. The USGS works extensively with local, state and federal agencies to reduce the loss from natural hazards. Collaborative processes have included stream and precipitation gauges on the Kenai Peninsula, volcano hazard monitoring, and improved seismic sensors. The USGS ASC science helps forecast and mitigate disasters and build resilient communities through cutting edge science, research, and monitoring tools and techniques pioneered here for Alaska's diverse and challenging landscape. Monitoring programs that address natural and emerging hazards include:

- Operating a streamflow monitoring network for flood warning and mitigation.
- Tracking emerging wildlife diseases, such as Avian Influenza (Highly Pathogenic H5N1) in migratory birds.

http://alaska.USGS.gov/ and http://pubs.USGS.gov/fs/2007/3019/

USGS Water Resources of Alaska

The USGS ASC Water Resources Office continuously monitors surface water, ground water, and water quality parameters across the state. Monitoring sites are operated in cooperation with various local, State, or Federal agencies. There a five programs within the Water Resources discipline which related to hazards. They include:

- Streambed Scour

  The USGS ASC is researching streambed scour at bridges through scour monitoring, hydrodynamic modeling, and data collection during high flows.
- Surface Water

  Alaska provides real-time water-stage, streamflow and precipitation data at 152 sites across the state.
- Ground Water

  Fourteen ground-water wells are monitored by the USGS in Alaska. These wells record data on hourly intervals.
- Flood Watch

  The "Flood and high flow" map shows the location of stream gages where the water level is currently at or above flood stage.
- Water Quality

Water-quality conditions are continuously monitored by the USGS at 42 sites across the state of Alaska

The USGS Water Resources website provides current ("real-time") stream stage and streamflow, water-quality, and ground-water levels for over 200 sites in Alaska.

http://alaska.USGS.gov/science/water/index.php

Volcano Hazard Program

The overall objectives of the Volcano Hazards Program (VHP) are to advance the scientific understanding of volcanic processes and to lessen the harmful impacts of volcanic activity. The VHP monitors active and potentially active volcanoes, assesses their hazards, responds to volcanic crises, and conducts research on how volcanoes work to fulfill a Congressional mandate (P.L. 93-288) that the USGS issue "timely warnings" of potential volcanic hazards to responsible emergency-management authorities and to the populace affected. Thus, in addition to obtaining the best possible scientific information, the program works to effectively communicate its scientific findings to authorities and the public in an appropriate and understandable form.

Monitoring and research at the five volcano observatories in conjunction with the Menlo Science Center in Menlo Park helps advance VHP's understanding of active volcanism and allows the Program to provide warnings of impending eruptions in the United States. Through these observatories, the VHP monitor earthquake activity, ground deformation, gas chemistry, and other geophysical and hydrologic conditions before, during, and after eruptions. Observations are used to detect activity leading to an eruption, provide real-time emergency information about future and ongoing eruptions, identify hazardous areas around active and potentially active volcanoes, and improve our understanding of how volcanoes erupt and change our environment. The Volcano Disaster Assistance Program (VDAP) also assists other nations prepare for and respond to volcano emergencies.
http://volcanoes.USGS.gov/

Alaska Volcano Observatory

The Alaska Volcano Observatory is a joint program of USGS, the University of Alaska Fairbanks Geophysical Institute (UAFGI), and Alaska Division of Geological and Geophysical Surveys (DGGS). AVO monitors and studies Alaska's volcanoes to predict and record eruptive activity and informs and advises on volcanoes. Three primary objectives: conduct monitoring and other scientific investigations to assess the nature, timing, and likelihood of activity; assess volcanic hazards associated with anticipated activity, including kinds of events, effects and areas of risk; and provide timely and accurate information on volcanic hazards and warnings of impending activity. http://www.avo.alaska.edu/

U.S. Fish and Wildlife Service Alaska Region

The U.S. Fish and Wildlife Service (USFWS) Alaska Region manages 16 national wildlife refuges in Alaska, totaling 76,774,229 acres. Management goals include conservation, and where appropriate, restoration of the fish, wildlife and plant resources and their habitats within the State for the benefit of present and future generations of American. The USFWS Conservation Planning & Policy team in Alaska works cooperatively with state agencies, members of the public, and other stakeholders to provide refuge management at all levels. In doing this, they give the public a meaningful voice in the future of each refuge and make sure that the rights of traditional users and the State of Alaska are respected and reflected in daily refuge administration. http://alaska.fws.gov/

Bureau of Land Management

In Alaska, the Bureau of Land Management (BLM) administers approximately 80 million surface acres of federal public land. The focuses of the BLM in Alaska includes: https://afs.ak.blm.gov/.

Land Transfer

Alaska is a young state and land ownership is still being settled. The BLM is tasked with conveying federal land to the State of Alaska, Alaska Native corporations and individual Alaska Natives. Once final land status is determined, the BLM will manage about 70 million acres of federal public lands and 220 million acres of subsurface mineral estate in Alaska.

Energy Development

The BLM is committed to sound land use planning for the 23-million-acre National Petroleum Reserve-Alaska (NPR-A). Many resource management issues transcend the boundaries of NPR-A and are applicable to the entire North Slope of Alaska. The BLM partners with other federal and state agencies form the North Slope Science Initiative, a newly developed organization that encourages sharing knowledge to make science-based decisions about development activities on the North Slope. http://www.northslope.org/ and http://www.blm.gov/ak/st/en/prog/energy/oil_gas/npra.html

Trans-Alaska Pipeline System

The BLM partners with other federal and state agencies at the Joint Pipeline Office to work proactively with Alaska's oil and gas industry to safely operate the Trans-Alaska Pipeline System. http://www.jpo.doi.gov/

Fire Management

The BLM provides wildland fire suppression services for all Department of the Interior and Alaska Native corporation lands in Alaska through the Alaska Interagency Coordination Center (AICC) and Alaska Fire Service (AFS). http://fire.ak.blm.gov/aicc.php and https://afs.ak.blm.gov/

National Park Service Alaska Region

Alaska hosts 15 national parks, preserves, monuments and national historical parks. The National Park Service (NPS) also plays varying roles in the administration of 13 national wild rivers, two affiliated areas and a national heritage area. Alaska is also home to 49 National Historic Landmarks and 16 National Natural Landmarks. http://www.nps.gov/akso/index.html

Bureau of Indian Affairs Alaska Region

The Alaska Region encompasses a dynamic and diverse mix of Tribes, Tribal organizations and natural features. With the exception of the Annette Island Reserve, which falls under the Northwest Region, the entire state of Alaska falls under the jurisdiction of the Alaska Region.

Within that area the Alaska Regional Office (ARO) Headquarters is located in Juneau, Alaska with Trust, Transportation and Environmental offices located in Anchorage as is the West Central Alaska Agency. The other agency in ARO can be found in Fairbanks, Alaska.

This agency provides services to the villages within the Interior and the North Slope of Alaska.

The nearly 80,000 Tribal members that make up the 229 Tribes under the Alaska Region jurisdiction stretch from Ketchikan in the Southeast Panhandle to Barrow on the Arctic Ocean and from Eagle on the Yukon Territory border to Atka in the Aleutian Chain. Alaska Region Tribes Served are listed here:

http://www.bia.gov/WhoWeAre/RegionalOffices/Alaska/WeAre/Tribes/index.htm
http://www.bia.gov/WhoWeAre/RegionalOffices/Alaska/index.htm

U.S. Army Corps of Engineers Alaska District

The U.S. Army Corps of Engineers (USACE) Alaska District provides a full spectrum of quality engineering, technical, and construction support services in support of peacetime and contingency operations in Alaska and throughout the Pacific Region. Their major programs focus on military construction, civil works and environmental cleanup. Their civil works program operates and maintains 52 river and navigation projects along the coast of Alaska. Of these projects, 36 are small boat harbors, 10 are channels, four are breakwaters and two are river projects. Their formerly-used defense sites (FUDS) program has identified 312 environmental cleanup and restoration projects within the state. They are committed to supporting the overseas contingency operations by constructing quality facilities for service members and their families in Alaska.

The Corps of Engineers is also one of the primary Federal agencies assisting state and local governments in protecting the public from natural and manmade emergencies.

For floods, the Corps is the lead Federal response agency. Flood response activities are authorized under Public Law 84-99, and we can provide either technical assistance or direct assistance. There is no provision for financial assistance under PL 84-99. http://www.poa.U.S. ace.army.mil/hm/default.htm and http://www.poa.U.S. ace.army.mil/EM/EM.html

Economic Development Administration

The Economic Development Administration (EDA) was established under the Public Works and Economic Development Act of 1965 (42 U.S.C. § 3121), as amended, to generate jobs, help retain existing jobs, and stimulate industrial and commercial growth in economically distressed areas of the United States. EDA assistance is available to rural and urban areas of the Nation experiencing high unemployment, low income, or other severe economic distress. In fulfilling its mission, EDA is guided by the basic principle that distressed communities must be empowered to develop and implement their own economic development and revitalization strategies. Based on these locally- and regionally-developed priorities, EDA works in partnership with state and local governments, regional economic development districts, public and private nonprofit organizations, and Indian tribes. EDA helps distressed communities address problems associated with long-term economic distress, as well as sudden and severe economic dislocations including recovering from the economic impacts of natural disasters, the closure of military installations and other Federal facilities, changing trade patterns, and the depletion of natural resources. http://www.eda.gov/

Environmental Protection Agency Region 10 Alaska

The mission of The Environmental Protection Agency (EPA) is to protect human health and to safeguard the natural environment -- air, water and land -- upon which life depends. Alaska is in

the Pacific Northwest Regional Office (Region 10) of the EPA. Region 10 focuses on EPA's work and mission in the region which is comprised of the states of Alaska, Idaho, Oregon, Washington and Pacific Northwest Indian Country. http://yosemite.epa.gov/r10/homepage.nsf/webpage/Alaska%27s+Environment?OpenDocument and http://www.epa.gov/region10/

U.S. Forest Service

The mission of the Alaska Region of the U.S. Forest Service (USFS) is to manage the Chugach and Tongass National Forests to meet society's needs for a variety of goods, services, and amenities while enhancing the Forests' health and productivity, and to foster similar outcomes for State and private forestland across Alaska.

The USFS in Alaska also participates in wildfire management through the Alaska Interagency Coordination Center and Alaska Fire Service. http://www.fs.fed.U.S. /r10/

U.S. Department of Agriculture

http://www.U.S. da.gov/wps/portal/U.S. da/U.S. dahome

Farm Service Agency

The Farm Service Agency (FSA) lends money and provides credit counseling and supervision to eligible applicants who operate family-size farms. A family-size farm is considered to be one that a family can operate and manage itself. FSA makes and guarantees a variety of loans for youth, new and experienced farmers, and producers undergoing emergency situations. FSA also provides credit counseling and supervision to farmers and ranchers who are temporarily unable to obtain private, commercial credit. FSA also provides assistance for natural disaster losses, resulting from drought, flood, fire, freeze, tornadoes, pest infestation, and other calamities. http://www.fsa.U.S. da.gov/FSA/stateoffapp?mystate=ak&area=home&subject=prog&topic=landing and http://www.fsa.U.S. da.gov/FSA/webapp?area=home&subject=diap&topic=landing

Rural Development

Rural Development is committed to helping improve the economy and quality of life in all of rural America. Through our programs, they touch the rural residents of our state every day.

Their guarantee, loan and grant programs support such essential public facilities and services as water and sewer systems, housing, health clinics, emergency service facilities and electric and telephone service. They promote economic development by guaranteeing loans to businesses through qualified lenders. They promote renewable energy and energy efficiency projects including wind, geothermal, hydro and biodiesel initiatives. They offer technical assistance and information to help cooperatives get started and through our Rural Economic Development Loan and Grant program we supply funds to cooperatives to promote small business development.

In Alaska, Rural Development achieves its mission by helping families, communities and businesses from Barrow to Metlakatla and from Nome to Northway obtain the financial and technical assistance needed to address their needs. Rural Development works to make sure that rural citizens can participate fully in the global economy by supporting projects to stabilize the cost of electricity and extend broadband service to rural villages. http://www.rurdev.U.S. da.gov/ak/Director.htm

Natural Resources Conservation Service

The Natural Resources Conservation Service (NRCS) provides leadership in a partnership effort to help people conserve, maintain, and improve our natural resources and environment. NRCS puts nearly 70 years of experience to work in assisting owners of America's private land with conserving their soil, water, and other natural resources. Local, state and federal agencies and policymakers also rely on our expertise. They deliver technical assistance based on sound science and suited to a customer's specific needs. Cost shares and financial incentives are available in some cases. Most work is done with local partners. Their partnership with local conservation districts serves almost every county in the nation, and the Caribbean and Pacific Basin. Participation in our programs is voluntary. Alaska NRCS Programs include:

- Conservation Innovation Grants (CIG)
- Conservation Technical Assistance (CTA)
- Conservation Stewardship Program (CSP new)
- Conservation Security Program (CSP old)
- Emergency Watershed Protection Program (EWP)
- Environmental Quality Incentive Program (EQIP)
- Farm and Ranch Land Protection Program FRPP)
- Grassland Reserve Program (GRP)
- Resource, Conservation & Development Program (RC&D)
- Snow Survey
- Soil Survey
- Watershed Planning
- Wildlife Habitat Incentives Program (WHIP)

http://www.ak.nrcs.U.S. da.gov/

U.S. Department of Transportation Federal Highway Administration

Alaska Division

The Federal Highway Administration (FHWA) Mission is to improve mobility on our Nation's highways through national leadership, innovation, and program delivery. Programs include:

- Bridge / Structures
- Environment
- Marine
- Highways
- Safety
- Civil Rights
- Finance
- Planning

- Security & Emergency Preparedness
- Engineering
- ITS
- Right-of-Way
  http://www.fhwa.dot.gov/akdiv/

U.S. Department of Housing and Urban Development

Housing and Urban Development's (HUD) mission is to create strong, sustainable, inclusive communities and quality affordable homes for all. HUD is working to strengthen the housing market to bolster the economy and protect consumers; meet the need for quality affordable rental homes: utilize housing as a platform for improving quality of life; build inclusive and sustainable communities free from discrimination; and transform the way HUD does business. http://portal.hud.gov/portal/page/portal/HUD/states/alaska

National Oceanic and Atmospheric Administration

The National Oceanic and Atmospheric Administration (NOAA) is a federal agency focused on the condition of the oceans and the atmosphere. http://www.noaa.gov/

National Weather Service

The National Weather Service (NWS) is the official U.S. weather, marine, fire and aviation forecasts, warnings, meteorological products, climate forecasts and information about meteorology. http://www.arh.noaa.gov/

West Coast and Alaska Tsunami Warning Center

NOAA's tsunami mission is to provide reliable tsunami detection, forecasts and warnings, and to promote community resilience.

The primary operational warning system objectives for carrying out this mission are to rapidly locate, size, and otherwise characterize major earthquakes, determine their tsunamigenic potential, predict tsunami arrival times, predict coastal runup when possible, and disseminate appropriate warning and informational products based on this information.

NOAA operates two tsunami warning centers in the United States: the West Coast/Alaska Tsunami Warning Center and the Richard H. Hagemeyer Pacific Tsunami Warning Center. The West Coast/Alaska Tsunami Warning Center area-of-responsibility (AOR) consists of Canadian coastal regions, Puerto Rico, the Virgin Islands, and the ocean coasts of all U.S. States except Hawaii. The Pacific Tsunami Warning Center AOR consists of Hawaii, other U.S. interests in the Pacific Basin, countries participating in the Tsunami Warning System in the Pacific, and Indian Ocean and Caribbean Sea countries. http://wcatwc.arh.noaa.gov/

National Marine Fisheries Service

The Alaska Region of NOAA National Marine Fisheries Service (NMFS) oversees sustainable fisheries that produce about half the fish caught in U.S. waters, with responsibilities covering 842,000 square nautical miles off Alaska. The Alaska Region also works to ensure the viability of protected species—principally marine mammals—and to protect and enhance Alaska's marine habitat. http://www.fakr.noaa.gov/

Denali Commission

Introduced by Congress in 1998, the Denali Commission (Commission) is an independent federal agency designed to provide critical utilities, infrastructure, and economic support throughout Alaska. With the creation of the Denali Commission, Congress acknowledged the need for increased inter-agency cooperation and focus on Alaska's remote communities. Since its first meeting in April 1999, the Commission is credited with providing numerous cost-shared infrastructure projects across the State that exemplifies effective and efficient partnership between federal and state agencies, and the private sector. The Denali Commission's programs include:

- Community Planning
- Conference Sponsorships
- Economic Development
- Energy
- Government Coordination
- Health Facilities
- Solid Waste
- Teacher Housing
- Training
- Transportation

Grants Management Electronic Processing and Reporting Systems

The Denali Commission has two electronic web-based systems for Grants Management; GrantSolutions for processing proposed awards and post award amendments and the Commission Project Database for reporting progress on funded awards.

GrantSolutions - Electronic Grants Management Processing System

The Commission utilizes GrantSolutions to manage the electronic processing of every award from start to finish. The award starts with the posting of announcements of funding opportunities, receipt and review of applications, issuance of funded awards, the generation of post award amendments, to the close out of each award.

The GrantSolutions system provides access to award information based on verified identification of the individual, their job function or role within their organization, and their organization's business relationship with the Commission through their official awards or proposed awards. Individual users and the public do not have access to the GrantSolutions database itself but do have access to awards funded by the Commission in the Commission's Project Database System (see also Commission's Project Database - Electronic Grants Management Reporting System). https://www.grantsolutions.gov/cf/display/mkt/home and http://www.denali.gov/index.php?option=com_content&view=frontpage&Itemid=2

Small Business Administration

The U.S. Small Business Administration (SBA) was created in 1953 as an independent agency of the federal government to aid, counsel, assist and protect the interests of small business concerns, to preserve free competitive enterprise and to maintain and strengthen the overall economy of

our nation. We recognize that small business is critical to our economic recovery and strength, to building America's future, and to helping the United States compete in today's global marketplace. Although SBA has grown and evolved in the years since it was established in 1953, the bottom line mission remains the same. The SBA helps Americans start, build and grow businesses.

SBA provides low interest disaster loans to homeowners, renters, businesses of all sizes and private, non-profit organizations to repair or replace real estate, personal property, machinery & equipment, inventory and business assets that have been damaged or destroyed in a declared disaster. http://www.sba.gov/localresources/district/ak/index.html

Additional Organizations

American Red Cross Alaska

The American Red Cross has been the nation's premier emergency response organization. As part of a worldwide movement that offers neutral humanitarian care to the victims of war, the American Red Cross distinguishes itself by also aiding victims of devastating natural disasters. Over the years, the organization has expanded its services, always with the aim of preventing and relieving

Today, in addition to domestic disaster relief, the American Red Cross offers compassionate services in five other areas: community services that help the needy; support and comfort for military members and their families; the collection, processing and distribution of lifesaving blood and blood products; educational programs that promote health and safety; and international relief and development programs.

The American Red Cross also has Disaster Services and Emergency Assistance. Each year, the American Red Cross of Alaska responds immediately to more than 300 disasters, including house or apartment fires (the majority of disaster responses), earthquakes, floods, mudslides, avalanches, hazardous materials spills, and other natural and man-made disasters throughout the state. Trained Red Cross volunteers and staff are ready 24-hours-a-day, year-round to meet the disaster-caused needs of people in our community.

All disaster assistance from the Red Cross is based upon verified, disaster-caused need and is provided at no charge to the disaster client. While you are ultimately responsible for your own recovery, Red Cross is here to guide you through the process.
http://alaska.redcross.org/Home_Page.php and http://alaska.redcross.org/Disaster_Services.php

Alaska Conference of Mayors

The purpose of the Alaska Conference of Mayors (ACoM) is to offer an opportunity for the mayors to discuss common concern issues, work together for the betterment of their municipalities, and improve understanding Alaska municipalities.

Alaska Municipal League

The ACoM is the parent organization of the Alaska Municipal League (AML). ACoM and AML work together to form a municipal consensus on statewide and federal issues facing Alaskan local governments. AML is a voluntary, nonprofit, nonpartisan, statewide organization of 140 cities, boroughs, and unified municipalities, representing over 97% of Alaska's residents. AML’s mission is to:

1. Represent the unified voice of Alaska's local governments to successfully influence state and federal decision making.
2. Build consensus and partnerships to address Alaska's Challenges, and
3. Provide training and joint services to strengthen Alaska's local governments.

http://www.akml.org/

Interagency Hydrology Committee for Alaska

The Interagency Hydrology Committee for Alaska (IHCA) is an organization of technical specialists working for Federal, State, borough, and local governments and federally recognized tribes, who coordinate the collection and interpretation of data related to water resources and climate throughout the State of Alaska. The IHCA meets twice per year to coordinate multi-agency issues and exchange information. The work of the Committee is to a large extent based on coordination and prior knowledge of related activities of other agencies. Thus, to be effective, the continuity of the membership is considered necessary. The IHCA meets once in the spring and fall each year to coordinate multi-agency issues and exchange of information. Meetings rotate between Juneau, Anchorage, and Fairbanks to encourage participation by the greatest number. http://ak.water.usgs.gov/ihca/

APPENDIX 13.21 HAZARD MITIGATION SUCCESS STORIES

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The State of Alaska, Division of Homeland Security and Emergency Management would like to express our thanks to Alice Reardon and Alvin Jimmie Sr. for their assistance in the translation of this brochure. Quyana!

For other Emergency Preparedness information, please go to our website at:
www.ak-prepared.com
Or contact

Division of Homeland Security & Emergency Management
P.O. Box 5750
Building 49000, Suite B-210
Ft. Richardson, Alaska
99505-5750

Phone: 907-428-7000
1-800-478-2337
Fax: 907-428-7009

Upingauten-qaa?

Are You Prepared?

Your Basic Emergency Kit

Arenqiallugtem Nalliini Cat Upingaarkaten

Basic Emergency Kit

Arenqiallugtem Nalliini Cat Upinganarqellriit

You may have some of these basic emergency kit items already, such as a flashlight, battery operated radio, food, water and blankets. The key is to make sure they are organized, easy to find and easy to carry (in a suitcase with wheels or in a backpack) in case you need to evacuate your home. Whatever you do, don't wait for a disaster to happen.

Ak'a makunek ilaitnek aturyugarkanek avalingqerciqngatuci arenqiallugtem nalliini. Kenurqutaq, aturcetaat kenerkaillu, neqet, meq, uliit-llu paivngaarkaugut, enek'egcimaluteng, teguqainauluteng, missuugmun eksunaqluteng ang'aqsunaqluteng-llu pitsaqevkenaci alqunaq enec'i unitnarqekan. Upingakici, watqapiar-llu arenqiallugaartellerkarpecenek utaqayaqunaci.

Easy to carry – think of ways that you can pack your emergency kit so that you and those on your emergency plan can easily take the items with you, if necessary.

Ang'aqsunaqluteng– umyuangcangnaqkici qaillun makut aturyugarkat upingaurallerkaatnek, qaillun-llu elpet wall'u allam yuum qacigmek ayauskuniki ang'aqlerkaatnek.

☐ **Water** – two liters of water per person per day (Include small bottles that can be carried easily in case of an evacuation order)

Meq– mermek *two liters* amllertalriamek yuum ataucim aturarkaanek erenrem iluani (mikellrianek-llu assigtaumalrianek mernek ang'aqsunarqellrianek avalingqerkici cali, pitsaqaartevkenaci nunaci unitesqekatgu)

☐ **Food** – that won't spoil, such as canned food, energy bars and dried foods (remember to replace the food and water once a year)

Neqkat– assiirutarkaunrilnguut, kinerneret, *can*-aumalriit neqkat, *energy bar*-at (Cimillekaat neqkat mer'et-llu allrakuaqan umyuaqekiciu)

☐ **Manual can opener**

Ikircissuun

☐ **Flashlight and batteries**

Kenurqutaq kenerkai-llu

☐ **Candles and matches or lighter**

Cuucekaat cali-llu kenret wall'u spic'kat

☐ **Battery–powered or wind–up radio** (and extra batteries)

Aturcetaat kenermek atutulit wall'u qipqerluteng caliyugngalriit (kenernek-llu cali allanek)

☐ **First aid kit**

Kilinercuutnek iinrunek-llu imalget

☐ **Special needs items** – prescription medications, infant formula or equipment for people with disabilities

Aturyugarkat- Iinrut, aamarkat, wall'u yuut tememegteggun pisciigalnguut aturarkait

☐ **Extra keys** – for your car and house

Kelucairissuutet-enevet nunakuarcuutevet-llu kelucairissuutai

☐ **Cash** – include smaller bills, such as $10 bills (traveler's checks are also useful) and change for payphones

Akit- Akicuarnek-llu cali avalingqengnaqkici, qulnek tuaten (traveler's check-at-llu cali assirtut kangirat-llu akiliryaranun qanercuutnun, wall'u allat itumtat akit)

☐ **Emergency Plan** – include a copy of it and ensure it contains in–town and out–of–town contact information

Pillerkiurun kalikamun igausngalria pitsaqevkenani arenqiallugaareskuni aturarkaq-kalikaanek taum avalingqerqinanani-llu uitallerkan igausngakiu nunavni wall'u-q allani nunani

Additional Emergency Supplies

Allat Arenqiallugtem Nalliini Cat Upinganarqellriit

The basic emergency kit will help you get through the first 72 hours of an emergency. In addition to this kit, we recommend you also have the following additional emergency supplies. Then you will be well equipped for even the worst emergency situations.

Augkut upingaarkat arenqiallugtem nalliini ikayuutnguciqut pingayuni ernerni arenqiallugtem kinguani. Makunek-llu cali allanek canek avalingqesqumayaaqluci arenqiallugtem kinguani atuugarkanek. Upingaciquci pitsaqaartevkenaci arenqiallugareskuvci makunek avalingqerquvci.

Change of clothing and footwear – for each household member

Ac'inqigtarkaitnek sap'akirkaitnek-llu-qaqilluki enem yui

☐ **Sleeping bag or warm blanket** – for each household member

Inarrvik wall'u maqalria ulik- qaqilluki enem yui

☐ **A whistle** – in case you need to attract attention

Kukumyararcuun- pitsaqaartevkenak ikayungcallerkan pitekluku

☐ **Garbage bags** – for personal sanitation

Ciqiciviim missuugi- uqrutat caqukaitnek

☐ **Toilet paper**

Uqrutarkat

☐ **Safety gloves**

Aliimatek uqlaryailkutak wall'u akngircailkutak

Basic tools – hammer, pliers, wrench, screwdrivers, fasteners, work gloves

Calissuutet- mulutuuk, keggsuutek, angicissuun, qipsalget, calissuutek aliimatek

☐ **Small fuel–driven stove and fuel** – follow manufacturer's directions and store properly

Kenircuun uqumek atutuli uqurkaq-llu- Maligtaquluki alerquutai piliaqestiin pikici, qemagtenqegcarluku-llu pikiciu

Two additional liters of water per person per day – for cooking and cleaning

Mermek *two liters* amllertalriamek yuum ataucim aturyugarkaanek ernermi ataucimi- kenircuutekamek erurcuutekamek-llu.

☐ **Other personal care supplies**

Allat yuum aturyugarkai kenugcessuutet wall'u erurcuutet

☐ **Copies of personal documents**—such as passport and birth certificate

Yuum kalikautai- yuurtellmini yuum kalikautai wall'u calissuutet kalikat

Basic Emergency Kit

Arenqiallugtem Nalliini Cat Upinganarqellriit

FEMA

Best practices

Disaster Mitigation Working in Alaska

Students Contribute to Mitigation Planning

Hazard Mitigation Best Practices stories are written to shine a bright light on actions that effectively reduce or eliminate future damage to people, property, and the environment from natural or man-made disasters. This story is about creating and sustaining the ultimate mitigation program -- enhancing the potential of young Alaskans, through "place-based" education, to allow them to build strong, safe and self-reliant communities

Photo By Christopher Smith FEMA

Steve Kenrick–Dean of students in the Village of Akiachak

AKIACHAK, AK – Steve Kenrick moved to Alaska when he was 55 years old to pursue a new career in education after leaving his previous career in the wood products industry. After receiving his teaching certificate, he began working in rural Native villages and has followed that path for the past 10 years. In that period, Kenrick has worked in a number of the villages in the Yukon-Kuskokwim Delta area, with much of his time spent in the small community of Sheldon's Point, or Nunam Iqua, roughly translated as Land's End in the language of the Yupik Natives.

It was in Nunam Iqua that Kenrick first became interested in the idea of mitigation, and the role students could play in helping make their villages stronger, safer and more self-reliant. Nunam Iqua sits at the mouth of the Yukon River, on the shore of the Bering Sea. Following a particularly turbulent Fall storm in 2004, the village was inundated by several feet of water. While the majority of homes in the village were elevated enough to stay dry, everything on the ground was swept away by the rushing water. This included the village's primary means of access.

"There are no roads in Nunam Iqua," said Kenrick. "The village is connected by boardwalks, and they all floated away. We had to use boats to get everywhere, and people flying in to the airport would tell us the village looked like ships out to sea; lights shining in the middle of all that water."

This Publication was Produced by FEMA Region X Mitigation Division as part of Disaster 1843

Prior to the 2004 flood, Kenrick had involved his students (grades nine to twelve) in an erosion study of the village's decaying riverbanks. The data collected by the students helped secure a grant for an erosion prevention project, awarded by the State of Alaska. Following the 2004 flood, Nunam's City Manager sought to apply for grant assistance from the Federal Emergency Management Agency (FEMA). To receive grant monies from FEMA, a community is required to have a mitigation plan in place. The City Manager requested that Kenrick once again work with his students to provide data necessary for the creation of the plan. The students, under Kenrick's supervision, identified and mapped every structure in the village, and then compiled the data for the City Manager to use.

Following the success of their data collection efforts, Kenrick proposed a new challenge to his students. The village council was in the process of writing a comprehensive 20-year plan for projects to be completed during that period. Kenrick encouraged his students to conceive and design several projects to be added to the village's 20-year plan. Their suggestions included creation of a hybrid wind/diesel energy system; construction of alternative, affordable and durable, disaster resistant homes; and a design for a boat harbor to keep local fishing craft safe during periods of high water. All the projects were accepted and approved by the village council and added to the 20-year plan.

Kenrick realized that his students had great potential to make further contributions to research and implementation of projects, and to create a brighter future for their communities. State and federally funded studies and projects conducted in isolated villages typically require that people travel by boat or plane to reach these locations. They either travel back and forth or remain in the villages for weeks or months at a time to capture the information they need. Kenrick argues that a large portion of the data collection and work could be accomplished by residents of the villages themselves, with enormous cost savings.

"That's one of the things I'm pushing out here," said Kenrick. "Why pay someone to come out to the villages to do these studies? These are remote locations, with minimal provisions for guests. Why can't the students do this kind of work? They live in these places year round. Who better to collect data on an area than the people who actually live there? All they would need is training on how to collect the data."

The State of Alaska has gone to great expense to develop the schools in the Native villages. Almost all of them have been built with modern computer labs, science labs and fully equipped technical shops. In Kenrick's opinion, these schools provide the perfect environment for forging links between youth, education and building strong communities.

"I think that these schools provide everything we need to do this," said Kenrick. "We've got the computers, we've got the software, and we've got the technical people to help the students. I believe we could write reports and perform studies as good or better than a lot of the professional level work being done out there right now. And it would be relevant to the kids. They could see what they're doing and that their work actually means something."

Over the years, Kenrick has involved his students in a number of research projects, from conducting moose count reports to running a weather station and broadcasting their daily forecasts over VHF band radio to surrounding communities. Data collected by Kenrick's students has proved useful not only for their own villages, but has also been utilized by such agencies as the State of Alaska Department of Fish and Game and the Federal Aviation Administration (FAA).

Kenrick has recently taken a position as the Dean of Students in the village of Akiachak, and he intends to bring his program to his new post. He also hopes to expand it, first to the Yupiit school district, of which Akiachak is a part, and then, eventually to the entire State of Alaska. The goal is to incorporate what Kenrick refers to as a "place-based" education in the village schools, not only to provide this relatively undiscovered source of data collection and research to state, private and federal organizations, but to involve his students in something he feels will have a long-term impact on their communities, but more importantly, on themselves.

"Why are a lot of these kids dropping out of school?" asked Kenrick. "Because they're bored. They're not involved with anything relevant to them or where they live. A lot of these students are never going to leave their villages. They want to stay there. Some of the kids I've worked with in the past are now getting involved in their communities that probably wouldn't have before. They've found that connection."

Photo By Christopher Smith FEMA

Modern facilities in Akiachak classroom

FEMA

Best practices

Disaster Mitigation Working in Alaska

Elevated Homes in Alakanuk Stay Dry – So Far

Alakanuk home elevated 6 feet on post and pile foundation in 2005.

What is Retrofitting?

Retrofitting means making changes to an existing building to protect it from flooding or other hazards such as high winds and earthquakes.

What is Elevation?

Raising your house so that the lowest floor is above the flood level.

Alakanuk, Alaska - Using a boat to move around town for a few days each spring is not unusual for the residents of Alakanuk, a southwest Alaska community of about 600 people on the lower Yukon River. Flooding is common in the region at this time of year as the Yukon breaks up, and water and river ice dammed by the still shore-fast ice on the Bering Sea overflow the banks of the river at Alakanuk (and at its upstream neighbor Emmonak). Many of the homes in the riverside communities of the lower Yukon are elevated on pilings about 6 feet above the tundra.

Alakanuk is not on a major bend of the Yukon, but stretches along a 3-mile reach on the north bank of the channel. About 25 homes along the bank are threatened by erosion, a continual process that is exacerbated by the almost annual ice-jam floods of varying severity and damage potential.

In 2005, eight homes and the City of Alakunuk office building were relocated, and all but one of the homes were elevated, most of them to a height of 6 feet above the natural ground surface,

Process of elevation

which is the recommended building elevation designated by the Corps of Engineers. The relocation and elevation project was funded with a $265,000 grant from FEMA's Hazard Mitigation Grant Program (HMGP); the grant application was processed and the funds administered by the Alaska Division of Homeland Security and Emergency Management (DHS & EM).

In May 2006, snowmelt and ice-jam flooding on the lower Yukon caused inundation of Alakanuk with ice-laden water to depths up to 6 feet. At least one home, which had been within 30 feet of the river before it was relocated and elevated, would surely have been destroyed by the water and ice blocks the size of cars at its original site. This home and the six others that had been relocated and elevated escaped damage to the main structure. In the home that had been moved but not yet elevated when the floodwaters struck Alakanuk in 2006, the floor and some insulation was damaged by 4 to 5 feet of water.

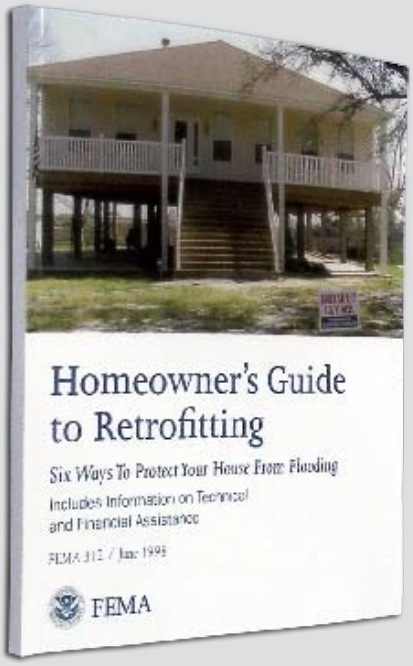
The severity of and damage caused by ice-jam floods along the lower reaches of the Yukon and other western Alaska rivers varies from year to year. The relatively severe flooding in May 2006 tested the effectiveness of the relocation and elevation project in Alakanuk; except for the single home that had not been elevated, the project "passed." Spring flooding in each of the subsequent years, most recently in late May 2009, was less severe, and the community was only minimally affected.

This Alakanuk home had been moved but not yet elevated when the 2005 floods struck. The owner's son is pointing at the level reached by the flood.

More Information

FEMA publication 312, Homeowner's Guide to Retrofitting: Six Ways To Protect Your House From Flooding, provides information that will help you decide whether your house is a candidate for retrofitting.

www.fema.gov/library



FEMA Mitigation measures

Protect Your World From Natural Disasters

Staying Warm and Safe

Alaskans plan ahead for winter!

Alaska's winter can bring extreme cold, high wind, falling trees, heavy snow, avalanches and more. An added challenge may be the failure of electrical power and heating systems. Alaskans need safe and reliable alternative ways to stay warm.

Typical winter problems and possible solutions include:

- **Many types of furnaces require electrical power for the fan and thermostat controls.** During a power outage a small portable generator may be able to power the furnace system, but plan ahead to have an electrician install the equipment to safely switch the furnace to the generator power source.

- **Oil stoves usually work without a source of electricity**. But when the temperature falls to about twenty degrees Fahrenheit, #2 diesel oil starts to congeal, while #1 grade oil will flow until the temperature approaches minus sixty degrees. Options: Use #1 or mix the two types of oil; Use a diesel fuel additive that lowers the congealing point of oil (to be effective, the additive must be added while the tank is being filled).

- **Water in diesel fuel can cause ice blockage in the fuel line.** Install an oil filter at the start of the fuel line and occasionally drain water that accumulates at the bottom of filter canister.

This document was produced by FEMA Region 10 Mitigation Division and Alaska Department of Homeland Security and Emergency Management

- **Protect the tank, oil filter and fuel line from extreme cold.** Options: If you have electrical power, install a small light bulb inside an enclosure that surrounds the fuel tank and pipe. Trap the heat of the sun by draping a clear plastic tarp over a frame that covers the tank and fuel line. Pile a layer of insulating snow over the tank and fuel line.
- **Oil stove exhaust pipes and air-intake vents may become blocked by ice or snow.** Insulated or double-wall stove pipe will prevent some types of icing blockage. A ladder may be needed to provide access to the top of the chimney or stovepipe for ice and snow removal.
- **Propane heaters and other gas-fired appliances stop working when temperatures drop below minus forty-four degrees Fahrenheit.** Best option: shelter and insulate the tank and line.
- **Wood and coal stoves are usually reliable for primary or backup heating but require some maintenance.** Clear bricks, mortar, ash, snow, ice or bird nests from the stovepipe or chimney. Avoid creosote buildup in the stove pipe or chimney by burning only dry firewood and occasionally cleaning the pipe with a proper sized brush.
- **During the coldest weather people often build very hot fires that pose extra danger.** Remove or protect nearby combustibles (furniture, clothing, walls and so on). Look for hidden fire sources such as incorrectly installed or rusted and cracked stove pipe. (Inspect where the pipe passes through the ceiling and roof by pulling back the circular flange and peering into the ceiling cavity with a flashlight. Charred ceiling joists, rafters or roof deck mean serious fire danger!)
- **Backup heating systems may not provide adequate heat to protect water pipes.** Some water piping may be far from the heat source or may be poorly insulated. Options: It sometimes helps to allow faucets to drip, but catch drips in a large bowl or pan, rather than risk causing the drain to become ice-clogged. If electricity is available, wrap heat tape around vulnerable pipes. Protect the water supply pipes from extreme cold by draining the entire system before the water freezes (this is difficult unless the piping was designed to slope toward a low spot and drain valve).
- **Unvented gas or kerosene heaters are too risky to use in a home, but are fine for temporary use in a large barn or drafty work shed.** When doors and windows are closed, especially in small, tight Alaskan homes, the buildup of odorless and colorless carbon monoxide gas from unvented heaters can be fatal. Also, it's never safe to operate a gasoline or propane powered electrical generator in a house or attached garage, due to the deadly exhaust gas.

If all of the safe options for heating your home fail, the best alternative may be to put on many layers of warm clothing and, if possible, evacuate to a safe and warm location.

Carbon Monoxide Facts:

More deaths from carbon monoxide poisoning occur in Alaska than in any other state. A study of five villages found elevated CO levels in nearly 10% of the homes, most commonly because of improperly vented tankless ("on demand") propane water heaters, stove pipe leaks, and gas cooking stoves that had been left on for several hours. The symptoms of CO poisoning are: headaches, fatigue, dizziness, weakness, confusion and nausea. Many of these symptoms are similar to those of the flu, food poisoning, or other illnesses. If you experience symptoms that you think could be from CO poisoning: Get fresh air immediately. Open the doors and windows, turn off combustion appliances and leave the house. Then call 911 for further instructions. Carbon monoxide alarms, when properly installed, can save lives.

Information and Resources:

Alaska Division of Homeland Security & Emergency Management
www.ready.alaska.gov

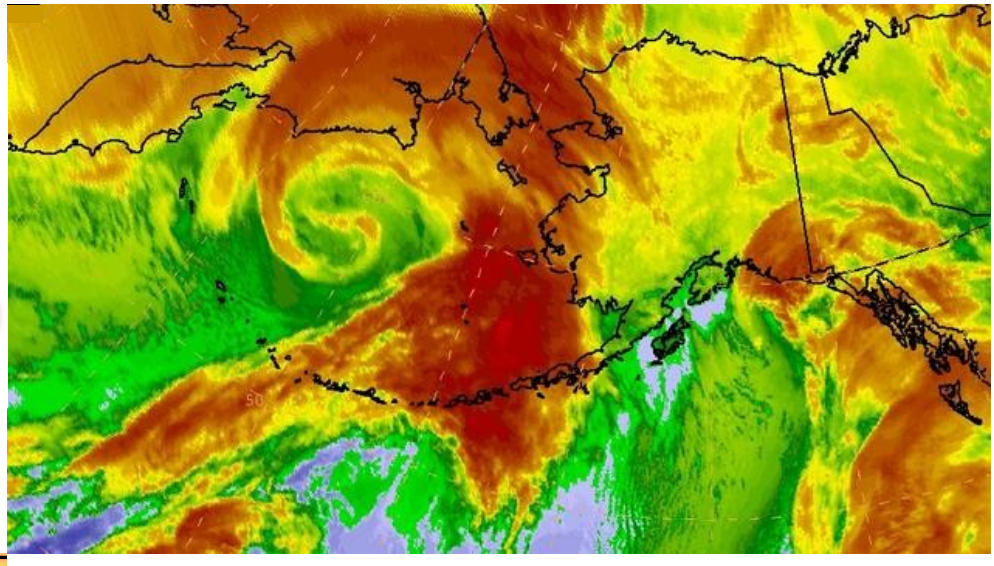
University of Alaska Fairbanks - Cooperative Extension Service
www.uaf.edu/ces

Cold Climate Housing Research Center
www.cchrc.org

FEMA Mitigation measures

Protect Your World From Natural Disasters

Alaska Winter Storms



Many Alaskan homes suffer damage from winter windstorms and heavy snow. Disaster resistant design, construction and retrofitting can reduce or eliminate many problems and keep your home safe, warm and dry.

During new construction or a re-roofing project you have opportunities to avoid water intrusion and consequent damage from missing shingles, flying debris, failure of the roof to wall connection or overloaded roof rafters:

- Metal connectors (hurricane clips) add tremendous strength where the rafters connect to the walls. You may want to add connectors during a re-roofing project by temporarily removing perimeter roof sheathing (to gain access). If the roof is already damaged, or is inadequate for possible future snow loading, consult a design professional to find the best way to add additional support.
- Plywood roof sheathing needs to be securely nailed, especially around the perimeter of each panel (see resources links on page 2 of this publication).
- During new construction or re-roofing consider sealing all plywood sheathing joints and roof deck penetrations (around vent pipe holes, etc.) with self-adhering modified bitumen tape (sometimes called "window flashing tape"). Taping the plywood joints is now a code requirement in certain high wind zones. This upgrade can keep water out of the house even after a wind borne tree branch or other flying object has swept away some of the roof materials.

Strong materials and good connections between all of the parts of a house will provide a reliable "load path" to transfer wind and snow loads (or earthquake forces) from the roof, walls and floors down to the foundation.

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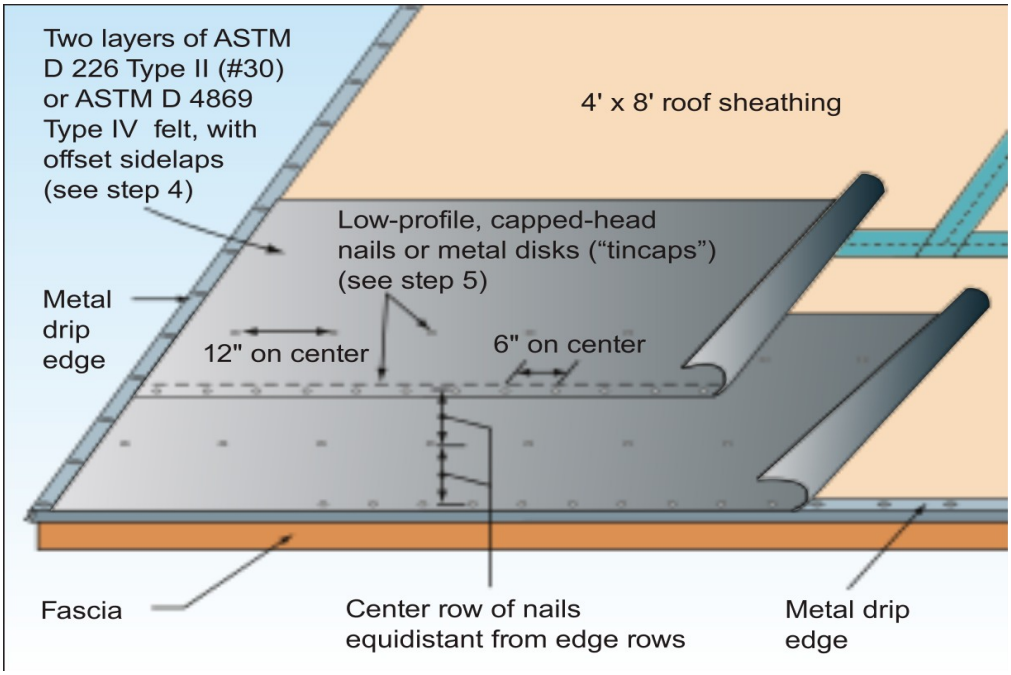
- Fasten two layers of underlayment (felt) with low-profile, capped-head nails or metal (or plastic) disks, rather than the small staple (hammer-tacker) installation method.
- Apply roof cement under the "leading edges" of shingles around the roof perimeter and ridge. Loose shingles can start a domino-like failure. Roof cement is available in tubes for caulking gun application (and works best in warm weather).



Example of roof sheathing and underlayment design detail from *Home Builder's Guide to Coastal Construction* (FEMA Publication P-499)

Window protection may be needed during the most severe winter storms:

- Plywood panels, cut to fit the dimensions of each window, are an effective and economical solution. They can be secured with screws for easy installation and removal.
- Removable storm windows are another option that can protect the primary glazing and reduce heating costs, while still allowing light to enter the house. Wood frame storm windows with tough acrylic plastic sheeting are affordable and practical as a do-it-yourself project. Thicker polycarbonate plastic panels are another extremely sturdy option. They are far more expensive than plywood, however, and must usually be ordered from a specialty plastics dealer.

Weather stripping, caulking and insulation are a final barrier to Alaska winters:

- Find air gaps that allow wind and snow to enter and heat to be wasted;
- Carefully select the best products for each type of crack or gap: Acrylic caulking for small cracks; Foam rope helps with larger gaps; Use expanding foam products where appropriate; Install metal, felt, or vinyl weather strips around doors and windows.
- Add insulation to recommended levels (see UAF Cooperative Extension and Cold Climate Housing Research Center publications).

More Information and Resources:

Wind resistant construction details are available for download through the Federal Emergency Management Agency website:

www.fema.gov/library

Home Builder's Guide to Coastal Construction (FEMA Publication P-499)

Wind Retrofit Guide for Residential Buildings (FEMA Publication P-804)

Information about special considerations for building and maintaining a home in Alaska:

Cooperative Extension Service—University of Alaska, Fairbanks www.uaf.edu/ces

Cold Climate Housing Research Center www.cchrc.org

Alaska Building Science Network www.absn.com

Important information on disaster preparedness:

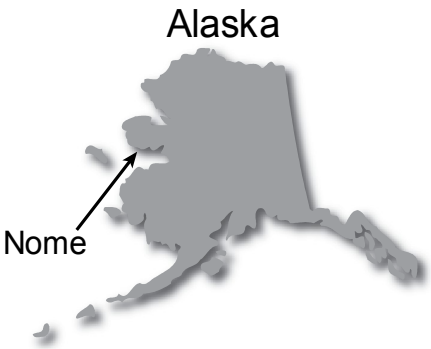
Alaska Division of Homeland Security & Emergency Management

www.ready.alaska.gov

FEMA Best practices

Disaster Mitigation Working in Alaska

Flood Mitigation in Nome, Alaska



The 1949 drainage culverts had rusted and collapsed

Damage prevention investments in 1949 and 1993 helped to protect the city, but high winds and water levels still managed to top the seawall and damage buildings along Front Street.

A new drainage system, completed in 2008, provided 30 inch culverts with sufficient capacity to remove the water from the streets and return it to the sea.

2004 flooding on Front Street

Nome, Alaska — A powerful and extremely dangerous storm of near record magnitude impacted the west coast of Alaska during November, 2011. The storm surge and blizzard conditions impacted forty-three communities. This was to be a major test for a recent investment in Nome's critical infrastructure.

Nome had experienced severe storms several times in its history, starting with an event in 1900 that left 1,000 homeless and destroyed the business district. More terrible storms followed and, in 1949, the U.S. Congress allocated $1 million to build a seawall and drainage system. Strong storms continued to top the rip-rap structure and eventually the old 12 inch drainage pipes serving the downtown began to rust and collapse.

A solution began to come together in 2005 with a proposal by the Alaska Department of Transportation and Public Facilities Northern Region (DOT&PF). The project would replace and upgrade the old, failed culverts to a system of five new 30 inch diameter, one-half inch thick galvanized steel pipes.

The collaboration of effort included the City of Nome, DOT&PF, the Hazard Mitigation Grant Program administered by the Alaska Division of Homeland Security and Emergency Management (DHS&EM), and funds provided by the Federal Emergency Management Agency (FEMA) and State of Alaska.

The work was not easy. Heavy equipment was needed to excavate through

Large diameter culverts being installed through the seawall

the rip-rap seawall; equipment that's not usually available in a remote Alaskan community. Thick-wall galvanized steel pipe was ordered from a fabricator in Puyallup, Washington. The load was transferred to a barge in Seattle, then towed all the way to Nome. Amazingly, one pipe per day installation was accomplished with the final pipe installed on September 13, 2008.

According to John Handeland, Head of the Nome Joint Utilities System, in the recent severe storms, the project worked quite well. Front Street had little storm water and it flowed out more quickly. Unlike past disasters, this time there were no traffic diversions, standing water or property damage. "Protecting buildings and infrastructure makes sense. The sea wall improvements in Nome prevented damages that could have easily been greater than the cost of the original mitigation project," said John Madden, Director Division of Homeland Security and Emergency Management. "Winters in Alaska can be brutal and repairs must often wait until spring. Small Alaskan communities cannot thrive without timely restoration of critical infrastructure. With proper mitigation we reduce the impact of future disasters."

For more project information contact:State of Alaska, HMGP Program Manager Brent A. Nichols: Brent.nichols@alaska.gov (907) 428-7085

To see more Hazard Mitigation Best Practices visit: www.fema.gov/plan/prevent/bestpractices

For Flood Insurance information visit: www.FloodSmart.gov

FEMA Best practices
Disaster Mitigation Working in Alaska

Power line protection brings hope to Hope

The 18 mile long Hope Feeder Power Line provides primary power to the communities of Sunrise and Hope.

There will still be storm related outages on this section of the line but the actions made possible by using the Hazard Mitigation Grant Program should decrease the frequency and cost of repairs.

Spruce bark beetles kill trees and disrupt power

Hope, Alaska —Electrical power outages are a fairly frequent occurrence in parts of the Kenai Peninsula, along with many other parts of Alaska. High winds, falling trees, heavy snow, ice and avalanches all contribute to causing power system damage. Winter storms and loss of electrical power in some remote communities can also bring loss of water, sewer, local telephone, cell-sites, emergency services systems and even access to groceries and fuel. Blizzards, extreme low temperatures, steep terrain, avalanches and other dangers conspire to delay the necessary repair work.

The small communities of Hope and Sunrise have experienced more than their fair share of such problems. According to a five year study completed by Chugach Electric Association (CEA), the non-profit association that owns and operates the electrical system, Hope residents and

This Publication was produced by FEMA Region 10 Mitigation Division and the Alaska Division of Homeland Security and Emergency Management

Right of way improvements

businesses have been affected by an average of 81 powerless hours per year, compared to 2.3 hours per year for the remainder of customers served by CEA.

In January, 2000, the Hope Feeder Line, running through the Chugach National Forest and across Department of Natural Resource (DNR) Land, was down in several places, with access blocked by avalanches. An emergency generator was brought in by helicopter to Hope. Again, in December, 2006, the same 18 mile line was so severely damaged that Hope and Sunrise needed large generators to be installed and maintained for some 7 weeks, as snow accumulated to depths of 8 to 12 feet.

The problem has been growing in recent years, largely due to that scourge of the northern forests, the Spruce Bark Beetle (*Dendroctonus rufipennis*). An enormous infestation of the beetles has killed most of the large spruce trees in the Kenai Peninsula. Much less wind force is needed to topple a dead tree, and remaining healthy trees are left more exposed to the wind. They've been falling across power lines with alarming frequency.

A partial solution has been found through Federal, State and Local government partnerships utilizing Local Hazard Mitigation Plans to identify the hazard, risks and vulnerabilities. Support for the first stages of work was approved by the Alaska Division of Homeland Security and Emergency Management's (DHS&EM) Hazard Mitigation Grant Program, with funds provided by the Federal Emergency Management Agency (FEMA) and the State of Alaska. Money for additional stages of the plan is well along in the approval process. The eventual savings are calculated to be more than four times the amount of the improvement investments.

The work, designed to be done in stages and already well underway, involves clearing the right of way and removing "hazard trees" that tower nearby. Relocating or undergrounding sections of the line to avoid avalanche chutes and steep gorges will also make a big difference to the reliability of the system. These projects will reduce the danger to repair crews and drastically reduce emergency response costs to homeowners, CEA, the State of Alaska and FEMA.

Another benefit of this effort is enhanced wildfire mitigation in conjunction with Forest Service work in the area. Clearing excess fire fuel and in some sections widening the right of way, will provide a more effective wildfire break. If the improvements work as expected they will bring a new day for Sunrise and less despair in Hope.

For more project information contact:

State of Alaska,
HMGP Program Manager
Brent A. Nichols
Brent.nichols@alaska.gov
(907) 428-7085

What can be done about Spruce Bark Beetles? The Kenai Peninsula Borough Spruce Bark Beetle Mitigation Program includes comprehensive programs designed to enhance:

- **Fire prevention and public safety;**
- **Timber management and reforestation;**
- **Fuel modeling and risk/hazard/fire assessment;**
- **Public education and communications;**
- **Public assistance;**
- **Science and research;**
- **Long term planning;**
- **Continuity of efforts through All Lands/All Hands Action.**

For more information:
www2.borough.kenai.ak.us/SBB/default.htm

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Disaster Mitigation Working in Alaska

A Moving Story

House reassembled at its new location above the floodplain of the Tanana River.

The ultimate solution to eliminating the risk of being flooded is moving out of the flood-prone area. Although many factors will influence your decision, you could either move to a new home or take your existing home with you. This story tells of one family who chose the latter option.

Salcha, Alaska - If you think the house on the property of Robert and Maria Baker along Old Valdez Trail in Salcha used to sit a lot closer to the Tanana River, you'd be right. If you think the house floated to its present position on the floodwaters of the Tanana, guess again. The house was moved to the site in February 2008 through the ingenuity and hard work of the Baker's, their family, and their friends.

To back up a bit, the home of the Olaf Allison family was built at the north end of the gravel airstrip along Sewell Drive in Salcha, Alaska. The Allison home and several other homes and buildings along Sewell Drive, as well as the roadway and the airstrip, had been inundated to depths as great as 7 feet by floodwaters of the Tanana River several times since development of the subdivision began in the early 1980s. Official records as well as the accounts of the residents indicate that floods in the Sewell Subdivision have increased in frequency and severity in the past decade. Although floods

House section being towed to the new location in February 2008.

have resulted from summer and early fall rainstorms, the most severe and damaging floods were those caused by the backup of water behind ice jams during Fall freeze-up and Spring break-up on the Tanana, which add moving blocks of ice to the debris-laden, fast-rising waters.

During the particularly damaging flood in November 2004, rapidly rising waters left roads, driveways, homes, woodpiles, vehicles, and other personal property encased in a thick layer of ice, and some residents were unable to return to their homes for as long as 10 days. That experience prompted property owners to contact the Fairbanks North Star Borough (FNSB) about obtaining some permanent relief from what was becoming an almost annual event. Within the next few months, the FNSB filed an application (with the Alaska Division of Homeland Security & Emergency Management) to obtain funding through FEMA's Hazard Mitigation Grant Program (HMGP) to acquire/purchase the affected properties and relocate the residents.

When the buildings on the acquired properties were made available for sale in 2007, the Bakers purchased the Allison home. Now the real challenge began – the house had to be moved out of the flood-prone area. Robert designed and built a "sled" from 8 inch diameter pipes under the house, which had first been separated into two sections. Each of the sections was braced and secured to the sled and then towed about a mile over and ice- and snow-covered route to the new location, which is considered to be well above the reach of any future floods on the Tanana. While the overall moving project took about a month to complete, towing the house from the original site to the Baker's property took just several hours.

What is Retrofitting?

Retrofitting means making changes to an existing building to protect it from flooding or other hazards such as high winds and earthquakes.

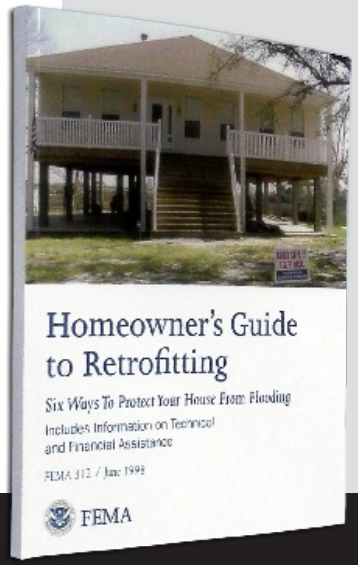
What is Relocation?

Relocation means moving your house to higher ground where the exposure to flooding is eliminated altogether.

More Information

FEMA publication 312, Homeowner's Guide to Retrofitting: Six Ways To Protect Your House From Flooding, provides information that will help you decide whether your house is a candidate for retrofitting.

www.fema.gov/library



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Best practices

Disaster Mitigation Working in Alaska

Property buyouts prevent further flood losses in Salcha

Slush ice forming on Tanana River near Salcha, AK, October 13, 2008 (12 miles downstream of Sewell project area)

Salcha, Alaska - The Fairbanks North Star Borough's (FNSB) offer to purchase several properties and remove existing buildings along Sewell Drive in Salcha, Alaska in 2005 turned out to be a wise one. Although most of the homes in the area along the Tanana River southeast of Fairbanks had been inundated and damaged by several previous floods, their removal after the Borough's acquisition of the properties has prevented still further losses in subsequent floods, in Spring 2008, again in late Summer 2008, and most recently in late April and early May 2009.

"The Sewell Drive acquisition is a real success story," said Karrie Shaw, Land Management Specialist with the FSNB. "Any buildings left on that property would surely have been affected by this year's floods," she added.

Floods are common events at Salcha, and official records as well as the memories of local residents suggest that flooding

> "This project was a success in several respects. With the removal of buildings and other property, the Tanana River will be allowed to meander freely through the area, so that ultimately the natural wetlands and the fish and wildlife habitat will be restored. Most importantly, the families, their homes, and their property were moved out of harm's way."
>
> -Karrie Shaw

has increased dramatically in severity and frequency in recent years. And although floods can result from the runoff off late summer and early autumn rainfall – long-time residents remember well the "Great 1967 Fairbanks Flood" – the much more frequent, almost yearly ice-jam floods during fall freeze-up and spring break-up add the hazards of moving ice to the debris-laden, fast-rising waters.

An unusually wet summer of 2008 in Interior Alaska culminated in at least two new single-day rainfall records at Fairbanks in late July and heavy rainfall to the east and southeast of the city. Runoff of the late July rains resulted in a rise in the level of the Tanana River at Fairbanks to its highest levels since 1967, and on July 30th, the Salcha River near Salcha crested at 3 feet above flood stage where it crosses the Richardson Highway about 40 miles southeast of Fairbanks. More than 100 homes in the Salcha areas were affected by the floodwaters, and most of the Sewell subdivision was inundated.

The homes and other buildings and properties along Sewell Drive, as well as

One of the houses being towed to new location.

the roadway and private gravel airstrip, had been inundated to depths as great as 7 feet by floodwaters of the Tanana River several times since development of the subdivision began in the early 1980s. During the particularly damaging flood in November 2004, rapidly rising waters forced residents from their homes and left roads, driveways, homes, woodpiles, vehicles, and other personal property encased in a thick layer of ice, and some residents were unable to return to their homes for as long as 10 days. That experience prompted property owners to contact the Fairbanks North Star Borough to seek permanent relief from what was becoming an almost annual event, and Borough officials worked with the residents over the next several months to address the issue.

In early 2005, the Borough filed an application with the Alaska Division of Homeland Security and Emergency Management (AK DHS&EM) to obtain funding through the Federal Emergency Management Agency's (FEMA) Hazard Mitigation Grant Program (HMGP) to acquire the affected properties and relocate the residents.

Participation in the program was voluntary, and 10 of the 15 properties in the subdivision were purchased – 4 homes were occupied, 3 were unoccupied, and 3 of the purchased properties were vacant. As a condition of the acquisition, all personal property had to be removed at the owner's expense. Following the acquisition and removal of existing structures, no permanent structures can be erected on a property, and it must remain vacant land in perpetuity.

Four of the structures were sold and have been moved out of the flood zone, and two either have been or will be refurbished or restored to living condition. Usable building materials were salvaged and donated to local non-profit organizations and groups and were then either sold or auctioned.

"This project was a success in several respects," said Shaw. "Most importantly, the families, their homes, and their property were moved out of harm's way. Our emergency personnel will no longer have to endanger their own lives to rescue residents of the Sewell subdivision who used to get stranded by the fast-rising waters. And with the removal of buildings and other property, the Tanana River will be allowed to meander freely through the area, so that ultimately the natural wetlands and the fish and wildlife habitat will be restored."

Lot 2, Block B, Sewell S/D – Former site of Maria Sewell mobile home

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Disaster Mitigation Working in Alaska

Living Simply:

Facing Challenges in Rural Alaska

The native village of Stevens is located on the north bank of the Yukon River, 90 miles north of Fairbanks. Isolated by the lack of roads, the village can be reached easily only by plane or boat. The population consists mostly of Athabascan Natives, along with a small number of non-natives that have chosen to embrace the subsistence-based life the villagers pursue.

Photo By Christopher Smith FEMA

Andy Brattrud stands in front of the raft he constructed to save his vehicles and dogs from the floodwaters.

STEVENS VILLAGE, ALASKA - Andy Brattrud, a Minnesota native, has lived on the Yukon River for the past nine years. Three of those years have been spent in Stevens Village, and one year ago, he moved into the home he currently occupies with his wife, Barbara. The traditional log cabin originally sat very close to the bank of the river, but being familiar with the hazards posed by the Yukon, especially during the turbulent period of Spring ice thaw and break-up, Brattrud elected to move the house.

"We were seeing about four feet of bank erosion every year," said Brattrud. "We didn't know if it was going to be this year or the next, but it was definitely going to go in (to the river). We pulled it back one cabin length the first year, and then another cabin length this past Spring."

The decision to move the cabin a second time proved a wise one. During the last week of April, 2009, the ice on the Yukon River began to break-up and the river started flowing. Unusually heavy snowfall in the previous winter, higher-than-normal temperatures as Spring approached, and ice-jams at several bends in the river combined to cause disastrous flooding.

The City of Eagle and Eagle Village, approximately 386 miles upriver from Stevens Village, were the communities first and hardest hit by flood waters as well as by huge chunks of ice that were forced out of the river. The water and ice

This Publication was Produced by FEMA Region X Mitigation Division as part of Disaster 1843

devastated the Eagle communities. As the river ice continued to break and the flow increased, the flood levels moved downriver.

After several upstream communities had been impacted by the high water and ice, the Stevens Village council met to discuss the situation. The Council informed the villagers to expect hazardous conditions, and a general evacuation was declared. Many of the families departed the village for the safety of Fairbanks. The Brattruds and a number of other residents decided to stay behind to do what they could to prepare.

"They put all the vehicles up on the airstrip, because that was the highest point in the village," said Brattrud. "I could have gotten my four-wheeler up there, but not my snowmobile, so instead I decided to build a raft in my back yard."

The Brattrud's cabin lies downriver from the village, and can only be conveniently reached by boat during the Summer and by dog-sled or snowmobile during the Winter. It also happens to sit at a lower elevation than other homes in the area.

Photo By Christopher Smith FEMA

Floodwater reached heights of 8 feet on the Brattrud's Property

Over the next ten hours, Brattrud constructed a raft out of materials gathered from around his home. Calling on his logging background, he began by felling two trees in his back yard to use as the base for the raft. In addition, the roller logs once used to move the cabin were utilized for additional bracing. He then dismantled one of his storage huts, or caches, to provide logs for the raft's structure. To tie it all together, Brattrud used an old fire hose he had saved from years before and also fastened the raft with several 12-inch nails he found, hammering them in at crucial points. Finally, several 20-foot long boards were nailed down to provide a deck. The only money spent on the raft was for some rope for additional strength and several boxes of nails. The completed raft was 14-feet wide and 20-feet long. To secure it in place, he tied it off to several surrounding trees.

By now, running out of time, Brattrud loaded his four-wheeler and snowmobile onto the raft, followed by his entire team of 11 dogs, as well as a litter of pups. Though Brattrud does not race his dogs, they are all from champion-team stock, and vital for the Brattrud's existence in Stevens Village.

The Brattrud's final chore was making sure their home was safe."They were saying we were going to get hit pretty hard," said Brattrud. "I didn't want to take any chances of losing the cabin, so I tied it off not once, but in four places, one on each corner. And it worked. It's still sitting there."

Brattrud used two high-test nylon straps and two lengths of chain to tie off the cabin corners to four large trees that surround the house. Even as the Brattruds completed the last of their preparations, the water and ice had begun to top the river banks. They were left with no choice but to get aboard their supply-laden canoe and paddle out through treacherous waters.

"Out here, you have to make do with what you've got,"said Brattrud."If you don't have something you need, you make it out of something else. You have to do it all with little or nothing."

After remaining in the village center overnight, the Brattruds returned to their home the next day to check on their property and to feed the dogs. The cabin had taken on water, but securing it had been the right thing to do, as there were indications that the structure had been lifted by the floodwater. Once the waters had receded, Brattrud discovered that a 50-gallon barrel had become wedged under the cabin. In total, Brattrud estimated that the water depth reached eight feet in his yard.

By taking these emergency precautions, Brattrud not only likely saved his home from destruction, but also avoided the loss of his vehicles and dogs. And all for an investment of a day's labor and less than $50 in supplies.

Are you and your community ready for the next flood?

Do you have a plan to protect people, valuable property, and the environment?

Do you know what to do before, during, and after a disaster?

Make a copy of the very useful "2009 Spring Flood Breakup Guide", available on this website: www.ak.prepared.com (Alaska Division of Homeland Security and Emergency Management)

Another link to learn about getting ready: www.fema.gov (Federal Emergency Management Agency)

APPENDIX 13.22 ALASKA EMERGENCY MANAGEMENT FOCUSED ADMINISTRATIVE ORDERS

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Emergency Management Focused Administrative Orders

This Appendix lists Alaska's Emergency Management focused Administrative orders. The list contains direct links to each Administrative Order:

AK Administrative Orders
1971 Admin Order 15 Nat'l Disaster Defined
1976 Admin Order 36 Disaster-Prepare-Response
1978 Admin Order 46-NFIP
1997 Admin Order 170 Emergency Management Sys-ICS
1998 Admin Order 175 Siting-Construct State Owned Infrastructure
2000 Admin Order 186 Tribal Sovereignty
2001 Admin Order 190 Northern Inter-Jurisdictional Disaster Planning & Service Area
2002 Admin Order 199 Rural Construction-Public Facilities
2003 Admin Order 203 DHSEM -SVA-Staffing
2004 Admin Order 217 DHSEM Created
2005 Admin Order 224 Agency Collaboration-Coordination-Sustainability
2005 Admin Order 225 Retiree-Rehire
2006 Admin Order 228 Influenza Pandemic Preparedness
2007 Admin Order 238 Established AK Climate Change Sub-Cabinet
2016 Admin Order 281 Streamline AK Economic Development Focus
2017 Admin Order 289 AK Climate Change Strategy and Climate Action for Alaska Leadership Team

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APPENDIX 13.23 2017 AK DISTRESSED COMMUNITIES REPORT - DENALI COMMISSION

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Denali Commission
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2017 Distressed Communities Report

June 2017

This 2017 annual update of the distressed community list was prepared by the Alaska Department of Labor and Workforce Development (DOL&WD), Research and Analysis Section. DOL&WD used the most current population, employment and earnings data available to identify those Alaska communities and Census Designated Places (CDP's) considered "distressed". The distressed status is determined by comparing average income of a community or CDP to full-time minimum wage earnings, the percentage of the population earning greater than full-time minimum wage earnings and a measure of the percentage of the population engaged in year-round wage and salary employment.

This report uses enhanced physical place of residence information to better identify the community/CDP of residence for Permanent Fund Dividend applicants age 16 and over. Communities and CDP's included in this report are closely aligned with those used in the annual population place estimates prepared by DOL&WD.

This document includes a list of all Alaska communities and CDP's, and indicates whether they are considered distressed or non-distressed. The list also includes employment and earnings information used to determine the status of each location for 2017. Maps by economic region that show locations of communities and CDP's that meet the distressed criteria are also included.

Data Sources and Methodology

Three sources of data were used for the 2017 update:

- 2016 Permanent Fund Dividend applications (PFD). This information includes the applicant's age, social security number (SSN), and physical place of residence. The 2016 recent year PFD applications correspond with 2016 wage records, the most recent available.
- Alaska unemployment insurance wage records for calendar year 2016. This information includes wage and salary worker earnings from all private, state and local government employers. Federal government, military, and self-employed earnings are not available and not included in the earnings estimate.
- Calendar year 2015 Commercial Fisheries Entry Commissions (CFEC) total fish value data by community, the most recent data available.

To approximate the community/CDP income, DOL&WD combined the most recent fishery income and wage records. All 2016 PFD applicants age 16 and over in 2016 were assigned to an Alaska borough/census area and community by place of residence. PFD applicants age 16 and over were matched with wage and employment information by SSN. CFEC 2015 total fish values were added to wage and salary earnings to compute community average market income.

The minimum wage was $9.75 in 2016. For a forty-hour work week, or 2,080 hours annually, the average market income threshold is $20,280.

Surrogate Standard

In 2000, the Denali Commission adopted a “surrogate standard” method for determining if a location is considered distressed. A location that meets two of the following three criteria is considered distressed.

Criteria 1 - Average Market Income

$$\text{Average market income} = \frac{\text{Community Wage \& Salary Earnings} + \text{Community CFEC Earnings}}{\text{Number Residents 16 and Over}}$$

Any location with an average market income of less than $20,280 in 2016 meets this criterion.

Criteria 2 - Percent of Residents Earning Less Than $20,280

$$\text{Percent Residents w/Earnings < than \$20,280} = 100 \times \frac{\text{Number Residents w/Earnings < than \$20,280}}{\text{Number Residents 16 and Over}}$$

Any location with 70% (or more) of its residents earning less than $20,280 in 2016 meets this criterion.

Criteria 3 – Percent of Residents Working All Four Quarters

$$\text{Percent Residents Employed All 4 Quarters} = 100 \times \frac{\text{Number Residents Employed All 4 Quarters}}{\text{Number Residents 16 and Over}}$$

Any location with 30% (or less) of its residents employed in all four quarters of 2016 meets this criterion.

Distressed Locations

The following is a list of communities and CDP's that meet the surrogate standard.

Akiachak
Akiak
Alakanuk
Alcan Border
Aleknagik
Aleneva
Alexander Creek
Allakaket
Ambler
Anaktuvuk Pass
Anchor Point
Angoon
Anvik
Arctic
Atmautluak
Beaver
Beluga
Big Delta
Birch Creek
Brevig Mission
Buckland
Cantwell
Central
Chalkyitsik
Chase
Chefornak
Chenega
Chevak
Chickaloon
Chicken
Chignik Lake
Chisana
Chistochina
Chitina
Chuathbaluk
Circle
Clark's Point
Coffman Cove
Cohoe
Cooper Landing
Copper Center
Harding-Birch Lakes
Holy Cross
Hoonah
Hooper Bay
Hope
Hughes
Huslia
Hydaburg
Hyder
Ivanof Bay
Kachemak
Kake
Kaltag
Karluk
Kasigluk
Kenny Lake
Kiana
Kipnuk
Kivalina
Klukwan
Kobuk
Kodiak Station
Kokhanok
Koliganek
Kongiganak
Kotlik
Koyuk
Koyukuk
Kupreanof
Kwethluk
Kwigillingok
Lake Louise
Lake Minchumina
Larsen Bay
Levelock
Lime
Livengood
Loring
Lower Kalskag
Lutak
Manley Hot Springs
Old Harbor
Ouzinkie
Pelican
Perryville
Pilot Point
Pilot Station
Pitkas Point
Platinum
Point Baker
Point Hope
Point MacKenzie
Pope-Vannoy Landing
Port Alexander
Port Alsworth
Port Graham
Port Lions
Port Protection
Portage Creek
Quinhagak
Rampart
Red Devil
Ruby
Russian Mission
Salamatof
Salcha
Savoonga
Scammon Bay
Selawik
Seldovia
Seldovia Village
Shageluk
Shaktoolik
Shishmaref
Shungnak
Skwentna
Slana
Sleetmute
South Naknek
St. Mary's
St. Michael
Stebbins

Crooked Creek
Crown Point
Deltana
Dot Lake
Dot Lake Village
Dry Creek
Eagle
Eagle Village
Edna Bay
Eek
Eielson AFB
Ekwok
Elfin Cove
Elim
Emmonak
Eureka Roadhouse
Excursion Inlet
Ferry
Fort Greely
Fort Yukon
Fox River
Fritz Creek
Funny River
Gambell
Game Creek
Glacier View
Goodnews Bay
Grayling
Gulkana
Gustavus
Halibut Cove
Happy Valley
Manokotak
Marshall
McCarthy
McKinley Park
Mekoryuk
Mendeltna
Mentasta Lake
Metlakatla
Moose Pass
Mosquito Lake
Mountain Village
Mud Bay
Nabensa
Nanwalek
Napakiak
Napaskiak
Naukati Bay
Nelson Lagoon
New Stuyahok
Newtok
Nightmute
Nikolai
Ninilchik
Noatak
Nondalton
Noorvik
Northway
Northway Junction
Northway Village
Nulato
Nunam Iqua
Nunapitchuk
Stevens Village
Stony River
Susitna North
Takotna
Talkeetna
Tanacross
Tanana
Tatitlek
Teller
Tenakee Springs
Tetlin
Thorne Bay
Togiak
Toksook Bay
Tonsina
Trapper Creek
Tuluksak
Tuntutuliak
Tununak
Twin Hills
Tyonek
Ugashik
Upper Kalskag
Venetie
Wales
Whale Pass
White Mountain
Whitestone
Willow
Willow Creek
Wiseman

Non-Distressed Locations

The following is a list of communities and CDP's that <u>do not</u> meet the surrogate standard.

Adak
Akhiok
Akutan
Alatna
Anchorage
Anderson
Atka
Gateway
Glennallen
Goldstream
Golovin
Healy
Healy Lake
Hobart Bay
Nuiqsut
Oscarville
Palmer
Paxson
Pedro Bay
Petersville
Pleasant Valley

Atqasuk
Badger
Bear Creek
Bethel
Bettles
Buffalo Soapstone
Butte
Chena Ridge
Chignik
Chignik Lagoon
Cold Bay
Coldfoot
College
Cordova
Craig City
Deering
Dillingham
Egegik
Ester
Evansville
Fairbanks
False Pass
Farm Loop
Farmers Loop
Fishhook
Four Mile Road
Fox
Galena
Hollis
Igiugig
Iliamna
Juneau
Kaktovik
Kalifornsky
Kasaan
Kasilof
Kenai
Ketchikan
King Cove
King Salmon
Klawock
Knik River
Knik-Fairview
Kodiak
Kotzebue
Lakes
Lazy Mountain
Lowell Point
McGrath
Meadow Lakes
Minto
Naknek
Newhalen
Nikiski
Nome
North Pole
Point Lay
Port Heiden
Prudhoe Bay
Ridgeway
Sand Point
Seward
Sitka
Skagway
Soldotna
South Van Horn
St. George
St. Paul
Steele Creek
Sterling
Sunrise
Tanaina
Tazlina
Tolsona
Two Rivers
Unalakleet
Unalaska
Utqiaġvik
Valdez
Wainwright
Wasilla
Womens Bay
Yakutat

Expanded Standard

DOL&WD also evaluated communities and CDP's against an expanded set of surrogate standard criteria. Under the expanded standard, the criteria are increased/decreased by 3% as appropriate, which results in more locations being classified as distressed. Again, a location must meet two of the following three criteria in order to be considered distressed.

Criteria 1 - *Average earnings less than $20,888* in 2016*
* *$20,280 x 1.03*

Criteria 2 - *67%* (or more) residents earned less than $20,280 in 2016*
* *70% - 3%*

Criteria 3 – *33%* of residents (or less) employed in all four quarters of 2016*
* 30% + 3%

Additional Locations Considered Distressed Based on the Expanded Standard

Aniak	Haines	Petersburg
Big Lake	Homer	Primrose
Chiniak	Houston	Saxman
Clam Gulch	Moose Creek	Silver Springs
Covenant Life	Nelchina	Sutton-Alpine
Delta Junction	Nenana	Tok
Diamond Ridge	Nikolaevsk	Whittier
Diomede	Nikolski	Wrangell
Gakona		

Appeals

The Denali Commission recognizes that in some cases the data collection and application methodologies described above do not accurately reflect the appropriate classification for some communities. Therefore, any community that believes a “non-distressed” classification was determined in error may submit an appeal to the Commission. Appeal determinations will be made based on new information (relevant economic data and facts) submitted by the Community that demonstrate the data used by DOL&WD in their original analysis was erroneous, invalid, or outdated. New information must come from a verifiable source, and be robust and representative of the entire community and/or population.

In addition to demonstrating the data compiled by DOL&WD was erroneous, invalid, or outdated, the new information must demonstrate that a community meets at least two of the three Surrogate Standard criteria, or two of the three Expanded criteria defined above. Appeals with supporting data and facts must be sent in writing to:

Denali Commission
Attention: Director of Programs
510 L Street, Suite 410
Anchorage, AK 99501

The Denali Commission will make an appeal determination in collaboration with DOL&WD based on the new verifiable information presented. Communities filing an appeal will be notified of the decision on their appeal in writing, within 30 days.

The following is a list of communities that have filed a successful appeal since 2001. This list is presented for historical purposes only. Communities that are classified as Non-Distressed by DOL&WD in any particular year, must file a new appeal for that year if they feel their status is in error.

Diomede (2015)
Wales (2013)
Haines (2008)
Glennallen (2007)
Chenega (2006)
Nanwalek (2006)
Atmautluak (2005)
Georgetown (2005)
Kongiganak (2005)
McGrath (2005)
Napaskiak (2005)
Newtok (2005)
Oscarville (2005)
Shaktoolik (2005)
Brevig Mission (2005)
Port Graham (2004)
Newhalen (2001)

Master Community Lists

The following tables summarize the status of individual communities and CDP's based on DOL&WD analyses in 2016 and 2017. The first table is organized by Borough/Census Area. In the second table, all communities and CDP's are listed alphabetically.

Distressed Community Status

Communities and CDP's by Borough/Census Area

Community	2017 Status	2017 Qualification Method	2016 Status	2016 Qualification Method	Average Earnings in 2016	% With Earnings Less Than $20,280	% Employed All Four Quarters
Aleutians East Borough							
Akutan	Non-Distressed		Non-Distressed		34,372	20.1	77.7
Cold Bay	Non-Distressed		Non-Distressed		29,485	62.9	40.0
False Pass	Non-Distressed		Non-Distressed		60,102	71.4	42.9
King Cove	Non-Distressed		Non-Distressed		43,109	66.8	38.3
Nelson Lagoon	Distressed	Surrogate Std.	Non-Distressed		36,974	82.1	20.5
Sand Point	Non-Distressed		Non-Distressed		57,785	63.9	37.0
Aleutians West Census Area							
Adak	Non-Distressed		Non-Distressed		31,520	54.7	47.2
Atka	Non-Distressed		Non-Distressed		29,147	63.6	54.5
Nikolski	Distressed	Expanded Std.	Non-Distressed		18,672	69.2	61.5
St. George	Non-Distressed		Non-Distressed		22,754	61.5	40.4
St. Paul	Non-Distressed		Non-Distressed		29,828	60.1	47.7
Unalaska	Non-Distressed		Non-Distressed		48,382	38.2	62.9
Anchorage Municipality							
Anchorage	Non-Distressed		Non-Distressed		29,238	56.7	44.9
Bethel Census Area							
Akiachak	Distressed	Surrogate Std.	Distressed	Surrogate Std.	10,624	81.0	31.0
Akiak	Distressed	Surrogate Std.	Distressed	Surrogate Std.	9,340	87.1	34.6
Aniak	Distressed	Expanded Std.	Non-Distressed		19,195	67.3	41.8
Atmautluak	Distressed	Surrogate Std.	Distressed	Surrogate Std.	9,046	88.9	18.3
Bethel	Non-Distressed		Non-Distressed		32,299	50.5	48.5
Chefornak	Distressed	Surrogate Std.	Distressed	Surrogate Std.	10,710	83.7	36.7
Chuathbaluk	Distressed	Surrogate Std.	Distressed	Surrogate Std.	10,679	77.1	35.7
Crooked Creek	Distressed	Surrogate Std.	Distressed	Surrogate Std.	7,512	89.2	18.9
Eek	Distressed	Surrogate Std.	Distressed	Surrogate Std.	14,392	75.1	32.3
Goodnews Bay	Distressed	Surrogate Std.	Distressed	Surrogate Std.	13,262	81.5	30.9
Kasigluk	Distressed	Surrogate Std.	Distressed	Surrogate Std.	11,100	83.2	30.0
Kipnuk	Distressed	Surrogate Std.	Distressed	Surrogate Std.	10,014	83.5	25.7
Kongiganak	Distressed	Surrogate Std.	Distressed	Surrogate Std.	12,236	77.5	39.2
Kwethluk	Distressed	Surrogate Std.	Distressed	Surrogate Std.	10,556	81.9	27.4
Kwigillingok	Distressed	Surrogate Std.	Distressed	Surrogate Std.	10,690	80.9	36.4
Lime	Distressed	Surrogate Std.	Distressed	Surrogate Std.	1,749	100.0	5.3
Lower Kalskag	Distressed	Surrogate Std.	Distressed	Surrogate Std.	6,869	88.4	32.6
Mekoryuk	Distressed	Surrogate Std.	Distressed	Surrogate Std.	13,867	77.3	42.9
Napakiak	Distressed	Surrogate Std.	Distressed	Surrogate Std.	8,849	84.8	32.0
Napaskiak	Distressed	Surrogate Std.	Distressed	Surrogate Std.	13,227	76.7	34.7
Newtok	Distressed	Surrogate Std.	Distressed	Surrogate Std.	10,031	84.5	35.0
Nightmute	Distressed	Surrogate Std.	Distressed	Surrogate Std.	10,534	82.8	28.0
Nunapitchuk	Distressed	Surrogate Std.	Distressed	Surrogate Std.	10,195	84.7	39.1
Oscarville	Non-Distressed		Non-Distressed		16,920	64.0	44.0
Platinum	Distressed	Surrogate Std.	Distressed	Surrogate Std.	19,104	69.7	27.3
Quinhagak	Distressed	Surrogate Std.	Distressed	Surrogate Std.	10,402	82.1	27.8
Red Devil	Distressed	Surrogate Std.	Distressed	Surrogate Std.	1,982	100.0	17.6
Sleetmute	Distressed	Surrogate Std.	Distressed	Surrogate Std.	5,326	91.8	17.8
Stony River	Distressed	Surrogate Std.	Distressed	Surrogate Std.	7,639	91.7	37.5
Toksook Bay	Distressed	Surrogate Std.	Distressed	Surrogate Std.	13,106	80.1	39.1
Tuluksak	Distressed	Surrogate Std.	Distressed	Surrogate Std.	6,888	88.9	31.6
Tuntutuliak	Distressed	Surrogate Std.	Distressed	Surrogate Std.	11,556	81.1	34.1

Distressed Community Status

Communities and CDP's by Borough/Census Area

Community	2017 Status	2017 Qualification Method	2016 Status	2016 Qualification Method	Average Earnings in 2016	% With Earnings Less Than $20,280	% Employed All Four Quarters
Tununak	Distressed	Surrogate Std.	Distressed	Surrogate Std.	9,338	85.4	28.0
Upper Kalskag	Distressed	Surrogate Std.	Distressed	Surrogate Std.	12,958	75.5	39.7
Bristol Bay Borough							
King Salmon	Non-Distressed		Non-Distressed		34,938	56.5	38.7
Naknek	Non-Distressed		Non-Distressed		32,789	64.7	33.4
South Naknek	Distressed	Surrogate Std.	Distressed	Expanded Std.	20,468	77.8	24.4
Denali Borough							
Anderson	Non-Distressed		Non-Distressed		28,147	64.0	35.4
Cantwell	Distressed	Surrogate Std.	Non-Distressed		19,671	72.1	28.5
Ferry	Distressed	Surrogate Std.	Distressed	Surrogate Std.	17,274	81.0	19.0
Healy	Non-Distressed		Non-Distressed		28,796	60.7	38.9
McKinley Park	Distressed	Surrogate Std.	Distressed	Surrogate Std.	15,898	68.9	22.8
Dillingham Census Area							
Aleknagik	Distressed	Surrogate Std.	Distressed	Expanded Std.	19,378	72.2	31.5
Clark's Point	Distressed	Surrogate Std.	Distressed	Surrogate Std.	13,010	90.5	19.0
Dillingham	Non-Distressed		Non-Distressed		36,589	51.8	47.4
Ekwok	Distressed	Surrogate Std.	Distressed	Surrogate Std.	11,740	81.1	35.1
Koliganek	Distressed	Surrogate Std.	Non-Distressed		14,812	82.7	30.8
Manokotak	Distressed	Surrogate Std.	Distressed	Surrogate Std.	12,955	84.2	33.3
New Stuyahok	Distressed	Surrogate Std.	Distressed	Surrogate Std.	9,402	84.9	32.8
Portage Creek	Distressed	Surrogate Std.	Distressed	Surrogate Std.	0	100.0	0.0
Togiak	Distressed	Surrogate Std.	Distressed	Surrogate Std.	14,902	86.3	20.9
Twin Hills	Distressed	Surrogate Std.	Distressed	Surrogate Std.	11,786	78.2	36.4
Fairbanks North Star Borough							
Badger	Non-Distressed		Non-Distressed		25,157	59.6	41.1
Chena Ridge	Non-Distressed		Non-Distressed		33,607	53.3	46.1
College	Non-Distressed		Non-Distressed		28,254	56.9	44.4
Eielson AFB	Distressed	Surrogate Std.	Distressed	Surrogate Std.	3,618	93.7	8.3
Ester	Non-Distressed		Non-Distressed		26,493	58.2	43.5
Fairbanks	Non-Distressed		Non-Distressed		22,277	61.9	40.4
Farmers Loop	Non-Distressed		Non-Distressed		30,789	55.2	44.2
Fox	Non-Distressed		Non-Distressed		25,418	56.2	37.9
Goldstream	Non-Distressed		Non-Distressed		28,151	56.4	43.5
Harding-Birch Lakes	Distressed	Surrogate Std.	Distressed	Expanded Std.	18,493	73.8	28.9
Moose Creek	Distressed	Expanded Std.	Non-Distressed		16,498	69.2	34.1
North Pole	Non-Distressed		Non-Distressed		23,068	62.0	40.1
Pleasant Valley	Non-Distressed		Non-Distressed		22,296	65.4	34.0
Salcha	Distressed	Surrogate Std.	Distressed	Expanded Std.	17,969	70.4	29.8
South Van Horn	Non-Distressed		Non-Distressed		18,927	64.5	35.2
Steele Creek	Non-Distressed		Non-Distressed		30,750	56.0	43.9
Two Rivers	Non-Distressed		Non-Distressed		23,126	62.9	37.1
Haines Borough							
Covenant Life	Distressed	Expanded Std.	Distressed	Expanded Std.	16,384	67.6	39.7
Excursion Inlet	Distressed	Surrogate Std.	Distressed	Surrogate Std.	--	93.3	20.0
Haines	Distressed	Expanded Std.	Distressed	Expanded Std.	21,362	71.4	31.9
Lutak	Distressed	Surrogate Std.	Distressed	Surrogate Std.	9,958	73.9	13.0
Mosquito Lake	Distressed	Surrogate Std.	Distressed	Surrogate Std.	13,106	81.1	20.5
Mud Bay	Distressed	Surrogate Std.	Distressed	Surrogate Std.	14,306	75.8	24.2

Distressed Community Status

Communities and CDP's by Borough/Census Area

Community	2017 Status	2017 Qualification Method	2016 Status	2016 Qualification Method	Data Used to Determine 2017 Status: Average Earnings in 2016	% With Earnings Less Than $20,280	% Employed All Four Quarters
Hoonah - Angoon Census Area							
Angoon	Distressed	Surrogate Std.	Distressed	Surrogate Std.	12,274	80.8	28.4
Elfin Cove	Distressed	Surrogate Std.	Distressed	Surrogate Std.	63,086	96.2	11.5
Game Creek	Distressed	Surrogate Std.	Distressed	Surrogate Std.	--	91.7	8.3
Gustavus	Distressed	Surrogate Std.	Distressed	Surrogate Std.	12,271	85.6	21.2
Hoonah	Distressed	Surrogate Std.	Distressed	Expanded Std.	20,582	73.0	29.6
Klukwan	Distressed	Surrogate Std.	Distressed	Surrogate Std.	11,339	74.0	39.0
Pelican	Distressed	Surrogate Std.	Distressed	Surrogate Std.	24,138	82.9	25.0
Tenakee Springs	Distressed	Surrogate Std.	Distressed	Surrogate Std.	13,659	90.1	18.8
Juneau Borough							
Juneau	Non-Distressed		Non-Distressed		29,262	54.0	47.2
Kenai Peninsula Borough							
Anchor Point	Distressed	Surrogate Std.	Distressed	Expanded Std.	18,835	72.3	26.8
Bear Creek	Non-Distressed		Non-Distressed		23,823	58.5	41.6
Beluga	Distressed	Surrogate Std.	Distressed	Surrogate Std.	--	84.6	15.4
Clam Gulch	Distressed	Expanded Std.	Distressed	Expanded Std.	29,222	68.3	26.8
Cohoe	Distressed	Surrogate Std.	Distressed	Expanded Std.	17,459	72.4	28.8
Cooper Landing	Distressed	Surrogate Std.	Distressed	Surrogate Std.	14,650	75.8	19.0
Crown Point	Distressed	Surrogate Std.	Distressed	Surrogate Std.	14,980	73.9	28.3
Diamond Ridge	Distressed	Expanded Std.	Non-Distressed		19,589	69.4	31.0
Fox River	Distressed	Surrogate Std.	Distressed	Surrogate Std.	4,615	91.3	14.5
Fritz Creek	Distressed	Surrogate Std.	Non-Distressed		19,586	72.3	28.9
Funny River	Distressed	Surrogate Std.	Distressed	Surrogate Std.	19,852	73.2	28.4
Halibut Cove	Distressed	Surrogate Std.	Distressed	Surrogate Std.	27,823	87.5	10.0
Happy Valley	Distressed	Surrogate Std.	Distressed	Surrogate Std.	11,551	82.8	20.0
Homer	Distressed	Expanded Std.	Distressed	Expanded Std.	37,844	70.6	31.2
Hope	Distressed	Surrogate Std.	Distressed	Surrogate Std.	12,274	77.7	20.0
Kachemak	Distressed	Surrogate Std.	Distressed	Expanded Std.	19,391	71.6	27.6
Kalifornsky	Non-Distressed		Non-Distressed		29,011	59.8	40.1
Kasilof	Non-Distressed		Non-Distressed		34,508	66.8	33.9
Kenai	Non-Distressed		Non-Distressed		27,192	62.0	41.7
Lowell Point	Non-Distressed		Non-Distressed		25,326	54.3	52.2
Moose Pass	Distressed	Surrogate Std.	Distressed	Surrogate Std.	19,361	73.5	28.2
Nanwalek	Distressed	Surrogate Std.	Distressed	Surrogate Std.	13,340	75.8	42.5
Nikiski	Non-Distressed		Non-Distressed		23,830	67.4	33.9
Nikolaevsk	Distressed	Expanded Std.	Distressed	Surrogate Std.	20,876	75.4	30.2
Ninilchik	Distressed	Surrogate Std.	Distressed	Surrogate Std.	17,002	77.4	20.6
Port Graham	Distressed	Surrogate Std.	Non-Distressed		15,415	74.2	44.3
Primrose	Distressed	Expanded Std.	Non-Distressed		18,550	65.7	31.4
Ridgeway	Non-Distressed		Non-Distressed		26,774	63.2	38.2
Salamatof	Distressed	Surrogate Std.	Distressed	Surrogate Std.	19,906	70.9	29.7
Seldovia	Distressed	Surrogate Std.	Distressed	Surrogate Std.	23,561	86.1	19.3
Seldovia Village	Distressed	Surrogate Std.	Distressed	Surrogate Std.	17,855	71.3	31.5
Seward	Non-Distressed		Non-Distressed		28,396	63.5	36.0
Soldotna	Non-Distressed		Non-Distressed		27,628	63.4	38.8
Sterling	Non-Distressed		Non-Distressed		26,972	64.5	35.8
Sunrise	Non-Distressed		Non-Distressed		27,415	50.0	41.7
Tyonek	Distressed	Surrogate Std.	Distressed	Surrogate Std.	10,916	84.8	22.0

Distressed Community Status

Communities and CDP's by Borough/Census Area

Community	2017 Status	2017 Qualification Method	2016 Status	2016 Qualification Method	Average Earnings in 2016	% With Earnings Less Than $20,280	% Employed All Four Quarters
Ketchikan Gateway Borough							
Ketchikan	Non-Distressed		Non-Distressed		26,608	59.2	44.7
Loring	Distressed	Surrogate Std.	Distressed	Surrogate Std.	--	100.0	0.0
Saxman	Distressed	Expanded Std.	Distressed	Expanded Std.	17,823	69.4	34.2
Kodiak Island Borough							
Akhiok	Non-Distressed		Distressed	Surrogate Std.	22,066	69.5	44.1
Aleneva	Distressed	Surrogate Std.	Distressed	Surrogate Std.	0	100.0	0.0
Chiniak	Distressed	Expanded Std.	Distressed	Surrogate Std.	23,694	73.3	30.0
Karluk	Distressed	Surrogate Std.	Non-Distressed		19,749	63.2	26.3
Kodiak	Non-Distressed		Non-Distressed		48,998	60.0	51.0
Kodiak Station	Distressed	Surrogate Std.	Distressed	Surrogate Std.	9,610	83.8	18.0
Larsen Bay	Distressed	Surrogate Std.	Non-Distressed		23,954	73.7	19.3
Old Harbor	Distressed	Surrogate Std.	Distressed	Surrogate Std.	26,640	83.3	22.0
Ouzinkie	Distressed	Surrogate Std.	Non-Distressed		19,429	76.8	34.8
Port Lions	Distressed	Surrogate Std.	Distressed	Surrogate Std.	23,310	81.0	28.9
Womens Bay	Non-Distressed		Non-Distressed		24,083	64.3	37.8
Kusilvak Census Area							
Alakanuk	Distressed	Surrogate Std.	Distressed	Surrogate Std.	11,616	81.7	29.2
Chevak	Distressed	Surrogate Std.	Distressed	Surrogate Std.	9,765	84.2	26.2
Emmonak	Distressed	Surrogate Std.	Distressed	Surrogate Std.	15,432	74.0	33.7
Hooper Bay	Distressed	Surrogate Std.	Distressed	Surrogate Std.	11,405	80.6	28.5
Kotlik	Distressed	Surrogate Std.	Distressed	Surrogate Std.	11,059	81.0	27.3
Marshall	Distressed	Surrogate Std.	Distressed	Surrogate Std.	9,554	85.4	23.3
Mountain Village	Distressed	Surrogate Std.	Distressed	Surrogate Std.	13,610	78.2	32.3
Nunam Iqua	Distressed	Surrogate Std.	Distressed	Surrogate Std.	10,705	82.3	37.9
Pilot Station	Distressed	Surrogate Std.	Distressed	Surrogate Std.	10,874	82.1	30.5
Pitkas Point	Distressed	Surrogate Std.	Distressed	Surrogate Std.	6,570	91.4	20.0
Russian Mission	Distressed	Surrogate Std.	Distressed	Surrogate Std.	9,451	84.7	30.1
Scammon Bay	Distressed	Surrogate Std.	Distressed	Surrogate Std.	10,994	78.5	28.8
St. Mary's	Distressed	Surrogate Std.	Distressed	Expanded Std.	15,376	74.7	38.4
Lake and Peninsula Borough							
Chignik	Non-Distressed		Non-Distressed		49,728	69.2	48.1
Chignik Lagoon	Non-Distressed		Non-Distressed		155,120	79.0	35.5
Chignik Lake	Distressed	Surrogate Std.	Distressed	Surrogate Std.	19,115	78.5	35.4
Egegik	Non-Distressed		Non-Distressed		35,832	61.4	47.7
Igiugig	Non-Distressed		Non-Distressed		27,128	57.5	55.0
Iliamna	Non-Distressed		Non-Distressed		26,080	61.2	43.2
Ivanof Bay	Distressed	Surrogate Std.	*not evaluated*		0	100.0	0.0
Kokhanok	Distressed	Surrogate Std.	Distressed	Surrogate Std.	14,056	84.4	36.7
Levelock	Distressed	Surrogate Std.	Distressed	Surrogate Std.	15,900	77.4	34.0
Newhalen	Non-Distressed		Non-Distressed		23,690	65.5	34.5
Nondalton	Distressed	Surrogate Std.	Distressed	Surrogate Std.	9,476	82.9	31.8
Pedro Bay	Non-Distressed		Non-Distressed		28,107	61.5	57.7
Perryville	Distressed	Surrogate Std.	Distressed	Surrogate Std.	31,389	82.9	29.3
Pilot Point	Distressed	Surrogate Std.	Distressed	Expanded Std.	20,179	70.5	38.6
Pope-Vannoy Landing	Distressed	Surrogate Std.	Distressed	Surrogate Std.	--	75.0	25.0
Port Alsworth	Distressed	Surrogate Std.	Distressed	Expanded Std.	18,782	71.3	34.1
Port Heiden	Non-Distressed		Non-Distressed		33,040	55.9	48.5
Ugashik	Distressed	Surrogate Std.	Non-Distressed		19,815	90.9	0.0

Distressed Community Status

Communities and CDP's by Borough/Census Area

Community	2017 Status	2017 Qualification Method	2016 Status	2016 Qualification Method	Average Earnings in 2016	% With Earnings Less Than $20,280	% Employed All Four Quarters
Matanuska – Susitna Borough							
Alexander Creek	Distressed	Surrogate Std.	Distressed	Surrogate Std.	--	100.0	0.0
Big Lake	Distressed	Expanded Std.	Non-Distressed		21,130	69.1	31.4
Buffalo Soapstone	Non-Distressed		Non-Distressed		24,561	64.7	36.5
Butte	Non-Distressed		Non-Distressed		23,061	65.0	34.8
Chase	Distressed	Surrogate Std.	Distressed	Expanded Std.	18,891	74.4	15.4
Chickaloon	Distressed	Surrogate Std.	Distressed	Expanded Std.	19,806	68.9	27.8
Eureka Roadhouse	Distressed	Surrogate Std.	Distressed	Surrogate Std.	14,707	72.7	30.3
Farm Loop	Non-Distressed		Non-Distressed		25,067	63.8	39.2
Fishhook	Non-Distressed		Non-Distressed		29,802	58.2	42.2
Gateway	Non-Distressed		Non-Distressed		30,289	58.5	42.1
Glacier View	Distressed	Surrogate Std.	Distressed	Surrogate Std.	12,240	81.7	18.8
Houston	Distressed	Expanded Std.	Non-Distressed		18,121	68.4	32.6
Knik River	Non-Distressed		Non-Distressed		27,703	58.7	41.5
Knik-Fairview	Non-Distressed		Non-Distressed		22,697	61.0	39.2
Lake Louise	Distressed	Surrogate Std.	Distressed	Surrogate Std.	6,739	90.0	2.5
Lakes	Non-Distressed		Non-Distressed		27,223	60.8	40.8
Lazy Mountain	Non-Distressed		Non-Distressed		21,578	67.4	34.4
Meadow Lakes	Non-Distressed		Non-Distressed		22,748	64.8	36.4
Palmer	Non-Distressed		Non-Distressed		21,856	63.3	39.6
Petersville	Non-Distressed		Non-Distressed		--	55.6	44.4
Point MacKenzie	Distressed	Surrogate Std.	Distressed	Surrogate Std.	14,370	83.1	17.6
Skwentna	Distressed	Surrogate Std.	Distressed	Surrogate Std.	6,938	90.0	3.3
Susitna North	Distressed	Surrogate Std.	Distressed	Surrogate Std.	14,346	76.4	26.3
Sutton-Alpine	Distressed	Expanded Std.	Non-Distressed		19,175	68.5	31.6
Talkeetna	Distressed	Surrogate Std.	Non-Distressed		16,622	72.1	30.8
Tanaina	Non-Distressed		Non-Distressed		26,993	59.2	43.0
Trapper Creek	Distressed	Surrogate Std.	Distressed	Surrogate Std.	10,852	83.5	20.0
Wasilla	Non-Distressed		Non-Distressed		25,393	63.7	38.0
Willow	Distressed	Surrogate Std.	Distressed	Surrogate Std.	17,218	75.1	26.3
Nome Census Area							
Brevig Mission	Distressed	Surrogate Std.	Distressed	Surrogate Std.	10,931	79.3	25.2
Diomede	Distressed	Expanded Std.	Distressed	Surrogate Std.	16,711	68.6	43.1
Elim	Distressed	Surrogate Std.	Distressed	Surrogate Std.	13,402	75.9	35.8
Gambell	Distressed	Surrogate Std.	Distressed	Surrogate Std.	8,540	85.1	20.8
Golovin	Non-Distressed		Non-Distressed		21,551	59.6	45.6
Koyuk	Distressed	Surrogate Std.	Distressed	Surrogate Std.	13,463	75.9	36.9
Nome	Non-Distressed		Non-Distressed		35,756	49.9	49.1
Savoonga	Distressed	Surrogate Std.	Distressed	Surrogate Std.	12,296	80.1	38.2
Shaktoolik	Distressed	Surrogate Std.	Non-Distressed		9,242	83.9	26.6
Shishmaref	Distressed	Surrogate Std.	Distressed	Surrogate Std.	19,025	70.2	38.5
St. Michael	Distressed	Surrogate Std.	Distressed	Surrogate Std.	11,085	79.0	29.9
Stebbins	Distressed	Surrogate Std.	Distressed	Surrogate Std.	9,507	80.9	32.1
Teller	Distressed	Surrogate Std.	Distressed	Surrogate Std.	14,122	75.3	38.8
Unalakleet	Non-Distressed		Non-Distressed		24,104	63.1	39.4
Wales	Distressed	Surrogate Std.	Distressed	Surrogate Std.	15,188	72.9	51.0
White Mountain	Distressed	Surrogate Std.	Distressed	Surrogate Std.	16,861	73.6	43.2

North Slope Borough							
Anaktuvuk Pass	Distressed	Surrogate Std.	Non-Distressed		18,202	71.5	35.0
Atqasuk	Non-Distressed		Non-Distressed		24,565	54.9	49.3
Utqiaġvik (Barrow)	Non-Distressed		Non-Distressed		39,374	47.0	49.8
Kaktovik	Non-Distressed		Non-Distressed		28,984	51.8	51.8
Nuiqsut	Non-Distressed		Non-Distressed		22,106	63.0	31.5
Point Hope	Distressed	Surrogate Std.	Non-Distressed		17,445	72.0	31.3
Point Lay	Non-Distressed		Non-Distressed		25,060	58.5	44.4
Prudhoe Bay	Non-Distressed		Non-Distressed		68,973	16.7	75.0
Wainwright	Non-Distressed		Non-Distressed		19,655	65.8	36.9
Northwest Arctic Borough							
Ambler	Distressed	Surrogate Std.	Non-Distressed		19,772	63.4	28.5
Buckland	Distressed	Surrogate Std.	Distressed	Surrogate Std.	12,493	75.3	27.2
Deering	Non-Distressed		Non-Distressed		18,897	57.5	41.4
Kiana	Distressed	Surrogate Std.	Distressed	Surrogate Std.	15,055	76.7	19.3
Kivalina	Distressed	Surrogate Std.	Distressed	Surrogate Std.	11,531	77.2	28.1
Kobuk	Distressed	Surrogate Std.	Distressed	Surrogate Std.	10,628	80.7	30.7
Kotzebue	Non-Distressed		Non-Distressed		25,575	58.0	28.0
Noatak	Distressed	Surrogate Std.	Distressed	Expanded Std.	15,886	74.1	32.1
Noorvik	Distressed	Surrogate Std.	Distressed	Surrogate Std.	12,631	77.5	25.6
Selawik	Distressed	Surrogate Std.	Distressed	Surrogate Std.	8,763	83.0	12.8
Shungnak	Distressed	Surrogate Std.	Distressed	Surrogate Std.	12,804	76.4	24.7
Petersburg Census Area							
Hobart Bay	Non-Distressed		*not evaluated*		--	0	100
Kupreanof	Distressed	Surrogate Std.	Distressed	Surrogate Std.	--	89.5	5.3
Petersburg	Distressed	Expanded Std.	Distressed	Surrogate Std.	46,677	70.8	32.5
Prince of Wales – Hyder Census Area							
Coffman Cove	Distressed	Surrogate Std.	Distressed	Surrogate Std.	14,926	80.8	31.4
Craig City	Non-Distressed		Non-Distressed		34,064	64.8	38.8
Edna Bay	Distressed	Surrogate Std.	Distressed	Surrogate Std.	15,981	82.1	17.9
Hollis	Non-Distressed		Non-Distressed		20,608	65.3	36.3
Hydaburg	Distressed	Surrogate Std.	Distressed	Surrogate Std.	22,880	76.4	25.6
Hyder	Distressed	Surrogate Std.	Distressed	Surrogate Std.	2,295	98.3	12.1
Kake	Distressed	Surrogate Std.	Distressed	Surrogate Std.	18,371	74.2	34.9
Kasaan	Non-Distressed		Non-Distressed		24,420	62.2	51.1
Klawock	Non-Distressed		Non-Distressed		24,269	65.1	38.8
Metlakatla	Distressed	Surrogate Std.	Non-Distressed		16,885	72.1	17.7
Naukati Bay	Distressed	Surrogate Std.	Distressed	Surrogate Std.	11,384	83.3	20.6
Point Baker	Distressed	Surrogate Std.	Distressed	Surrogate Std.	26,033	100.0	8.3
Port Alexander	Distressed	Surrogate Std.	Distressed	Surrogate Std.	26,410	89.7	10.3
Port Protection	Distressed	Surrogate Std.	Distressed	Surrogate Std.	4,783	94.1	9.8
Thorne Bay	Distressed	Surrogate Std.	Distressed	Surrogate Std.	14,486	76.4	25.4
Whale Pass	Distressed	Surrogate Std.	Distressed	Surrogate Std.	10,345	81.8	21.2
Sitka Borough							
Sitka	Non-Distressed		Non-Distressed		29,789	61.5	41.2
Skagway Municipality							
Skagway	Non-Distressed		Non-Distressed		22,394	60.1	37.3
Southeast Fairbanks Census Area							
Alcan Border	Distressed	Surrogate Std.	Distressed	Surrogate Std.	--	93.8	6.3
Big Delta	Distressed	Surrogate Std.	Distressed	Surrogate Std.	15,243	76.7	24.5
Chicken	Distressed	Surrogate Std.	Distressed	Surrogate Std.	51,527	93.3	6.7
Delta Junction	Distressed	Expanded Std.	Non-Distressed		23,121	69.1	30.8
Deltana	Distressed	Surrogate Std.	Distressed	Expanded Std.	18,148	71.9	27.1
Dot Lake	Distressed	Surrogate Std.	Distressed	Surrogate Std.	8,342	89.7	17.2
Dot Lake Village	Distressed	Surrogate Std.	Distressed	Surrogate Std.	5,747	91.7	12.5
Dry Creek	Distressed	Surrogate Std.	Distressed	Surrogate Std.	5,129	89.6	14.9
Eagle	Distressed	Surrogate Std.	Distressed	Surrogate Std.	10,349	80.0	28.6
Eagle Village	Distressed	Surrogate Std.	Distressed	Surrogate Std.	7,265	86.5	25.0
Fort Greely	Distressed	Surrogate Std.	Distressed	Surrogate Std.	13,080	82.2	17.8
Healy Lake	Non-Distressed		Distressed	Surrogate Std.	15,438	63.6	36.4
Northway	Distressed	Surrogate Std.	Non-Distressed		15,034	71.0	33.3
Northway Junction	Distressed	Surrogate Std.	Distressed	Surrogate Std.	11,523	82.1	30.8
Northway Village	Distressed	Surrogate Std.	Distressed	Surrogate Std.	5,357	85.7	18.4

Tanacross	Distressed	Surrogate Std.	Distressed	Surrogate Std.	10,211	80.7	27.5
Tetlin	Distressed	Surrogate Std.	Distressed	Surrogate Std.	10,866	83.6	31.5
Tok	Distressed	Expanded Std.	Non-Distressed		17,842	69.3	32.2
Whitestone	Distressed	Surrogate Std.	Distressed	Surrogate Std.	8,523	81.4	34.3
Valdez – Cordova Census Area							
Chenega	Distressed	Surrogate Std.	Distressed	Surrogate Std.	12,385	81.3	40.6
Chisana	Distressed	Surrogate Std.	Distressed	Surrogate Std.	0	100.0	0.0
Chistochina	Distressed	Surrogate Std.	Non-Distressed		20,209	70.3	37.5
Chitina	Distressed	Surrogate Std.	Distressed	Surrogate Std.	9,456	88.1	16.4
Copper Center	Distressed	Surrogate Std.	Non-Distressed		20,223	74.7	22.9
Cordova	Non-Distressed		Non-Distressed		53,338	65.8	34.4
Gakona	Distressed	Expanded Std.	Distressed	Expanded Std.	22,535	22,535	25.0
Glennallen	Non-Distressed		Non-Distressed		23,683	63.4	36.9
Gulkana	Distressed	Surrogate Std.	Non-Distressed		16,407	70.4	21.0
Kenny Lake	Distressed	Surrogate Std.	Distressed	Surrogate Std.	14,253	79.8	20.6
McCarthy	Distressed	Surrogate Std.	Distressed	Surrogate Std.	8,284	85.7	6.5
Mendeltna	Distressed	Surrogate Std.	Distressed	Expanded Std.	17,404	76.2	19.0
Mentasta Lake	Distressed	Surrogate Std.	Distressed	Surrogate Std.	8,985	88.2	15.1
Nabensa	Distressed	Surrogate Std.	Distressed	Surrogate Std.	0	100.0	0.0
Nelchina	Distressed	Expanded Std.	Non-Distressed		23,673	70.0	26.7
Paxson	Non-Distressed		Non-Distressed		--	66.7	33.3
Silver Springs	Distressed	Expanded Std.	Non-Distressed		20,004	68.4	32.1
Slana	Distressed	Surrogate Std.	Distressed	Surrogate Std.	8,510	88.4	17.4
Tatitlek	Distressed	Surrogate Std.	Distressed	Surrogate Std.	14,657	76.7	38.3
Tazlina	Non-Distressed		Non-Distressed		23,569	64.5	36.4
Tolsona	Non-Distressed		Distressed	Surrogate Std.	34,588	55.6	33.3
Tonsina	Distressed	Surrogate Std.	Distressed	Surrogate Std.	4,243	92.4	7.6
Valdez	Non-Distressed		Non-Distressed		42,297	51.5	49.9
Whittier	Non-Distressed		Non-Distressed		20,593	68.5	35.3
Willow Creek	Distressed	Surrogate Std.	Distressed	Surrogate Std.	12,686	77.2	20.6
Wrangell Borough							
Wrangell	Distressed	Expanded Std.	Distressed	Expanded Std.	24,650	70.4	31.6
Yakutat Borough							
Yakutat	Non-Distressed		Non-Distressed		32,073	63.1	38.5
Yukon – Koyukuk Census Area							
Alatna	Non-Distressed		Distressed	Surrogate Std.	12,182	63.6	36.4
Allakaket	Distressed	Surrogate Std.	Distressed	Surrogate Std.	9,655	83.6	27.9
Anvik	Distressed	Surrogate Std.	Distressed	Surrogate Std.	15,582	78.2	47.3
Arctic	Distressed	Surrogate Std.	Distressed	Surrogate Std.	11,574	82.1	26.8
Beaver	Distressed	Surrogate Std.	Distressed	Surrogate Std.	8,583	87.5	18.8
Bettles	Non-Distressed		Non-Distressed		38,695	47.1	52.9
Birch Creek	Distressed	Surrogate Std.	Distressed	Surrogate Std.	7,758	83.3	22.2
Central	Distressed	Surrogate Std.	Distressed	Surrogate Std.	5,699	90.9	8.0
Chalkyitsik	Distressed	Surrogate Std.	Distressed	Surrogate Std.	13,177	77.8	50.0
Circle	Distressed	Surrogate Std.	Distressed	Surrogate Std.	8,728	87.8	25.7
Coldfoot	Non-Distressed		Non-Distressed		22,270	57.1	57.1
Evansville	Non-Distressed		*not evaluated*		--	50.0	50.0
Fort Yukon	Distressed	Surrogate Std.	Non-Distressed		16,874	67.1	28.5
Four Mile Road	Non-Distressed		Non-Distressed		30,029	52.0	40.0
Galena	Non-Distressed		Non-Distressed		24,001	55.6	46.5
Grayling	Distressed	Surrogate Std.	Distressed	Surrogate Std.	9,757	84.7	40.3
Holy Cross	Distressed	Surrogate Std.	Distressed	Surrogate Std.	14,246	73.8	32.0
Hughes	Distressed	Surrogate Std.	Distressed	Surrogate Std.	11,367	78.6	45.7
Huslia	Distressed	Surrogate Std.	Distressed	Surrogate Std.	11,664	78.0	30.0
Kaltag	Distressed	Surrogate Std.	Distressed	Surrogate Std.	13,506	79.7	25.6
Koyukuk	Distressed	Surrogate Std.	Distressed	Surrogate Std.	11,079	82.2	34.2
Lake Minchumina	Distressed	Surrogate Std.	Distressed	Surrogate Std.	--	92.3	7.7
Livengood	Distressed	Surrogate Std.	Distressed	Surrogate Std.	12,310	83.9	12.9
Manley Hot Springs	Distressed	Surrogate Std.	Distressed	Surrogate Std.	22,868	63.4	38.4
McGrath	Non-Distressed		Non-Distressed		14,598	78.6	17.0
Minto	Non-Distressed		Non-Distressed		22,134	63.7	40.0
Nenana	Distressed	Expanded Std.	Non-Distressed		19,597	67.7	34.0
Nikolai	Distressed	Surrogate Std.	Distressed	Surrogate Std.	9,204	85.1	43.2
Nulato	Distressed	Surrogate Std.	Distressed	Surrogate Std.	12,541	75.8	29.8

Rampart	Distressed	Surrogate Std.	Non-Distressed		20,645	78.3	26.1
Ruby	Distressed	Surrogate Std.	Distressed	Surrogate Std.	11,076	81.7	31.7
Shageluk	Distressed	Surrogate Std.	Non-Distressed		12,319	78.3	30.4
Stevens Village	Distressed	Surrogate Std.	Distressed	Surrogate Std.	9,900	83.3	26.7
Takotna	Distressed	Surrogate Std.	Distressed	Surrogate Std.	15,782	77.1	48.6
Tanana	Distressed	Surrogate Std.	Non-Distressed		14,015	70.6	23.7
Venetie	Distressed	Surrogate Std.	Distressed	Surrogate Std.	8,878	84.6	20.6
Wiseman	Distressed	Surrogate Std.	Distressed	Expanded Std.	14,374	76.9	0.0

Notes:

1. *Cells marked with – were not able to be disclosed due to confidentiality policies*
2. *Source: Alaska Department of Labor and Workforce Development, Research and Analysis Section; and Commercial Fisheries Entry Commission*
3. *Rose shaded = status has declined since 2016*
4. *Green shaded = status has improved since 2016*

Distressed Community Status

Alphabetical List

	2017		2016		Data Used to Determine 2017 Status		
Community	**Status**	**Qualification Method**	**Status**	**Qualification Method**	**Average Earnings in 2016**	**% With Earnings Less Than $20,280**	**% Employed All Four Quarters**
Adak	Non-Distressed		Non-Distressed		31,520	54.7	47.2
Akhiok	Non-Distressed		Distressed	Surrogate Std.	22,066	69.5	44.1
Akiachak	Distressed	Surrogate Std.	Distressed	Surrogate Std.	10,624	81.0	31.0
Akiak	Distressed	Surrogate Std.	Distressed	Surrogate Std.	9,340	87.1	34.6
Akutan	Non-Distressed		Non-Distressed		34,372	20.1	77.7
Alakanuk	Distressed	Surrogate Std.	Distressed	Surrogate Std.	11,616	81.7	29.2
Alatna	Non-Distressed		Distressed	Surrogate Std.	12,182	63.6	36.4
Alcan Border	Distressed	Surrogate Std.	Distressed	Surrogate Std.	--	93.8	6.3
Aleknagik	Distressed	Surrogate Std.	Distressed	Expanded Std.	19,378	72.2	31.5
Aleneva	Distressed	Surrogate Std.	Distressed	Surrogate Std.	0	100.0	0.0
Alexander Creek	Distressed	Surrogate Std.	Distressed	Surrogate Std.	--	100.0	0.0
Allakaket	Distressed	Surrogate Std.	Distressed	Surrogate Std.	9,655	83.6	27.9
Ambler	Distressed	Surrogate Std.	Non-Distressed		19,772	63.4	28.5
Anaktuvuk Pass	Distressed	Surrogate Std.	Non-Distressed		18,202	71.5	35.0
Anchor Point	Distressed	Surrogate Std.	Distressed	Expanded Std.	18,835	72.3	26.8
Anchorage	Non-Distressed		Non-Distressed		29,238	56.7	44.9
Anderson	Non-Distressed		Non-Distressed		28,147	64.0	35.4
Angoon	Distressed	Surrogate Std.	Distressed	Surrogate Std.	12,274	80.8	28.4
Aniak	Distressed	Expanded Std.	Non-Distressed		19,195	67.3	41.8
Anvik	Distressed	Surrogate Std.	Distressed	Surrogate Std.	15,582	78.2	47.3
Arctic	Distressed	Surrogate Std.	Distressed	Surrogate Std.	11,574	82.1	26.8
Atka	Non-Distressed		Non-Distressed		29,147	63.6	54.5
Atmautluak	Distressed	Surrogate Std.	Distressed	Surrogate Std.	9,046	88.9	18.3
Atqasuk	Non-Distressed		Non-Distressed		24,565	54.9	49.3
Badger	Non-Distressed		Non-Distressed		25,157	59.6	41.1
Bear Creek	Non-Distressed		Non-Distressed		23,823	58.5	41.6
Beaver	Distressed	Surrogate Std.	Distressed	Surrogate Std.	8,583	87.5	18.8
Beluga	Distressed	Surrogate Std.	Distressed	Surrogate Std.	--	84.6	15.4
Bethel	Non-Distressed		Non-Distressed		32,299	50.5	48.5
Bettles	Non-Distressed		Non-Distressed		38,695	47.1	52.9
Big Delta	Distressed	Surrogate Std.	Distressed	Surrogate Std.	15,243	76.7	24.5
Big Lake	Distressed	Expanded Std.	Non-Distressed		21,130	69.1	31.4

Distressed Community Status

Alphabetical List

Community	2017 Status	2017 Qualification Method	2016 Status	2016 Qualification Method	Average Earnings in 2016	% With Earnings Less Than $20,280	% Employed All Four Quarters
Birch Creek	Distressed	Surrogate Std.	Distressed	Surrogate Std.	7,758	83.3	22.2
Brevig Mission	Distressed	Surrogate Std.	Distressed	Surrogate Std.	10,931	79.3	25.2
Buckland	Distressed	Surrogate Std.	Distressed	Surrogate Std.	12,493	75.3	27.2
Buffalo Soapstone	Non-Distressed		Non-Distressed		24,561	64.7	36.5
Butte	Non-Distressed		Non-Distressed		23,061	65.0	34.8
Cantwell	Distressed	Surrogate Std.	Non-Distressed		19,671	72.1	28.5
Central	Distressed	Surrogate Std.	Distressed	Surrogate Std.	5,699	90.9	8.0
Chalkyitsik	Distressed	Surrogate Std.	Distressed	Surrogate Std.	13,177	77.8	50.0
Chase	Distressed	Surrogate Std.	Distressed	Expanded Std.	18,891	74.4	15.4
Chefornak	Distressed	Surrogate Std.	Distressed	Surrogate Std.	10,710	83.7	36.7
Chena Ridge	Non-Distressed		Non-Distressed		33,607	53.3	46.1
Chenega	Distressed	Surrogate Std.	Distressed	Surrogate Std.	12,385	81.3	40.6
Chevak	Distressed	Surrogate Std.	Distressed	Surrogate Std.	9,765	84.2	26.2
Chickaloon	Distressed	Surrogate Std.	Distressed	Expanded Std.	19,806	68.9	27.8
Chicken	Distressed	Surrogate Std.	Distressed	Surrogate Std.	51,527	93.3	6.7
Chignik	Non-Distressed		Non-Distressed		49,728	69.2	48.1
Chignik Lagoon	Non-Distressed		Non-Distressed		155,120	79.0	35.5
Chignik Lake	Distressed	Surrogate Std.	Distressed	Surrogate Std.	19,115	78.5	35.4
Chiniak	Distressed	Expanded Std.	Distressed	Surrogate Std.	23,694	73.3	30.0
Chisana	Distressed	Surrogate Std.	Distressed	Surrogate Std.	0	100.0	0.0
Chistochina	Distressed	Surrogate Std.	Non-Distressed		20,209	70.3	37.5
Chitina	Distressed	Surrogate Std.	Distressed	Surrogate Std.	9,456	88.1	16.4
Chuathbaluk	Distressed	Surrogate Std.	Distressed	Surrogate Std.	10,679	77.1	35.7
Circle	Distressed	Surrogate Std.	Distressed	Surrogate Std.	8,728	87.8	25.7
Clam Gulch	Distressed	Expanded Std.	Distressed	Expanded Std.	29,222	68.3	26.8
Clark's Point	Distressed	Surrogate Std.	Distressed	Surrogate Std.	13,010	90.5	19.0
Coffman Cove	Distressed	Surrogate Std.	Distressed	Surrogate Std.	14,926	80.8	31.4
Cohoe	Distressed	Surrogate Std.	Distressed	Expanded Std.	17,459	72.4	28.8
Cold Bay	Non-Distressed		Non-Distressed		29,485	62.9	40.0
Coldfoot	Non-Distressed		Non-Distressed		22,270	57.1	57.1
College	Non-Distressed		Non-Distressed		28,254	56.9	44.4
Cooper Landing	Distressed	Surrogate Std.	Distressed	Surrogate Std.	14,650	75.8	19.0
Copper Center	Distressed	Surrogate Std.	Non-Distressed		20,223	74.7	22.9
Cordova	Non-Distressed		Non-Distressed		53,338	65.8	34.4
Covenant Life	Distressed	Expanded Std.	Distressed	Expanded Std.	16,384	67.6	39.7
Craig City	Non-Distressed		Non-Distressed		34,064	64.8	38.8
Crooked Creek	Distressed	Surrogate Std.	Distressed	Surrogate Std.	7,512	89.2	18.9
Crown Point	Distressed	Surrogate Std.	Distressed	Surrogate Std.	14,980	73.9	28.3
Deering	Non-Distressed		Non-Distressed		18,897	57.5	41.4
Delta Junction	Distressed	Expanded Std.	Non-Distressed		23,121	69.1	30.8
Deltana	Distressed	Surrogate Std.	Distressed	Expanded Std.	18,148	71.9	27.1
Diamond Ridge	Distressed	Expanded Std.	Non-Distressed		19,589	69.4	31.0
Dillingham	Non-Distressed		Non-Distressed		36,589	51.8	47.4
Diomede	Distressed	Expanded Std.	Distressed	Surrogate Std.	16,711	68.6	43.1
Dot Lake	Distressed	Surrogate Std.	Distressed	Surrogate Std.	8,342	89.7	17.2
Dot Lake Village	Distressed	Surrogate Std.	Distressed	Surrogate Std.	5,747	91.7	12.5
Dry Creek	Distressed	Surrogate Std.	Distressed	Surrogate Std.	5,129	89.6	14.9
Eagle	Distressed	Surrogate Std.	Distressed	Surrogate Std.	10,349	80.0	28.6
Eagle Village	Distressed	Surrogate Std.	Distressed	Surrogate Std.	7,265	86.5	25.0

Distressed Community Status

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Community	2017 Status	2017 Qualification Method	2016 Status	2016 Qualification Method	Data Used to Determine 2017 Status: Average Earnings in 2016	% With Earnings Less Than $20,280	% Employed All Four Quarters
Edna Bay	Distressed	Surrogate Std.	Distressed	Surrogate Std.	15,981	82.1	17.9
Eek	Distressed	Surrogate Std.	Distressed	Surrogate Std.	14,392	75.1	32.3
Egegik	Non-Distressed		Non-Distressed		35,832	61.4	47.7
Eielson AFB	Distressed	Surrogate Std.	Distressed	Surrogate Std.	3,618	93.7	8.3
Ekwok	Distressed	Surrogate Std.	Distressed	Surrogate Std.	11,740	81.1	35.1
Elfin Cove	Distressed	Surrogate Std.	Distressed	Surrogate Std.	63,086	96.2	11.5
Elim	Distressed	Surrogate Std.	Distressed	Surrogate Std.	13,402	75.9	35.8
Emmonak	Distressed	Surrogate Std.	Distressed	Surrogate Std.	15,432	74.0	33.7
Ester	Non-Distressed		Non-Distressed		26,493	58.2	43.5
Eureka Roadhouse	Distressed	Surrogate Std.	Distressed	Surrogate Std.	14,707	72.7	30.3
Evansville	Non-Distressed		*not evaluated*		--	50.0	50.0
Excursion Inlet	Distressed	Surrogate Std.	Distressed	Surrogate Std.	--	93.3	20.0
Fairbanks	Non-Distressed		Non-Distressed		22,277	61.9	40.4
False Pass	Non-Distressed		Non-Distressed		60,102	71.4	42.9
Farm Loop	Non-Distressed		Non-Distressed		25,067	63.8	39.2
Farmers Loop	Non-Distressed		Non-Distressed		30,789	55.2	44.2
Ferry	Distressed	Surrogate Std.	Distressed	Surrogate Std.	17,274	81.0	19.0
Fishhook	Non-Distressed		Non-Distressed		29,802	58.2	42.2
Fort Greely	Distressed	Surrogate Std.	Distressed	Surrogate Std.	13,080	82.2	17.8
Fort Yukon	Distressed	Surrogate Std.	Non-Distressed		16,874	67.1	28.5
Four Mile Road	Non-Distressed		Non-Distressed		30,029	52.0	40.0
Fox	Non-Distressed		Non-Distressed		25,418	56.2	37.9
Fox River	Distressed	Surrogate Std.	Distressed	Surrogate Std.	4,615	91.3	14.5
Fritz Creek	Distressed	Surrogate Std.	Non-Distressed		19,586	72.3	28.9
Funny River	Distressed	Surrogate Std.	Distressed	Surrogate Std.	19,852	73.2	28.4
Gakona	Distressed	Expanded Std.	Distressed	Expanded Std.	22,535	69.6	25.0
Galena	Non-Distressed		Non-Distressed		24,001	55.6	46.5
Gambell	Distressed	Surrogate Std.	Distressed	Surrogate Std.	8,540	85.1	20.8
Game Creek	Distressed	Surrogate Std.	Distressed	Surrogate Std.	--	91.7	8.3
Gateway	Non-Distressed		Non-Distressed		30,289	58.5	42.1
Glacier View	Distressed	Surrogate Std.	Distressed	Surrogate Std.	12,240	81.7	18.8
Glennallen	Non-Distressed		Non-Distressed		23,683	63.4	36.9
Goldstream	Non-Distressed		Non-Distressed		28,151	56.4	43.5
Golovin	Non-Distressed		Non-Distressed		21,551	59.6	45.6
Goodnews Bay	Distressed	Surrogate Std.	Distressed	Surrogate Std.	13,262	81.5	30.9
Grayling	Distressed	Surrogate Std.	Distressed	Surrogate Std.	9,757	84.7	40.3
Gulkana	Distressed	Surrogate Std.	Non-Distressed		16,407	70.4	21.0
Gustavus	Distressed	Surrogate Std.	Distressed	Surrogate Std.	12,271	85.6	21.2
Haines	Distressed	Expanded Std.	Distressed	Expanded Std.	21,362	71.4	31.9
Halibut Cove	Distressed	Surrogate Std.	Distressed	Surrogate Std.	27,823	87.5	10.0
Happy Valley	Distressed	Surrogate Std.	Distressed	Surrogate Std.	11,551	82.8	20.0
Harding-Birch Lakes	Distressed	Surrogate Std.	Distressed	Expanded Std.	18,493	73.8	28.9
Healy	Non-Distressed		Non-Distressed		28,796	60.7	38.9
Healy Lake	Non-Distressed		Distressed	Surrogate Std.	15,438	63.6	36.4
Hobart Bay	Non-Distressed		*not evaluated*		--	0.0	100.0
Hollis	Non-Distressed		Non-Distressed		20,608	65.3	36.3
Holy Cross	Distressed	Surrogate Std.	Distressed	Surrogate Std.	14,246	73.8	32.0
Homer	Distressed	Expanded Std.	Distressed	Expanded Std.	37,844	70.6	31.2
Hoonah	Distressed	Surrogate Std.	Distressed	Expanded Std.	20,582	73.0	29.6

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Community	2017 Status	2017 Qualification Method	2016 Status	2016 Qualification Method	Average Earnings in 2016	% With Earnings Less Than $20,280	% Employed All Four Quarters
Hooper Bay	Distressed	Surrogate Std.	Distressed	Surrogate Std.	11,405	80.6	28.5
Hope	Distressed	Surrogate Std.	Distressed	Surrogate Std.	12,274	77.7	20.0
Houston	Distressed	Expanded Std.	Non-Distressed		18,121	68.4	32.6
Hughes	Distressed	Surrogate Std.	Distressed	Surrogate Std.	11,367	78.6	45.7
Huslia	Distressed	Surrogate Std.	Distressed	Surrogate Std.	11,664	78.0	30.0
Hydaburg	Distressed	Surrogate Std.	Distressed	Surrogate Std.	22,880	76.4	25.6
Hyder	Distressed	Surrogate Std.	Distressed	Surrogate Std.	2,295	98.3	12.1
Igiugig	Non-Distressed		Non-Distressed		27,128	57.5	55.0
Iliamna	Non-Distressed		Non-Distressed		26,080	61.2	43.2
Ivanof Bay	Distressed	Surrogate Std.	*not evaluated*		0	100.0	0.0
Juneau	Non-Distressed		Non-Distressed		28,834	54.8	46.6
Kachemak	Distressed	Surrogate Std.	Distressed	Expanded Std.	19,391	71.6	27.6
Kake	Distressed	Surrogate Std.	Distressed	Surrogate Std.	18,371	74.2	34.9
Kaktovik	Non-Distressed		Non-Distressed		28,984	51.8	51.8
Kalifornsky	Non-Distressed		Non-Distressed		29,011	59.8	40.1
Kaltag	Distressed	Surrogate Std.	Distressed	Surrogate Std.	13,506	79.7	25.6
Karluk	Distressed	Surrogate Std.	Non-Distressed		19,749	63.2	26.3
Kasaan	Non-Distressed		Non-Distressed		24,420	62.2	51.1
Kasigluk	Distressed	Surrogate Std.	Distressed	Surrogate Std.	11,100	83.2	30.0
Kasilof	Non-Distressed		Non-Distressed		34,508	66.8	33.9
Kenai	Non-Distressed		Non-Distressed		27,192	62.0	41.7
Kenny Lake	Distressed	Surrogate Std.	Distressed	Surrogate Std.	14,253	79.8	20.6
Ketchikan	Non-Distressed		Non-Distressed		26,608	59.2	44.7
Kiana	Distressed	Surrogate Std.	Distressed	Surrogate Std.	15,055	76.7	19.3
King Cove	Non-Distressed		Non-Distressed		43,109	66.8	38.3
King Salmon	Non-Distressed		Non-Distressed		34,938	56.5	38.7
Kipnuk	Distressed	Surrogate Std.	Distressed	Surrogate Std.	10,014	83.5	25.7
Kivalina	Distressed	Surrogate Std.	Distressed	Surrogate Std.	11,531	77.2	28.1
Klawock	Non-Distressed		Non-Distressed		24,269	65.1	38.8
Klukwan	Distressed	Surrogate Std.	Distressed	Surrogate Std.	11,339	74.0	39.0
Knik River	Non-Distressed		Non-Distressed		27,703	58.7	41.5
Knik-Fairview	Non-Distressed		Non-Distressed		22,697	61.0	39.2
Kobuk	Distressed	Surrogate Std.	Distressed	Surrogate Std.	10,628	80.7	30.7
Kodiak	Non-Distressed		Non-Distressed		48,998	60.0	51.0
Kodiak Station	Distressed	Surrogate Std.	Distressed	Surrogate Std.	9,610	83.8	18.0
Kokhanok	Distressed	Surrogate Std.	Distressed	Surrogate Std.	14,056	84.4	36.7
Koliganek	Distressed	Surrogate Std.	Non-Distressed		14,812	82.7	30.8
Kongiganak	Distressed	Surrogate Std.	Distressed	Surrogate Std.	12,236	77.5	39.2
Kotlik	Distressed	Surrogate Std.	Distressed	Surrogate Std.	11,059	81.0	27.3
Kotzebue	Non-Distressed		Non-Distressed		25,575	58.0	28.0
Koyuk	Distressed	Surrogate Std.	Distressed	Surrogate Std.	13,463	75.9	36.9
Koyukuk	Distressed	Surrogate Std.	Distressed	Surrogate Std.	11,079	82.2	34.2
Kupreanof	Distressed	Surrogate Std.	Distressed	Surrogate Std.	--	89.5	5.3
Kwethluk	Distressed	Surrogate Std.	Distressed	Surrogate Std.	10,556	81.9	27.4
Kwigillingok	Distressed	Surrogate Std.	Distressed	Surrogate Std.	10,690	80.9	36.4
Lake Louise	Distressed	Surrogate Std.	Distressed	Surrogate Std.	6,739	90.0	2.5
Lake Minchumina	Distressed	Surrogate Std.	Distressed	Surrogate Std.	--	92.3	7.7
Lakes	Non-Distressed		Non-Distressed		27,223	60.8	40.8
Larsen Bay	Distressed	Surrogate Std.	Non-Distressed		23,954	73.7	19.3

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Lazy Mountain	Non-Distressed		Non-Distressed		21,578	67.4	34.4
Levelock	Distressed	Surrogate Std.	Distressed	Surrogate Std.	15,900	77.4	34.0
Lime	Distressed	Surrogate Std.	Distressed	Surrogate Std.	1,749	100.0	5.3
Livengood	Distressed	Surrogate Std.	Distressed	Surrogate Std.	12,310	83.9	12.9
Loring	Distressed	Surrogate Std.	Distressed	Surrogate Std.	--	100.0	0.0
Lowell Point	Non-Distressed		Non-Distressed		25,326	54.3	52.2
Lower Kalskag	Distressed	Surrogate Std.	Distressed	Surrogate Std.	6,869	88.4	32.6
Lutak	Distressed	Surrogate Std.	Distressed	Surrogate Std.	9,958	73.9	13.0
Manley Hot Springs	Distressed	Surrogate Std.	Distressed	Surrogate Std.	22,868	63.4	38.4
Manokotak	Distressed	Surrogate Std.	Distressed	Surrogate Std.	12,955	84.2	33.3
Marshall	Distressed	Surrogate Std.	Distressed	Surrogate Std.	9,554	85.4	23.3
McCarthy	Distressed	Surrogate Std.	Distressed	Surrogate Std.	8,284	85.7	6.5
McGrath	Non-Distressed		Non-Distressed		14,598	78.6	17.0
McKinley Park	Distressed	Surrogate Std.	Distressed	Surrogate Std.	15,898	68.9	22.8
Meadow Lakes	Non-Distressed		Non-Distressed		22,748	64.8	36.4
Mekoryuk	Distressed	Surrogate Std.	Distressed	Surrogate Std.	13,867	77.3	42.9
Mendeltna	Distressed	Surrogate Std.	Distressed	Expanded Std.	17,404	76.2	19.0
Mentasta Lake	Distressed	Surrogate Std.	Distressed	Surrogate Std.	8,985	88.2	15.1
Metlakatla	Distressed	Surrogate Std.	Non-Distressed		16,885	72.1	17.7
Minto	Non-Distressed		Non-Distressed		22,134	63.7	40.0
Moose Creek	Distressed	Expanded Std.	Non-Distressed		16,498	69.2	34.1
Moose Pass	Distressed	Surrogate Std.	Distressed	Surrogate Std.	19,361	73.5	28.2
Mosquito Lake	Distressed	Surrogate Std.	Distressed	Surrogate Std.	13,106	81.1	20.5
Mountain Village	Distressed	Surrogate Std.	Distressed	Surrogate Std.	13,610	78.2	32.3
Mud Bay	Distressed	Surrogate Std.	Distressed	Surrogate Std.	14,306	75.8	24.2
Nabensa	Distressed	Surrogate Std.	Distressed	Surrogate Std.	0	100.0	0.0
Naknek	Non-Distressed		Non-Distressed		32,789	64.7	33.4
Nanwalek	Distressed	Surrogate Std.	Distressed	Surrogate Std.	13,340	75.8	42.5
Napakiak	Distressed	Surrogate Std.	Distressed	Surrogate Std.	8,849	84.8	32.0
Napaskiak	Distressed	Surrogate Std.	Distressed	Surrogate Std.	13,227	76.7	34.7
Naukati Bay	Distressed	Surrogate Std.	Distressed	Surrogate Std.	11,384	83.3	20.6
Nelchina	Distressed	Expanded Std.	Non-Distressed		23,673	70.0	26.7
Nelson Lagoon	Distressed	Surrogate Std.	Non-Distressed		36,974	82.1	20.5
Nenana	Distressed	Expanded Std.	Non-Distressed		19,597	67.7	34.0
New Stuyahok	Distressed	Surrogate Std.	Distressed	Surrogate Std.	9,402	84.9	32.8
Newhalen	Non-Distressed		Non-Distressed		23,690	65.5	34.5
Newtok	Distressed	Surrogate Std.	Distressed	Surrogate Std.	10,031	84.5	35.0
Nightmute	Distressed	Surrogate Std.	Distressed	Surrogate Std.	10,534	82.8	28.0
Nikiski	Non-Distressed		Non-Distressed		23,830	67.4	33.9
Nikolaevsk	Distressed	Expanded Std.	Distressed	Surrogate Std.	20,876	75.4	30.2
Nikolai	Distressed	Surrogate Std.	Distressed	Surrogate Std.	9,204	85.1	43.2
Nikolski	Distressed	Expanded Std.	Non-Distressed		18,672	69.2	61.5
Ninilchik	Distressed	Surrogate Std.	Distressed	Surrogate Std.	17,002	77.4	20.6
Noatak	Distressed	Surrogate Std.	Distressed	Expanded Std.	15,886	74.1	32.1
Nome	Non-Distressed		Non-Distressed		35,756	49.9	49.1
Nondalton	Distressed	Surrogate Std.	Distressed	Surrogate Std.	9,476	82.9	31.8
Noorvik	Distressed	Surrogate Std.	Distressed	Surrogate Std.	12,631	77.5	25.6
North Pole	Non-Distressed		Non-Distressed		23,068	62.0	40.1
Northway	Distressed	Surrogate Std.	Non-Distressed		15,034	71.0	33.3

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Community	2017 Status	2017 Qualification Method	2016 Status	2016 Qualification Method	Average Earnings in 2016	% With Earnings Less Than $20,280	% Employed All Four Quarters
Northway Junction	Distressed	Surrogate Std.	Distressed	Surrogate Std.	11,523	82.1	30.8
Northway Village	Distressed	Surrogate Std.	Distressed	Surrogate Std.	5,357	85.7	18.4
Nuiqsut	Non-Distressed		Non-Distressed		22,106	63.0	31.5
Nulato	Distressed	Surrogate Std.	Distressed	Surrogate Std.	12,541	75.8	29.8
Nunam Iqua	Distressed	Surrogate Std.	Distressed	Surrogate Std.	10,705	82.3	37.9
Nunapitchuk	Distressed	Surrogate Std.	Distressed	Surrogate Std.	10,195	84.7	39.1
Old Harbor	Distressed	Surrogate Std.	Distressed	Surrogate Std.	26,640	83.3	22.0
Oscarville	Non-Distressed		Non-Distressed		16,920	64.0	44.0
Ouzinkie	Distressed	Surrogate Std.	Non-Distressed		19,429	76.8	34.8
Palmer	Non-Distressed		Non-Distressed		21,856	63.3	39.6
Paxson	Non-Distressed		Non-Distressed		--	66.7	33.3
Pedro Bay	Non-Distressed		Non-Distressed		28,107	61.5	57.7
Pelican	Distressed	Surrogate Std.	Distressed	Surrogate Std.	24,138	82.9	25.0
Perryville	Distressed	Surrogate Std.	Distressed	Surrogate Std.	31,389	82.9	29.3
Petersburg	Distressed	Expanded Std.	Distressed	Surrogate Std.	46,677	70.8	32.5
Petersville	Non-Distressed		Non-Distressed		--	55.6	44.4
Pilot Point	Distressed	Surrogate Std.	Distressed	Expanded Std.	20,179	70.5	38.6
Pilot Station	Distressed	Surrogate Std.	Distressed	Surrogate Std.	10,874	82.1	30.5
Pitkas Point	Distressed	Surrogate Std.	Distressed	Surrogate Std.	6,570	91.4	20.0
Platinum	Distressed	Surrogate Std.	Distressed	Surrogate Std.	19,104	69.7	27.3
Pleasant Valley	Non-Distressed		Non-Distressed		22,296	65.4	34.0
Point Baker	Distressed	Surrogate Std.	Distressed	Surrogate Std.	26,033	100.0	8.3
Point Hope	Distressed	Surrogate Std.	Non-Distressed		17,445	72.0	31.3
Point Lay	Non-Distressed		Non-Distressed		25,060	58.5	44.4
Point MacKenzie	Distressed	Surrogate Std.	Distressed	Surrogate Std.	14,370	83.1	17.6
Pope-Vannoy Landing	Distressed	Surrogate Std.	Distressed	Surrogate Std.	--	75.0	25.0
Port Alexander	Distressed	Surrogate Std.	Distressed	Surrogate Std.	26,410	89.7	10.3
Port Alsworth	Distressed	Surrogate Std.	Distressed	Expanded Std.	18,782	71.3	34.1
Port Graham	Distressed	Surrogate Std.	Non-Distressed		15,415	74.2	44.3
Port Heiden	Non-Distressed		Non-Distressed		33,040	55.9	48.5
Port Lions	Distressed	Surrogate Std.	Distressed	Surrogate Std.	23,310	81.0	28.9
Port Protection	Distressed	Surrogate Std.	Distressed	Surrogate Std.	4,783	94.1	9.8
Portage Creek	Distressed	Surrogate Std.	Distressed	Surrogate Std.	0	100.0	0.0
Primrose	Distressed	Expanded Std.	Non-Distressed		18,550	65.7	31.4
Prudhoe Bay	Non-Distressed		Non-Distressed		68,973	16.7	75.0
Quinhagak	Distressed	Surrogate Std.	Distressed	Surrogate Std.	10,402	82.1	27.8
Rampart	Distressed	Surrogate Std.	Non-Distressed		20,645	78.3	26.1
Red Devil	Distressed	Surrogate Std.	Distressed	Surrogate Std.	1,982	100.0	17.6
Ridgeway	Non-Distressed		Non-Distressed		26,774	63.2	38.2
Ruby	Distressed	Surrogate Std.	Distressed	Surrogate Std.	11,076	81.7	31.7
Russian Mission	Distressed	Surrogate Std.	Distressed	Surrogate Std.	9,451	84.7	30.1
Salamatof	Distressed	Surrogate Std.	Distressed	Surrogate Std.	19,906	70.9	29.7
Salcha	Distressed	Surrogate Std.	Distressed	Expanded Std.	17,969	70.4	29.8
Sand Point	Non-Distressed		Non-Distressed		57,785	63.9	37.0
Savoonga	Distressed	Surrogate Std.	Distressed	Surrogate Std.	12,296	80.1	38.2
Saxman	Distressed	Expanded Std.	Distressed	Expanded Std.	17,823	69.4	34.2
Scammon Bay	Distressed	Surrogate Std.	Distressed	Surrogate Std.	10,994	78.5	28.8
Selawik	Distressed	Surrogate Std.	Distressed	Surrogate Std.	8,763	83.0	12.8
Seldovia	Distressed	Surrogate Std.	Distressed	Surrogate Std.	23,561	86.1	19.3

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Seldovia Village	Distressed	Surrogate Std.	Distressed	Surrogate Std.	17,855	71.3	31.5
Seward	Non-Distressed		Non-Distressed		28,396	63.5	36.0
Shageluk	Distressed	Surrogate Std.	Non-Distressed		12,319	78.3	30.4
Shaktoolik	Distressed	Surrogate Std.	Non-Distressed		9,242	83.9	26.6
Shishmaref	Distressed	Surrogate Std.	Distressed	Surrogate Std.	19,025	70.2	38.5
Shungnak	Distressed	Surrogate Std.	Distressed	Surrogate Std.	12,804	76.4	24.7
Silver Springs	Distressed	Expanded Std.	Non-Distressed		20,004	68.4	32.1
Sitka	Non-Distressed		Non-Distressed		29,789	61.5	41.2
Skagway	Non-Distressed		Non-Distressed		22,394	60.1	37.3
Skwentna	Distressed	Surrogate Std.	Distressed	Surrogate Std.	6,938	90.0	3.3
Slana	Distressed	Surrogate Std.	Distressed	Surrogate Std.	8,510	88.4	17.4
Sleetmute	Distressed	Surrogate Std.	Distressed	Surrogate Std.	5,326	91.8	17.8
Soldotna	Non-Distressed		Non-Distressed		27,628	63.4	38.8
South Naknek	Distressed	Surrogate Std.	Distressed	Expanded Std.	20,468	77.8	24.4
South Van Horn	Non-Distressed		Non-Distressed		18,927	64.5	35.2
St. George	Non-Distressed		Non-Distressed		22,754	61.5	40.4
St. Mary's	Distressed	Surrogate Std.	Distressed	Expanded Std.	15,376	74.7	38.4
St. Michael	Distressed	Surrogate Std.	Distressed	Surrogate Std.	11,085	79.0	29.9
St. Paul	Non-Distressed		Non-Distressed		29,828	60.1	47.7
Stebbins	Distressed	Surrogate Std.	Distressed	Surrogate Std.	9,507	80.9	32.1
Steele Creek	Non-Distressed		Non-Distressed		30,750	56.0	43.9
Sterling	Non-Distressed		Non-Distressed		26,972	64.5	35.8
Stevens Village	Distressed	Surrogate Std.	Distressed	Surrogate Std.	9,900	83.3	26.7
Stony River	Distressed	Surrogate Std.	Distressed	Surrogate Std.	7,639	91.7	37.5
Sunrise	Non-Distressed		Non-Distressed		27,415	50.0	41.7
Susitna North	Distressed	Surrogate Std.	Distressed	Surrogate Std.	14,346	76.4	26.3
Sutton-Alpine	Distressed	Expanded Std.	Non-Distressed		19,175	68.5	31.6
Takotna	Distressed	Surrogate Std.	Distressed	Surrogate Std.	15,782	77.1	48.6
Talkeetna	Distressed	Surrogate Std.	Non-Distressed		16,622	72.1	30.8
Tanacross	Distressed	Surrogate Std.	Distressed	Surrogate Std.	10,211	80.7	27.5
Tanaina	Non-Distressed		Non-Distressed		26,993	59.2	43.0
Tanana	Distressed	Surrogate Std.	Non-Distressed		14,015	70.6	23.7
Tatitlek	Distressed	Surrogate Std.	Distressed	Surrogate Std.	14,657	76.7	38.3
Tazlina	Non-Distressed		Non-Distressed		23,569	64.5	36.4
Teller	Distressed	Surrogate Std.	Distressed	Surrogate Std.	14,122	75.3	38.8
Tenakee Springs	Distressed	Surrogate Std.	Distressed	Surrogate Std.	13,659	90.1	18.8
Tetlin	Distressed	Surrogate Std.	Distressed	Surrogate Std.	10,866	83.6	31.5
Thorne Bay	Distressed	Surrogate Std.	Distressed	Surrogate Std.	14,486	76.4	25.4
Togiak	Distressed	Surrogate Std.	Distressed	Surrogate Std.	14,902	86.3	20.9
Tok	Distressed	Expanded Std.	Non-Distressed		17,842	69.3	32.2
Toksook Bay	Distressed	Surrogate Std.	Distressed	Surrogate Std.	13,106	80.1	39.1
Tolsona	Non-Distressed		Distressed	Surrogate Std.	34,588	55.6	33.3
Tonsina	Distressed	Surrogate Std.	Distressed	Surrogate Std.	4,243	92.4	7.6
Trapper Creek	Distressed	Surrogate Std.	Distressed	Surrogate Std.	10,852	83.5	20.0
Tuluksak	Distressed	Surrogate Std.	Distressed	Surrogate Std.	6,888	88.9	31.6
Tuntutuliak	Distressed	Surrogate Std.	Distressed	Surrogate Std.	11,556	81.1	34.1
Tununak	Distressed	Surrogate Std.	Distressed	Surrogate Std.	9,338	85.4	28.0
Twin Hills	Distressed	Surrogate Std.	Distressed	Surrogate Std.	11,786	78.2	36.4
Two Rivers	Non-Distressed		Non-Distressed		23,126	62.9	37.1

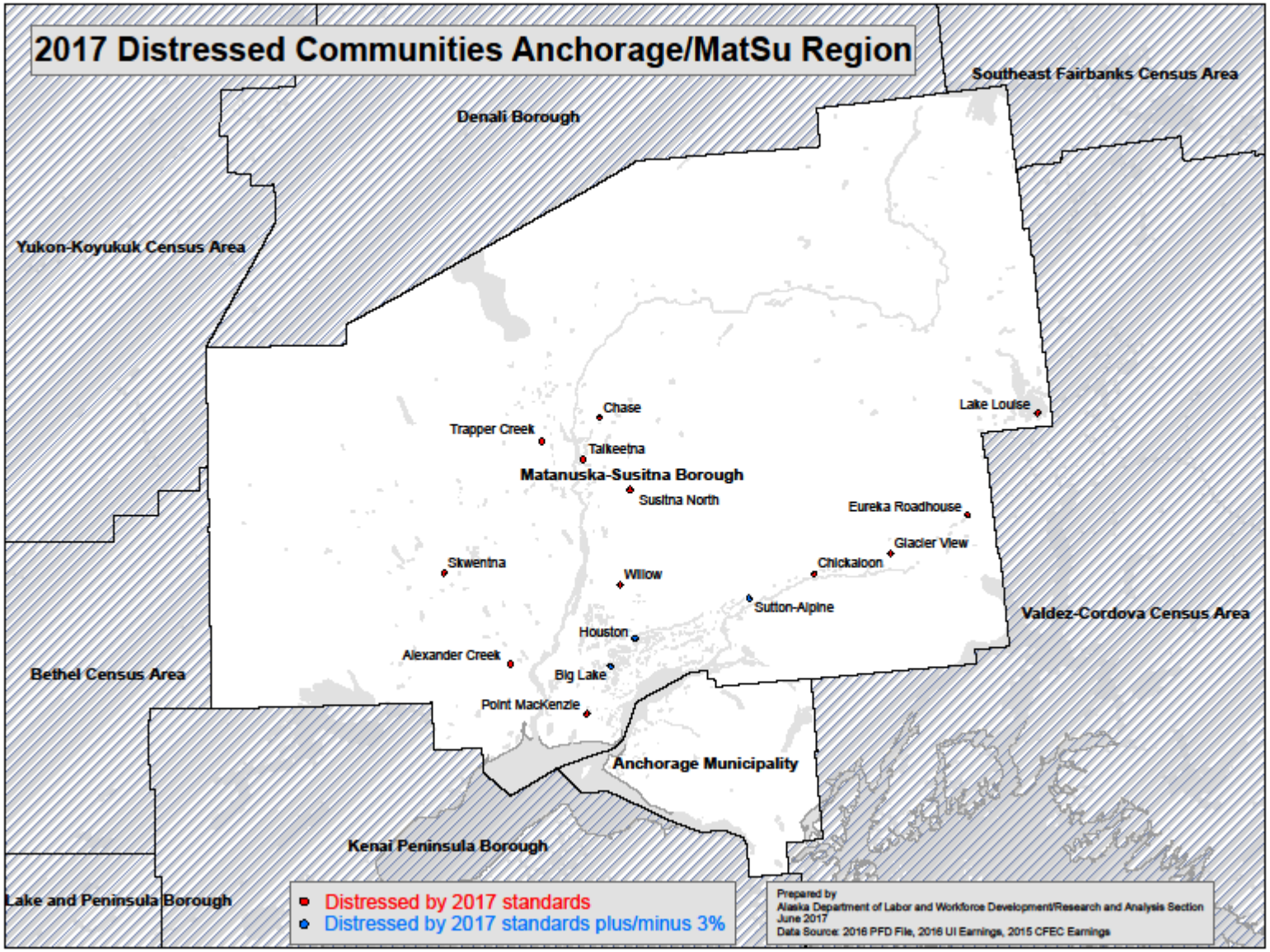
Distressed Community Status

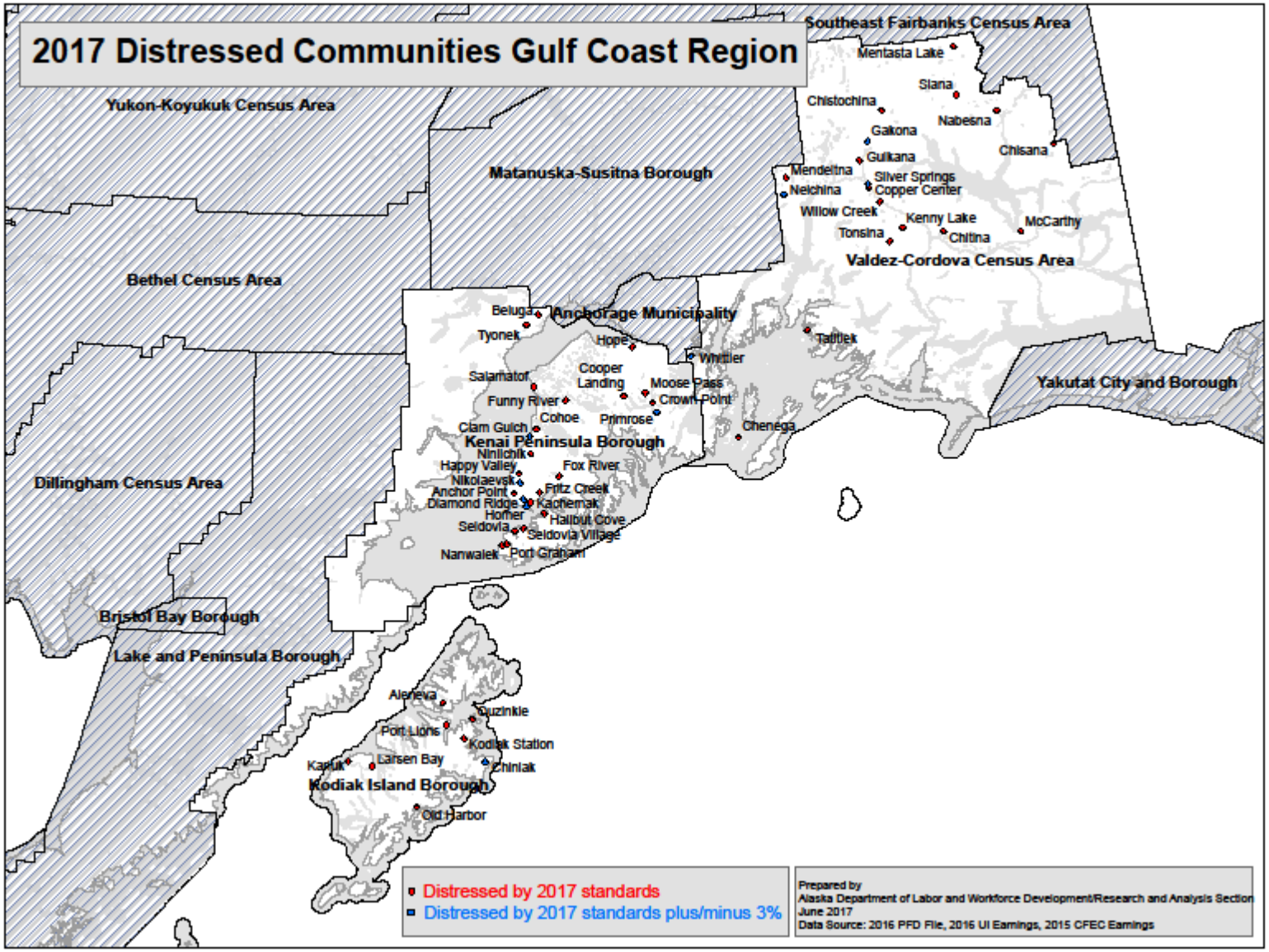
Alphabetical List

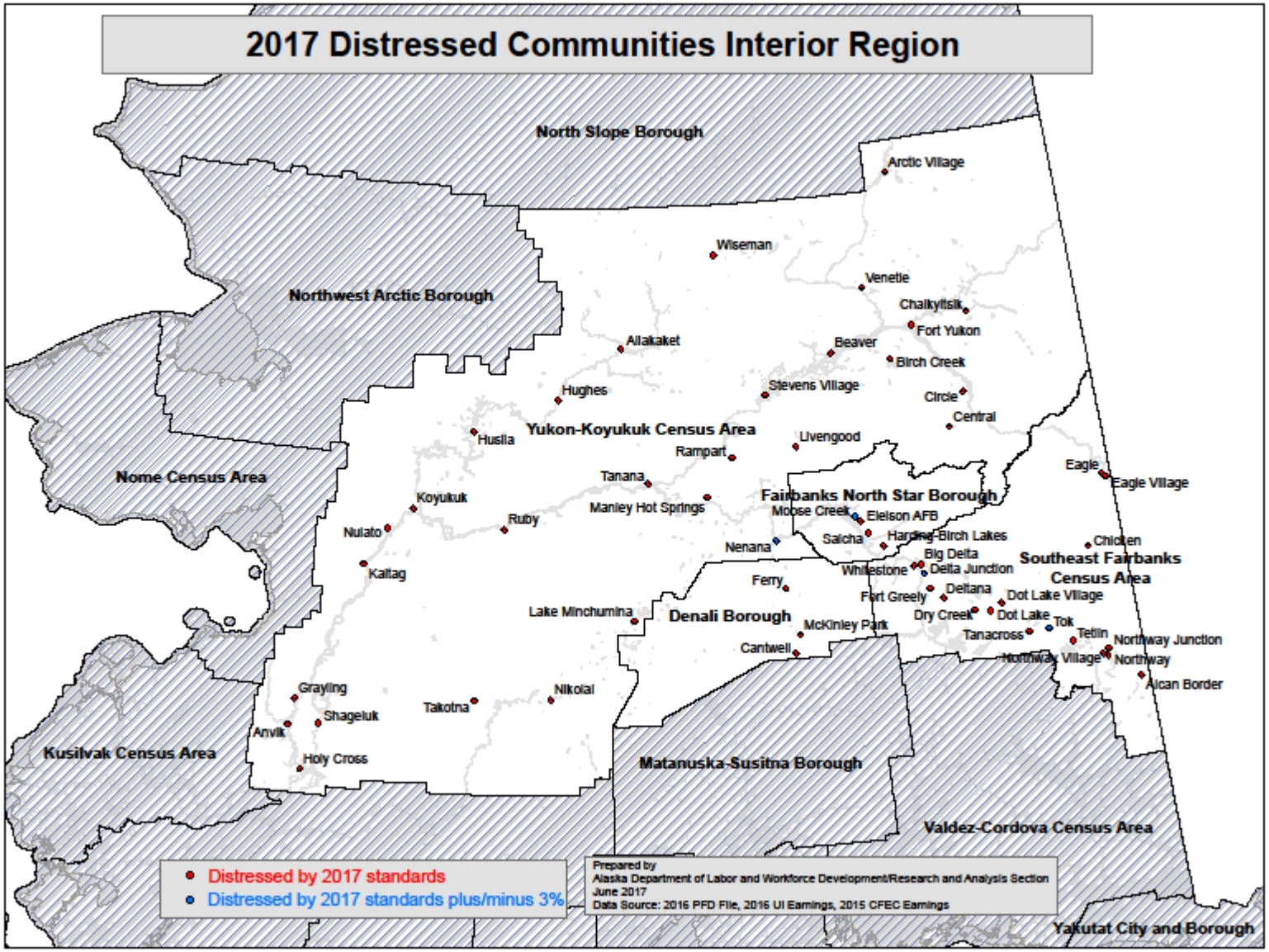
Community	2017		2016		Data Used to Determine 2017 Status		
	Status	Qualification Method	Status	Qualification Method	Average Earnings in 2016	% With Earnings Less Than $20,280	% Employed All Four Quarters
Tyonek	Distressed	Surrogate Std.	Distressed	Surrogate Std.	10,916	84.8	22.0
Ugashik	Distressed	Surrogate Std.	Non-Distressed		19,815	90.9	0.0
Unalakleet	Non-Distressed		Non-Distressed		24,104	63.1	39.4
Unalaska	Non-Distressed		Non-Distressed		48,382	38.2	62.9
Upper Kalskag	Distressed	Surrogate Std.	Distressed	Surrogate Std.	12,958	75.5	39.7
Utqiaġvik	Non-Distressed		Non-Distressed		39,374	47.0	49.8
Valdez	Non-Distressed		Non-Distressed		42,297	51.5	49.9
Venetie	Distressed	Surrogate Std.	Distressed	Surrogate Std.	8,878	84.6	20.6
Wainwright	Non-Distressed		Non-Distressed		19,655	65.8	36.9
Wales	Distressed	Surrogate Std.	Distressed	Surrogate Std.	15,188	72.9	51.0
Wasilla	Non-Distressed		Non-Distressed		25,393	63.7	38.0
Whale Pass	Distressed	Surrogate Std.	Distressed	Surrogate Std.	10,345	81.8	21.2
White Mountain	Distressed	Surrogate Std.	Distressed	Surrogate Std.	16,861	73.6	43.2
Whitestone	Distressed	Surrogate Std.	Distressed	Surrogate Std.	8,523	81.4	34.3
Whittier	Distressed	Expanded Std.	Non-Distressed		20,593	68.5	35.3
Willow	Distressed	Surrogate Std.	Distressed	Surrogate Std.	17,218	75.1	26.3
Willow Creek	Distressed	Surrogate Std.	Distressed	Surrogate Std.	12,686	77.2	20.6
Wiseman	Distressed	Surrogate Std.	Distressed	Expanded Std.	14,374	76.9	0.0
Womens Bay	Non-Distressed		Non-Distressed		24,083	64.3	37.8
Wrangell	Distressed	Expanded Std.	Distressed	Expanded Std.	24,650	70.4	31.6
Yakutat	Non-Distressed		Non-Distressed		32,073	63.1	38.5

Notes:

1. *Cells marked with – were not able to be disclosed due to confidentiality policies*
2. *Source: Alaska Department of Labor and Workforce Development, Research and Analysis Section; and Commercial Fisheries Entry Commission*
3. *Rose shaded = status has declined since 2016*
4. *Green shaded = status has improved since 2016*


2017 Distressed Communities Anchorage/MatSu Region
Southeast Fairbanks Census Area
Denali Borough
Yukon-Koyukuk Census Area
Chase
Lake Louise
Trapper Creek
Talkeetna
Matanuska-Susitna Borough
Susitna North
Eureka Roadhouse
Glacier View
Skwentna
Willow
Chickaloon
Sutton-Alpine
Valdez-Cordova Census Area
Houston
Alexander Creek
Big Lake
Bethel Census Area
Point MacKenzie
Anchorage Municipality
Kenai Peninsula Borough
Lake and Peninsula Borough
Distressed by 2017 standards
Distressed by 2017 standards plus/minus 3%
Prepared by
Alaska Department of Labor and Workforce Development/Research and Analysis Section
June 2017
Data Source: 2016 PFD File, 2016 UI Earnings, 2015 CFEC Earnings


2017 Distressed Communities Gulf Coast Region
Southeast Fairbanks Census Area
Mentasta Lake
Slana
Chistochina
Nabesna
Gakona
Chisana
Gulkana
Mendeltna
Silver Springs
Nelchina
Copper Center
Willow Creek
Kenny Lake
McCarthy
Tonsina
Chitina
Valdez-Cordova Census Area
Yukon-Koyukuk Census Area
Matanuska-Susitna Borough
Bethel Census Area
Beluga
Anchorage Municipality
Tyonek
Hope
Whittier
Tatitlek
Cooper Landing
Salamatof
Moose Pass
Funny River
Crown Point
Cohoe
Primrose
Clam Gulch
Chenega
Kenai Peninsula Borough
Ninilchik
Happy Valley
Fox River
Nikolaevsk
Anchor Point
Fritz Creek
Diamond Ridge
Kachemak
Homer
Halibut Cove
Seldovia
Seldovia Village
Nanwalek
Port Graham
Yakutat City and Borough
Dillingham Census Area
Bristol Bay Borough
Lake and Peninsula Borough
Akhiok
Ouzinkie
Port Lions
Kodiak Station
Karluk
Larsen Bay
Chiniak
Kodiak Island Borough
Old Harbor
Distressed by 2017 standards
Distressed by 2017 standards plus/minus 3%
Prepared by
Alaska Department of Labor and Workforce Development/Research and Analysis Section
June 2017
Data Source: 2016 PFD File, 2016 UI Earnings, 2015 CFEC Earnings


2017 Distressed Communities Interior Region
North Slope Borough
Northwest Arctic Borough
Nome Census Area
Kusilvak Census Area
Yukon-Koyukuk Census Area
Fairbanks North Star Borough
Southeast Fairbanks Census Area
Denali Borough
Matanuska-Susitna Borough
Valdez-Cordova Census Area
Yakutat City and Borough
Arctic Village
Wiseman
Venetie
Chalkyitsik
Fort Yukon
Allakaket
Beaver
Birch Creek
Hughes
Stevens Village
Circle
Central
Huslia
Livengood
Rampart
Tanana
Manley Hot Springs
Koyukuk
Ruby
Nulato
Kaltag
Nenana
Moose Creek
Eielson AFB
Salcha
Harding-Birch Lakes
Big Delta
Delta Junction
Whitestone
Ferry
Fort Greely
Deltana
Dot Lake Village
Dry Creek
Dot Lake
Tok
Tanacross
Tetlin
Northway Junction
Northway Village
Northway
Alcan Border
Eagle
Eagle Village
Chicken
Lake Minchumina
McKinley Park
Cantwell
Nikolai
Talkotna
Grayling
Shageluk
Anvik
Holy Cross
Distressed by 2017 standards
Distressed by 2017 standards plus/minus 3%
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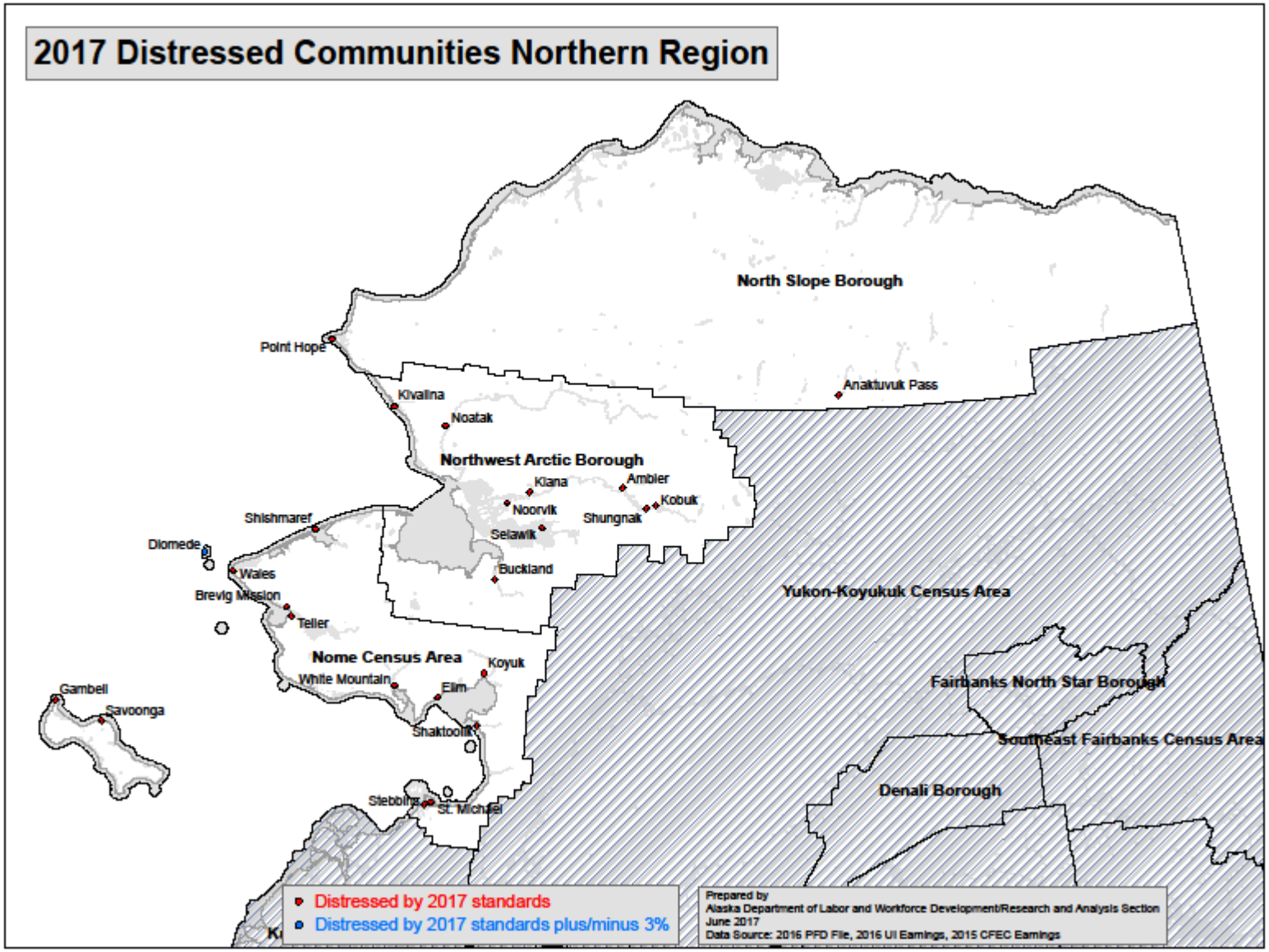
2017 Distressed Communities Northern Region
North Slope Borough
Point Hope
Kivalina
Noatak
Anaktuvuk Pass
Northwest Arctic Borough
Kiana
Ambler
Kobuk
Noorvik
Shungnak
Selawik
Buckland
Shishmaref
Diomede
Wales
Brevig Mission
Teller
Yukon-Koyukuk Census Area
Nome Census Area
Koyuk
White Mountain
Elim
Gambell
Savoonga
Shaktoolik
Fairbanks North Star Borough
Southeast Fairbanks Census Area
Denali Borough
Stebbins
St. Michael
Distressed by 2017 standards
Distressed by 2017 standards plus/minus 3%
Prepared by
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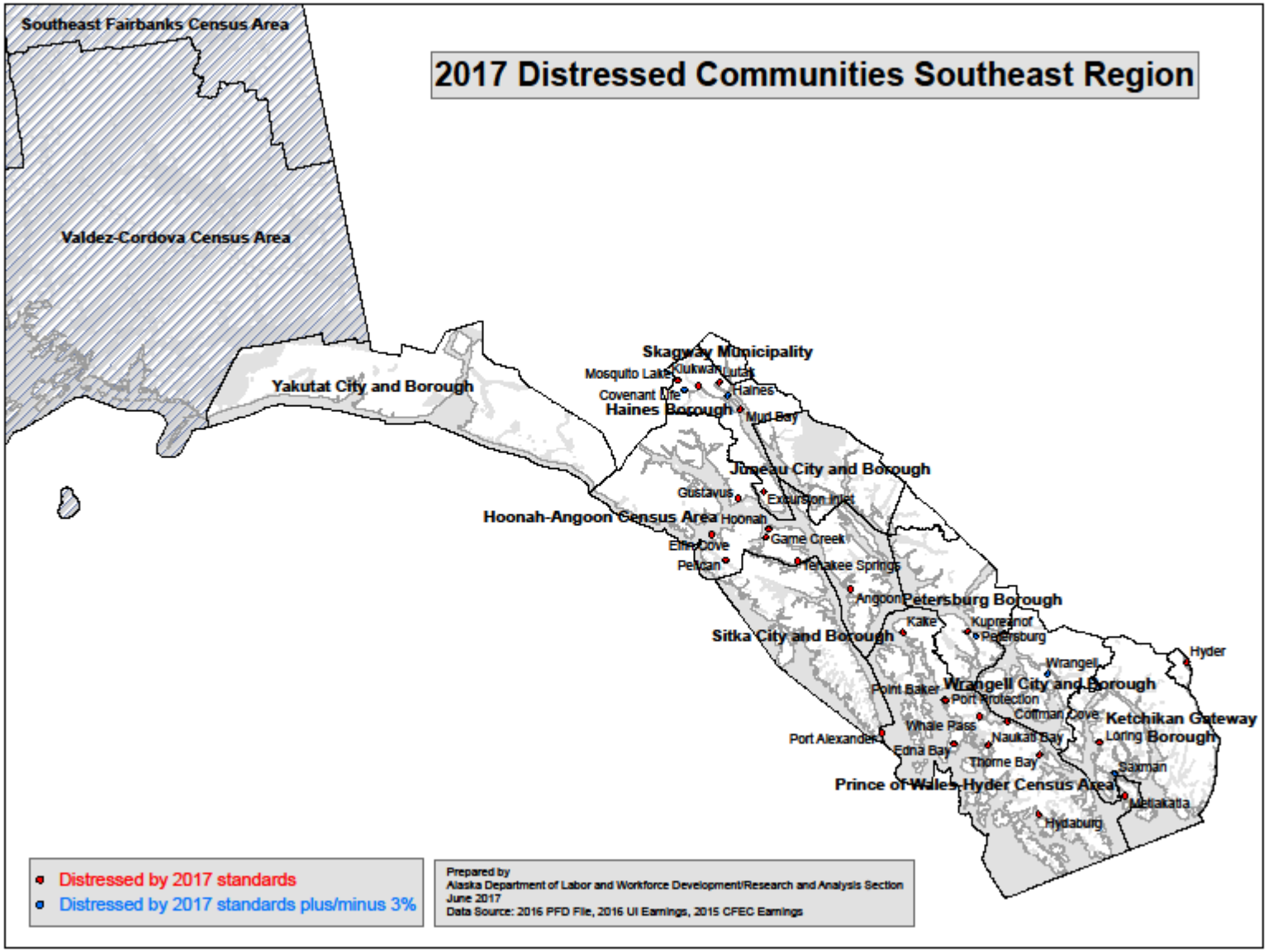
Data Source: 2016 PFD File, 2016 UI Earnings, 2015 CFEC Earnings


2017 Distressed Communities Southeast Region
Southeast Fairbanks Census Area
Valdez-Cordova Census Area
Yakutat City and Borough
Skagway Municipality
Mosquito Lake
Klukwan
Haines
Covenant Life
Haines Borough
Mud Bay
Juneau City and Borough
Gustavus
Excursion Inlet
Hoonah-Angoon Census Area
Hoonah
Game Creek
Elfin Cove
Pelican
Tenakee Springs
Angoon
Petersburg Borough
Kake
Kupreanof
Petersburg
Sitka City and Borough
Hyder
Wrangell
Point Baker
Wrangell City and Borough
Port Protection
Coffman Cove
Ketchikan Gateway
Whale Pass
Loring
Borough
Port Alexander
Naukati Bay
Edna Bay
Thorne Bay
Saxman
Prince of Wales-Hyder Census Area
Metlakatla
Hydaburg
Distressed by 2017 standards
Distressed by 2017 standards plus/minus 3%
Prepared by
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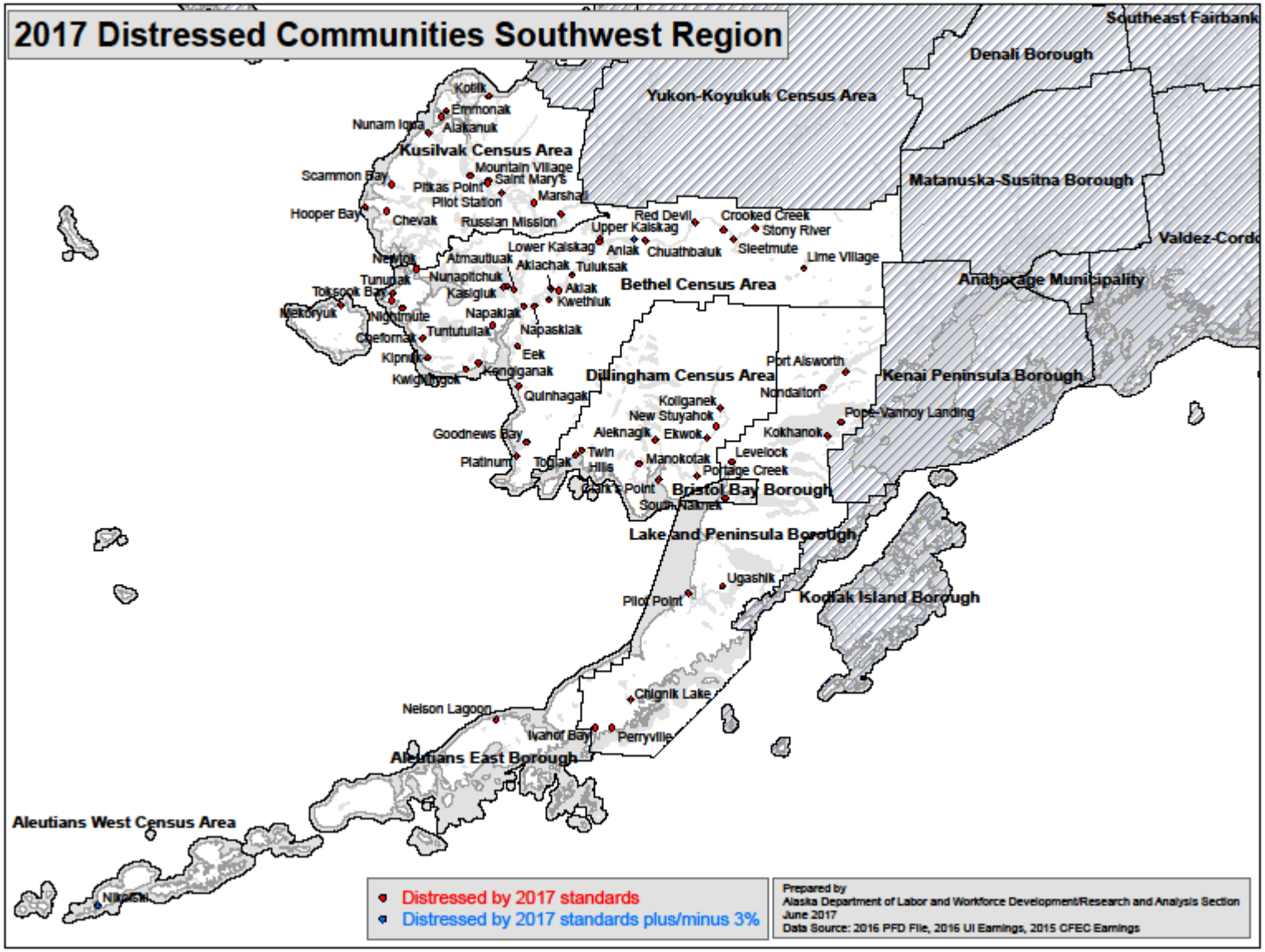
June 2017
Data Source: 2016 PFD File, 2016 UI Earnings, 2015 CFEC Earnings


2017 Distressed Communities Southwest Region
Southeast Fairbank
Denali Borough
Yukon-Koyukuk Census Area
Matanuska-Susitna Borough
Valdez-Cordo
Anchorage Municipality
Kenai Peninsula Borough
Kusilvak Census Area
Bethel Census Area
Dillingham Census Area
Bristol Bay Borough
Lake and Peninsula Borough
Kodiak Island Borough
Aleutians East Borough
Aleutians West Census Area
Kotlik
Emmonak
Nunam Iqua
Alakanuk
Scammon Bay
Mountain Village
Saint Mary's
Pitkas Point
Pilot Station
Marshall
Hooper Bay
Chevak
Russian Mission
Red Devil
Crooked Creek
Stony River
Upper Kalskag
Lower Kalskag
Aniak
Chuathbaluk
Sleetmute
Lime Village
Newtok
Atmautluak
Aklachak
Tuluksak
Tuntutuliak
Nunapitchuk
Kasigluk
Akiak
Kwethluk
Tununak
Toksook Bay
Nightmute
Napakiak
Napaskiak
Chefornak
Kipnuk
Eek
Kongiganak
Kwigillingok
Quinhagak
Port Alsworth
Nondalton
Koliganek
New Stuyahok
Pope-Vannoy Landing
Goodnews Bay
Aleknagik
Ekwok
Kokhanok
Platinum
Twin Hills
Manokotak
Levelock
Portage Creek
South Naknek
Ugashik
Pilot Point
Chignik Lake
Nelson Lagoon
Ivanof Bay
Perryville
Nikolski
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APPENDIX 13.24 POTENTIAL AGENCY MITIGATION FUNDING RESOURCES

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Federal Funding Resources

The federal government requires local governments to have a HMP in place to be eligible for mitigation funding opportunities through FEMA such as the UHMA Programs and the HMGP. The Mitigation Technical Assistance Programs available to local governments are also a valuable resource. FEMA may also provide temporary housing assistance through rental assistance, mobile homes, furniture rental, mortgage assistance, and emergency home repairs. The Disaster Preparedness Improvement Grant also promotes educational opportunities with respect to hazard awareness and mitigation.

- FEMA, through its Emergency Management Institute, offers training in many aspects of emergency management, including hazard mitigation. FEMA has also developed a large number of documents that address implementing hazard mitigation at the local level. Five key resource documents are available from FEMA Publication Warehouse (1-800-480-2520) and are briefly described here:

- How-to Guides. FEMA has developed a series of how-to guides to assist states, communities, and tribes in enhancing their hazard mitigation planning capabilities. The first four guides describe the four major phases of hazard mitigation planning. The last five how-to guides address special topics that arise in hazard mitigation planning such as conducting cost-benefit analysis and preparing multi-jurisdictional plans. The use of worksheets, checklists, and tables make these guides a practical source of guidance to address all stages of the hazard mitigation planning process. They also include special tips on meeting DMA 2000 requirements (http://www.fema.gov/hazard-mitigation-planning-resources#1).
- Local Mitigation Planning Handbook, March 2013: This handbook explains the basic concepts of hazard mitigation and provides guidance to local governments on developing or updating hazard mitigation plans to meet the requirements of Title 44 CFR §201.6 for FEMA approval and eligibility to apply for FEMA Hazard Mitigation Assistance grant programs. (http://www.fema.gov/library/viewRecord.do?id=7209)
- Earthquake Hazard Mitigation Handbook: This handbook provides local jurisdictions with mitigation ideas, many of which have demonstrated success and timeliness. These mitigation measures should be used as a source of ideas for potential mitigation projects, regardless of whether it will receive FEMA funding. (http://www.starr-team.com/starr/RegionalWorkspaces/RegionX/Documents/Hazard%20Mitigation%20Handbooks/EQHazMitHandbook.pdf)
- Flood Hazard Mitigation Handbook: This handbook provides local jurisdictions with mitigation ideas that have demonstrated success and can be timely implemented. These mitigation measures relate to the most common damages sustained by severe flood events. The handbook can be a useful mitigation tool regardless whether a specific project is proposed for FEMA funding under either the Public Assistance or Mitigation programs. (http://www.starr-team.com/starr/RegionalWorkspaces/RegionX/Documents/Hazard%20Mitigation%20Handbooks/FloodHazMitHandbook.pdf)
- Hurricane Hazard Mitigation Handbook: This handbook provides local jurisdictions with mitigation ideas, many of which have demonstrated success in the past. These mitigation measures should be used as a source of ideas for potential mitigation

projects, regardless of whether they will receive FEMA funding. (http://www.starr-team.com/starr/RegionalWorkspaces/RegionX/Documents/Hazard%20Mitigation%20Handbooks/HurricaneMitHandbook.pdf)

- A Guide to Recovery Programs FEMA 229(4), September 2005. The programs described in this guide may all be of assistance during disaster incident recovery. Some are available only after a presidential declaration of disaster, but others are available without a declaration. Please see the individual program descriptions for details. (http://www.fema.gov/txt/rebuild/ltrc/recoveryprograms229.txt)
- The Emergency Management Guide for Business and Industry. FEMA 141, October 1993. This guide provides a step-by-step approach to emergency management planning, response, and recovery. It also details a planning process that businesses can follow to better prepare for a wide range of hazards and emergency events. This effort can enhance a business's ability to recover from financial losses, loss of market share, damages to equipment, and product or business interruptions. This guide could be of great assistance to a community's industries and businesses located in hazard prone areas. (https://www.fema.gov/media-library/assets/documents/3412)
- The 2015 Hazard Mitigation Assistance (HMA) Guidance and Addendum, February 27 and March 3, 2015 respectively. Part I of the Hazard Mitigation Assistance (HMA) Guidance introduces the three HMA programs, identifies roles and responsibilities, and outlines the organization of the document. This guidance applies to Hazard Mitigation Grant Program (HMGP) disasters declared on or after the date of publication unless indicated otherwise. This guidance is also applicable to the Pre-Disaster Mitigation (PDM) and Flood Mitigation Assistance (FMA) programs; the application cycles are announced via http://www.grants.gov/. The guidance in this document is subject to change based on new laws or regulations enacted after publication.
- The Hazard Mitigation Grant Program. FEMA strives to connect individuals and state, local, and tribal government representatives with the resources they need to implement hazard mitigation measures (any sustainable action taken to reduce or eliminate long-term risk to people and property from future disasters) in their communities. The HMGP supports cost-effective post-disaster projects and is the longest running mitigation program among FEMA's three grant programs. Studies have shown that every $1 spent equals $4 of future damages mitigated. (https://www.fema.gov/hazard-mitigation-grant-program)
  - HMGP Program Post Fire for Fiscal Years 2017 and 2018. FEMA places a high priority on supporting wildfire recovery using the Hazard Mitigation Grant Program (HMGP) for Fire Management Assistance declarations in fiscal years 2017 and 2018. Section 20602 of the Bipartisan Budget Act of 2018 authorizes HMGP Post Fire assistance. (https://www.fema.gov/media-library-data/1528138266076-5782b600b82656a553b68c465e8d3871/Fact_Sheet_HMGP_Post_Fire_Final_508_6.01.18.pdf)
  - States, territories, and federally-recognized tribes with Fire Management Assistance declarations from October 01, 2016, until 11:59PM local time September 30, 2018 are eligible to apply.

- The application period is 6 months from the date of applicant funding notification, and extensions may be requested.
- FEMA encourages wildfire mitigation and related hazards such as flood or erosion. However, HMGP is available for reducing any hazard's risk reduction. Funding will be made available to the declared county or counties. The project may be outside of the designated Fire Assistance Management areas as long as the risk reduction benefits the declared county or counties (e.g., watershed mitigation). If funding cannot be used in these areas, then it may be available statewide. Applicants must detail their respective process, including deadlines, in their HMGP Administrative Plan.
- Federally recognized tribes with land burned in Fire Management Assistance declarations may choose to apply for HMGP assistance as an applicant. Tribal governments may also choose to apply through states as subapplicants. If tribal land is not burned, subapplicant funding may be unavailable since it is prioritized for declared areas. For additional questions regarding tribal eligibility, please contact your Regional Tribal Liaison (https://www.fema.gov/tribal-contacts).
- FEMA's website (available at: http://www.fema.gov) includes links to information, resources, and grants that communities can use in planning and implementing community resilience and sustainability measures.
- FEMA also administers emergency management grants (http://www.fema.gov/help/site.shtm) and various firefighter grant programs (http://www.firegrantsupport.com/) such as

  - Emergency Management Performance Grant (EMPG). This is a pass through grant. The amount is determined by the state. The grant is intended to support critical assistance to sustain and enhance state and local emergency management capabilities at the State and local levels for all-hazard mitigation, preparedness, response, and recovery including coordination of inter-governmental (federal, state, regional, local, and tribal) resources, joint operations, and mutual aid compacts state-to-state and nationwide. Sub-recipients must be compliant with National Incident Management System (NIMS) implementation as a condition for receiving funds. Requires 50 percent match. (https://www.fema.gov/emergency-management-performance-grant-program)
  - National Earthquake Hazards Reduction Program (NEHRP). The National Earthquake Hazards Reduction Program (NEHRP) seeks to mitigate earthquake losses in the U.S. through both basic and directed research and implementation activities in the fields of earthquake science and engineering. (https://www.fema.gov/national-earthquake-hazards-reduction-program)

    The NEHRP is the federal government's coordinated approach to addressing earthquake risks. Congress established the program in 1977 (Public Law 95-124) as a long-term, nationwide program to reduce the risks to life and property in the U.S. resulting from earthquakes. The NEHRP is managed as a collaborative effort among FEMA, the National Institute of Standards and Technology, the National Science Foundation, the U.S. Geological Survey, and the Department of Interior.

The four goals of the NEHRP are to:

- Develop effective practices and policies for earthquake loss-reduction and accelerate their implementation.
- Improve techniques to reduce seismic vulnerability of facilities and systems.
- Improve seismic hazards identification and risk-assessment methods and their use.
- Improve the understanding of earthquakes and their effects.

  NEHRPDHS information may be found at: https://nehrp.gov/contracts/index.htm

  - Assistance to Fire Fighters Grant (AFG), Fire Prevention and Safety (FP&S), Staffing for Adequate Fire and Emergency Response Grants (SAFER), and Assistance to Firefighters Station Construction Grant programs. Information can be found at: (http://forestry.alaska.gov/fire/vfa.htm).

- Department of Homeland Security (DHS) provides the following grants:
  - Homeland Security Grant Programs (HSGP) and State Homeland Security Programs (SHSP) are 80 percent passed through grants. SHSP supports implementing the State Homeland Security Strategies to address identified planning, organization, equipment, training, and exercise needs for acts of terrorism and other catastrophic events. In addition, SHSP supports implementing the National Preparedness Guidelines, the NIMS, and the National Response Framework (NRF). Must ensure that at least 25 percent of funds are dedicated towards law enforcement terrorism prevention-oriented activities. (https://www.dhs.gov/homeland-security-grant-program-hsgp)
  - Citizen Corps Program (CCP). The Citizen Corps' mission is to bring community and government leaders together to coordinate involving community members in emergency preparedness, planning, mitigation, response, and recovery activities. (http://www.dhs.gov/citizen-corps)
  - Emergency Operations Center (EOC) Guidance. This program is intended to improve emergency management and preparedness capabilities by supporting flexible, sustainable, secure, strategically located, and fully interoperable Emergency Operations Centers (EOCs) with a focus on addressing identified deficiencies and needs. Fully capable emergency operations facilities at the State and local levels are an essential element of a comprehensive national emergency management system and are necessary to ensure continuity of operations and continuity of government in major disasters or emergencies caused by any hazard. Requires 25 percent match. (https://www.fema.gov/media-library/assets/documents/20622)
  - Emergency Alert System (EAS). Resilient public alert and warning tools are essential to save lives and protect property during times of national, state, regional, and local emergencies. The Emergency Alert System (EAS) is used by alerting authorities to send warnings via broadcast, cable, satellite, and wireline communications pathways. Emergency Alert System participants, which consist of broadcast, cable, satellite, and wireline providers, are the stewards of this important public service in close partnership with alerting officials at all levels of government. The EAS is also used

when all other means of alerting the public are unavailable, providing an added layer of resiliency to the suite of available emergency communication tools. The EAS is in a constant state of improvement to ensure seamless integration of CAP-based and emerging technologies. (https://www.fema.gov/emergency-alert-system)

- The U.S. Department of Commerce's grant programs include:
  - The National Oceanic and Atmospheric Administration (NOAA), provides funds to the state of Alaska due to Alaska's high threat for tsunami. The allocation supports the promotion of local, regional, and state level tsunami mitigation and preparedness; installation of warning communications systems; installation of warning communications systems; installation of tsunami signage; promotion of the Tsunami Ready Program in Alaska; development of inundation models; and delivery of inundation maps and decision-support tools to communities in Alaska. (http://www.tsunami.noaa.gov/warning_system_works.html)
  - Remote Community Alert Systems (RCASP) grant for outdoor alerting technologies in remote communities effectively underserved by commercial mobile service for the purpose of enabling residents of those communities to receive emergency messages. (http://www.federalgrants.com/Remote-Community-Alert-Systems-Program-11966.html). This program is a contributing element of the Warning, Alert, and Response Network (WARN) Act.
- The U.S. Economic Development Administration (EDA's). The EDA's role in disaster recovery is to facilitate timely and effective delivering Federal economic development assistance to support long-term community economic recovery planning and project implementation, redevelopment, and resiliency. EDA is uniquely positioned to coordinate regional disaster recovery efforts in partnership with its extensive network of Economic Development Districts (EDDs), University Centers, institutions of higher education and other partners in designated impact areas. EDA has published the FY18 Disaster Supplemental Notice of Funding Opportunity (NOFO) making $587 million available to eligible grantees in communities where a Presidential declaration of a major disaster was issued under the Stafford Act as a result of Hurricanes Harvey, Irma and Maria, wildfires and other natural disasters in 2017.
  - Public Works and Development Facilities Program. EDA's Public Works program helps distressed communities revitalize, expand, and upgrade their physical infrastructure. This program enables communities to attract new industry; encourage business expansion; diversify local economies; and generate or retain long-term, private-sector jobs and investment through the acquisition or development of land and infrastructure improvements needed for the successful establishment or expansion of industrial or commercial enterprises. (https://www.eda.gov/pdf/about/Public-Works-Program-1-Pager.pdf)
- The U.S. Environmental Protection Agency (EPA). EPA's mission is to protect human health and the environment by ensuring that Americans have clean air, land and water.
  - Under EPA's Clean Water State Revolving Fund (CWSRF) program, each state maintains a revolving loan fund to provide independent and permanent sources of low-cost financing for a wide range of water quality infrastructure projects, including: municipal wastewater treatment projects; non-point source projects; watershed

protection or restoration projects; and estuary management projects. (https://www.epa.gov/cwsrf)

- Indian Environmental General Assistance Program (IGAP). 1992, Congress passed the Indian Environmental General Assistance Program Act (42 U.S.C. 4368b) which authorizes EPA to provide General Assistance Program (GAP) grants to federally recognized tribes and tribal consortia for planning, developing, and establishing environmental protection programs in Indian country, as well as for developing and implementing solid and hazardous waste programs on tribal lands.

  The goal of this program is to assist tribes in developing the capacity to manage their own environmental protection programs, and to develop and implement solid and hazardous waste programs in accordance with individual tribal needs and applicable federal laws and regulations. http://www.epa.gov/Indian/gap.htm

- Department of Agriculture (USDA). Provides diverse funding opportunities; providing a wide benefit range. Their grants and loans website provides a brief programmatic overview with links to specific programs and services. (http://www.rd.usda.gov/programs-services)
  - Farm Service Agency: Emergency Conservation Program, Non-Insured Assistance, Emergency Forest Restoration Program, Emergency Watershed Protection, Rural Housing Service, Rural Utilities Service, and Rural Business and Cooperative Service. (http://www.fsa.usda.gov/FSA/stateoffapp?mystate=ak&area=home&subject=landing&topic=landing)
  - Natural Resources Conservation Service (NRCS) has several funding sources to fulfill mitigation needs. (http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/alphabetical/)
    - Conservation Technical Assistance Program (CTA) is voluntary program available to any group or individual interested in conserving their natural resources and sustaining agricultural production. The program assists land users with addressing opportunities, concerns, and problems related to using their natural resources enabling them to make sound natural resource management decisions on private, tribal, and other non-federal lands. (http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/technical/)
    - Conservation Innovation Grants (CIG) is a voluntary program intended to stimulate developing and adopting 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 funds are used to award competitive grants to non-federal governmental or nongovernmental organizations, tribes, or individuals.

      CIG enables 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. (http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/financial/cig/)

- The Environmental Quality Incentives Program (EQIP) is a voluntary program that provides financial and technical assistance to agricultural producers through contracts up to a maximum term of ten years in length. These contracts provide financial assistance to help plan and implement conservation practices that address natural resource concerns and for opportunities to improve soil, water, plant, animal, air and related resources on agricultural land and non-industrial private forestland. In addition, a purpose of EQIP is to help producers meet federal, state, tribal and local environmental regulations. (https://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/financial/eqip/)
- The Emergency Watershed Protection Program (EWP) is designed is to undertake emergency measures, including the purchase of flood plain easements, for runoff retardation and soil erosion prevention to safeguard lives and property from floods, drought, and the products of erosion on any watershed whenever fire, flood or any other natural occurrence is causing or has caused a sudden impairment of the watershed. (http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/landscape/ewpp/)
- Watershed Surveys and Planning. NRCS watershed activities in Alaska are voluntary efforts requested through conservation districts and units of government and/or tribes. The purpose of the program is to assist federal, state, and local agencies and tribal governments to protect watersheds from damage caused by erosion, floodwater, and sediment and to conserve and develop water and land resources. Resource concerns addressed by the program include water quality, opportunities for water conservation, wetland and water storage capacity, agricultural drought problems, rural development, municipal and industrial water needs, upstream flood damages, and water needs for fish, wildlife, and forest-based industries. (http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/landscape/wsp/)

- Department of Energy (DOE), Office of Energy Efficiency and Renewable Energy, Weatherization Assistance Program. This program minimizes the adverse effects of high energy costs on low-income, elderly, and handicapped citizens through client education activities and weatherization services such as an all-around safety check of major energy systems, including heating system modifications and insulation checks. (https://www.energy.gov/eere/wipo/weatherization-assistance-program)
  - The Tribal Energy Program offers financial and technical assistance to Indian tribes to help them create sustainable renewable energy installations on their lands. This program promotes tribal energy self-sufficiency and fosters employment and economic development on America's tribal lands. (https://www.energy.gov/indianenergy/office-indian-energy-policy-and-programs)

- Department of Health and Human Services, Administration of Children & Families, Administration for Native Americans (ANA). The ANA awards funds through grants to American Indians, Native Americans, Native Alaskans, Native Hawaiians, and Pacific

Islanders. These grants are awarded to individual organizations that successfully apply for discretionary funds. ANA publishes in the Federal Register an announcement of funds available, the primary areas of focus, review criteria, and application information. (https://ami.grantsolutions.gov/)

- Department of Housing and Urban Development (HUD) provides a variety of disaster resources. They also partner with federal and state agencies to help implement disaster recovery assistance. Under the National Response Framework the FEMA and the Small Business Administration (SBA) offer initial recovery assistance. (https://www.hud.gov/info/disasterresources)
  - HUD, Office of Homes and Communities, Section 108 Loan Guarantee Programs. This program provides loan guarantees as security for federal loans for acquisition, rehabilitation, relocation, clearance, site preparation, special economic development activities, and construction of certain public facilities and housing. (https://www.hudexchange.info/programs/section-108/)
  - HUD, Office of Homes and Communities, Section 184 Indian Home Loan Guarantee Programs (IHLGP). The Section 184 Indian Home Loan Guarantee Program is a home mortgage specifically designed for American Indian and Alaska Native families, Alaska Villages, Tribes, or Tribally Designated Housing Entities. Section 184 loans can be used, both on and off native lands, for new construction, rehabilitation, purchase of an existing home, or refinance.
  - Because of the unique status of Indian lands being held in Trust, Native American homeownership has historically been an underserved market. Working with an expanding network of private sector and tribal partners, the Section 184 Program endeavors to increase access to capital for Native Americans and provide private funding opportunities for tribal housing agencies with the Section 184 Program. (https://www.hud.gov/program_offices/public_indian_housing/ih/homeownership/184)
  - Indian Housing Block Grant / Native American Housing Assistance and Self Determination Act (IHBG/NAHASDA) administration, operating & construction funds. The act is separated into seven sections:

    The Indian Housing Block Grant Program (IHBG) is a formula grant that provides a range of affordable housing activities on Indian reservations and Indian areas. The block grant approach to housing for Native Americans was enabled by the Native American Housing Assistance and Self Determination Act of 1996 (NAHASDA).

    Eligible IHBG recipients are federally recognized Indian tribes or their tribally designated housing entity (TDHE), and a limited number of state recognized tribes who were funded under the Indian Housing Program authorized by the U.S. Housing Act of 1937 (USHA). With the enactment of NAHASDA, Indian tribes are no longer eligible for assistance under the USHA.

    An eligible recipient must submit to HUD an Indian Housing Plan (IHP) each year to receive funding. At the end of each year, recipients must submit to HUD an Annual Performance Report (APR) reporting on their progress in meeting the goals and objectives included in their IHPs.

Eligible activities include housing development, assistance to housing developed under the Indian Housing Program, housing services to eligible families and individuals, crime prevention and safety, and model activities that provide creative approaches to solving affordable housing problems. (http://portal.hud.gov/hudportal/HUD?src=/program_offices/public_indian_housing/ih/grants/ihbg)

- Community Development Block Grants (CDBG) provides grant assistance and technical assistance to aid communities in planning activities that address issues detrimental to the health and safety of local residents, such as housing rehabilitation, public services, community facilities, and infrastructure improvements that would primarily benefit low-and moderate-income. persons (https://myecosystem.aecom.com/SitePages/Home.aspx)
- National Disaster Resilience (NDR) grant is a HUD/CDBG. The grant opportunity is called the Community Block Development Grant-National Disaster Resilience (CDBG-NDR). HUD sponsors the National Disaster Resilience Competition (NDRC) to help eligible communities impacted by federally declared disasters in 2011, 2012 and 2013 become more resilient. The NDRC is a two-phase process that will competitively award nearly $1 billion in HUD Disaster Recovery funds to the most impacted, distressed and needy eligible communities. The grant opportunity is called the Community Block Development Grant-National Disaster Resilience (CDBG-NDR). The State of Alaska is one of many applicants nationwide eligible to apply on behalf of its impacted communities. (https://www.hudexchange.info/programs/cdbg-dr/)
- HUD/Indian Community Development Block Grants (ICDBG) provide grant assistance and technical assistance to aid communities or Indian tribes in planning activities that address issues detrimental to the health and safety of local residents, such as housing rehabilitation, public services, community facilities, and infrastructure improvements that would primarily benefit low-and moderate-income. persons (http://portal.hud.gov/hudportal/HUD?src=/program_offices/public_indian_housing/ih/grants/icdbg)

- Department of Labor (DOL), Employment and Training Administration, Disaster Unemployment Assistance (DUA). Provides weekly unemployment subsistence grants for those who become unemployed because of a major disaster or emergency. Applicants must have exhausted all benefits for which they would normally be eligible. (http://www.workforcesecurity.doleta.gov/unemploy/disaster.asp)
  - The Workforce Investment Act contains provisions aimed at supporting employment and training activities for Indian, Alaska Native, and Native Hawaiian individuals. The Department of Labor's Indian and Native American Programs (INAP) funds grant programs that provide training opportunities at the local level for this target population. (http://www.dol.gov/dol/topic/training/indianprograms.htm)
- Department of Transportation (DOT), Hazardous Materials Emergency Preparedness (HMEP) Grant. The Hazardous Materials Transportation Safety and Security Reauthorization Act of 2005 authorizes the U.S. DOT to provide assistance to public sector employees through training and planning grants to States, Territories, and Native

American tribes for emergency response. The purpose of this grant program is to increase State, Territorial, Tribal, and local effectiveness in safely and efficiently handling hazardous materials accidents and incidents, enhance implementation of the Emergency Planning and Community Right-to-Know Act of 1986 (EPCRA), and encourage a comprehensive approach to emergency training and planning by incorporating the unique challenges of responses to transportation situations. (http://www.phmsa.dot.gov/hazmat/grants)

- Federal Financial Institutions. Member banks of Federal Deposit Insurance Corporation, Financial Reporting Standards or Federal Home Loan Bank Board may be permitted to waive early withdrawal penalties for Certificates of Deposit and Individual Retirement Accounts.
- Internal Revenue Service (IRS), Disaster Tax Relief. Provides extensions to current year's tax return, allows deductions for disaster losses, and allows amendment of previous year's tax returns. (https://www.irs.gov/newsroom/tax-relief-in-disaster-situations)
- Small Business Administration (SBA) Disaster Assistance Loans and Grants program provides information concerning disaster assistance, preparedness, planning, cleanup, and recovery planning. (https://disasterloan.sba.gov/ela/Information/Index)
- U.S. Army Corps of Engineers (USACE) Alaska District's Civil Works Branch studies potential water resource projects in Alaska. These studies analyze and solve water resource issues of concern to the local communities. These issues may involve navigational improvements, flood control or ecosystem restoration. The agency also tracks flood hazard data for over 300 Alaskan communities on floodplains or the sea coast. These data help local communities assess the risk of floods to their communities and prepare for potential future floods. The USACE is a member and co-chair of the Alaska Climate Change Sub-Cabinet.
    - Civil Works and Planning (http://www.poa.usace.army.mil/Missions/CivilWorksandPlanning.aspx)
    - Environmental Resources Section (http://www.poa.usace.army.mil/About/Offices/Engineering/EnvironmentalResources.aspx)
    - USACE Alaska District Grants (http://search.usa.gov/search?affiliate=alaska_district&query=grants)
- The Grants.gov program management office was established, in 2002, as a part of the President's Management Agenda. Managed by the Department of Health and Human Services, Grants.gov is an E-Government initiative operating under the governance of the Office of Management and Budget.

  Under the president's management agenda, the office was chartered to deliver a system that provides a centralized location for grant seekers to find and apply for federal funding opportunities. Today, the Grants.gov system houses information on over 1,000 grant programs and vets grant applications for 26 federal grant-making agencies.

State Funding Resources

- Department of Military and Veterans Affairs (DMVA): Provides damage appraisals and settlements for VA-insured homes, and assists with filing of survivor benefits. (http://veterans.alaska.gov/)
  - DHS&EM within DMVA is responsible for improving hazard mitigation technical assistance for local governments for the State of Alaska. Providing hazard mitigation training, current hazard information and communication facilitation with other agencies will enhance local hazard mitigation efforts. DHS&EM administers FEMA mitigation grants to mitigate future disaster damages such as those that may affect infrastructure including elevating, relocating, or acquiring hazard-prone properties. (http://ready.alaska.gov/Plans/Mitigation)

    DHS&EM also provides mitigation funding resources for mitigation planning on their Web site at http://ready.alaska.gov/grants.
- Division of Health and Social Services (DHSS): On this site you will find information intended to assist all who are interested in DHSS grants and services they support. (http://dhss.alaska.gov/fms/grants/pages/default.aspx and http://dhss.alaska.gov/fms/grants/Pages/grants.aspx)
- Division of Health and Social Services (DSS): Provides special outreach services for seniors, including food, shelter and clothing. (http://dhss.alaska.gov/dsds/Pages/hcb/hcb.aspx)
- Division of Insurance (DOI): Provides assistance in obtaining copies of policies and provides information regarding filing claims. (http://commerce.state.ak.us/dnn/ins/Consumers/AlaskaConsumerGuide.aspx)
- DCRA within the DCCED administers the HUD/CDBG, FMA Program, and the Climate Change Sub-Cabinet's Interagency Working Group's program funds and administers various flood and erosion mitigation projects, including the elevation, relocation, or acquisition of flood-prone homes and businesses throughout the State. This division also administers programs for State's" distressed" and "targeted" communities. (http://www.commerce.state.ak.us/dca/)
  - DCRA Planning and Land Management staff provide Alaska Climate Change Impact Mitigation Program (ACCIMP) funding to Alaskan communities that meet one or more of the following criteria related to flooding, erosion, melting permafrost, or other climate change-related phenomena: Life/safety risk during storm/flood events; loss of critical infrastructure; public health threats; and loss of 10% of residential dwellings. (http://commerce.state.ak.us/dnn/dcra/PlanningLandManagement/ACCIMP.aspx)

    The Hazard Impact Assessment is the first step in the ACCIMP process. The HIA identifies and defines the climate change-related hazards in the community, establishes current and predicted impacts, and provides recommendations to the community on alternatives to mitigate the impact. (http://commerce.alaska.gov/dca/planning/accimp/hazard_impact.html)
- Department of Environmental Conservation (DEC). DEC's primary roles and responsibilities concerning hazards mitigation are ensuring safe food and safe water, and

pollution prevention and pollution response. DEC ensures water treatment plants, landfills, and bulk fuel storage tank farms are safely constructed and operated in communities. Agency and facility response plans include hazards identification and pollution prevention and response strategies. (http://dec.alaska.gov/)

- The Division of Water's Village Safe Water (VSW) Program works with rural communities to develop sustainable sanitation facilities. Communities apply each year to VSW for grants for sanitation projects. Federal and state funding for this program is administered and managed by the VSW program. VSW provides technical and financial support to Alaska's smallest communities to design and construct water and wastewater systems. In some cases, funding is awarded by VSW through the Alaska Native Tribal Health Consortium (ANTHC), who in turn assist communities in design and construct of sanitation projects.
- The Alaska Municipal Matching Grant (AMMG) program provides partial funding and engineering support for drinking water, wastewater (sewer), solid waste and non-point source pollution projects, such as water body restoration and recovery. These state grants primarily assist the larger communities and boroughs in the state. (http://dec.alaska.gov/water/technical-assistance-and-financing/state-revolving-fund/)
- The Alaska Clean Water Fund (ACWF) and the Alaska Drinking Water Fund (ADWF) are two Alaska Department of Environmental Conservation (ADEC) loan fund programs that offer low interest loans to Alaskan municipalities and other qualified entities for financing water, wastewater and water quality related projects.

  Loans can finance up to 100 percent of a project's eligible costs for planning, design and construction of publicly owned facilities. In addition, loans can serve as local match for the ADEC Municipal Water, Sewer and Solid Waste Matching Grants Program or most other federal or state funding sources. (http://dec.alaska.gov/water/technical-assistance-and-financing/state-revolving-fund/loan-overview)

- Department of Transportation and Public Facilities (DOT/PF) personnel provide technical assistance to the various emergency management programs, to include mitigation. This assistance is addressed in the DHS&EM-DOT/PF Memorandum of Agreement and includes but is not limited to: environmental reviews, archaeological surveys, and historic preservation reviews.
  - DOT/PF and DHS&EM coordinate buy-out projects to ensure that there are no potential right-of-way conflicts with future use of land for bridge and highway projects, and collaborate on earthquake mitigation.
  - Additionally, DOT/PF provides the safe, efficient, economical, and effective State highway, harbor, and airport operation. DOT/PF uses its Planning, Design and Engineering, Maintenance and Operations, and Intelligent Transportation Systems resources to identify hazards, plan and initiate mitigation activities to meet the transportation needs of Alaskans, and make Alaska a better place to live and work. DOT/PF budgets for temporary bridge replacements and materials necessary to make the multi-modal transportation system operational following natural disaster events.

- DNR administers various projects designed to reduce stream bank erosion, reduce localized flooding, improve drainage, and improve discharge water quality through the stormwater grant program funds. Within DNR,
  - The Division of Geological and Geophysical Survey (DGGS) is responsible Alaska's mineral, land, and water resources use, development, and earthquake mitigation collaboration.

    Their geologists and support staff are leaders in researching Alaska's geology and implementing technological tools to most efficiently collect, interpret, publish, archive, and disseminate information to the public. (http://dggs.alaska.gov/pubs/advanced-search)
  - The DNR's Division of Forestry (DOF) in collaboration with other agencies participates in a statewide wildfire control program in cooperation with the forest industry, rural fire departments and other agencies. Prescribed burning may increase the risks of fire hazards; however, prescribed burning reduces the availability of fire fuels and therefore the potential for future, more serious fires. http://dhss.alaska.gov/dph/emergency/documents/02-internal/08firesuppressionmediaguide.pdf)
  - DOF also manages various wildland fire programs, activities, and grant programs such as the FireWise Program (http://forestry.alaska.gov/fire/firewise.htm), Community Forestry Program (CFP) (http://forestry.alaska.gov/community/), Assistance to Fire Fighters Grant (AFG), Fire Prevention and Safety (FP&S), Staffing for Adequate Fire and Emergency Response Grants (SAFER), and Volunteer Fire Assistance and Rural Fire Assistance Grant (VFA-RFA) programs (http://forestry.alaska.gov/fire/vfarfa.htm). Information can be found at http://forestry.alaska.gov/fire/current.htm.
  - The Alaska Interagency Coordination Center (AICC) is the Geographic Area Coordination Center for Alaska. AICC serves as the focal point for initial attack resource coordination, logistics support, and predictive services for all state and federal agencies involved in wildland fire management and suppression in Alaska.

    Fire management planning, preparedness, suppression operations, prescribed burning, and related activities are coordinated on an interagency basis. DOF has cooperative agreements with the departments of Agriculture and Interior, and numerous local government and volunteer fire departments to respond to wildland fires, reduce duplication of efforts, and share resources.

    In 1984, the State of Alaska adopted the National Interagency Incident Management System Incident Command System concept for managing fire suppression. The Incident Command System (ICS) guiding principles are followed in all wildland fire management operations. All State of Alaska Departments adopted ICS in 1996 through the governor's administrative order.

Other Funding Resources

The following provide focused access to valuable planning resources for communities interested in sustainable development activities.

Potential Agency Funding Resources

- Rural Alaska Community Action Program Inc. (RurALCAP) In the nearly 50 years since it began, it is difficult to imagine any aspect of rural Alaskan lives which has not been touched in some way by the people and programs of RurALCAP. From Head Start, parent education, adult basic education, and elder-youth programs, to Native land claims and subsistence rights, energy and weatherization programs, and alcohol and substance abuse prevention, RurALCAP has left a lasting mark on the history and development of Alaska and its rural Peoples.
  - Weatherization Assistance Program assists low to moderate income households in weatherization needs. The program is available to homeowners as well as renters and includes; single family homes, cabins, mobile homes, condominiums and multifamily dwellings. (http://weatherizeme.org/?page_id=32)
  - Solid Waste Management. RurALCAP continues to host an expert solid waste liaison, Ted Jacobson, through funding provided by the Environmental Protection Agency (EPA) and Senior Services America, Inc. The liaison provides solid waste management technical assistance to rural communities through training, site visits, hands-on demonstrations, and remote contact. Resources are provided for dump management activities, collaborating with funders for funding and technical assistance on solid waste management, recycling, and backhaul. (https://ruralcap.com/energy-and-environment/solid-waste-management/)
- American Planning Association (APA), https://www.planning.org - a non-profit professional association that serves as a resource for planners, elected officials, and citizens concerned with planning and growth initiatives.
- Institute for Business and Home Safety (IBHS), an initiative of the insurance industry to reduce deaths, injuries, property damage, economic losses, and human suffering caused by natural disasters. (http://www.disastersafety.org/)
- American Red Cross (ARC). Provides for the critical needs of individuals such as food, clothing, shelter, and supplemental medical needs. Provides recovery needs such as furniture, home repair, home purchasing, essential tools, and some bill payment may be provided. (http://www.redcross.org/find-help)
- Catalog of Federal Domestic Assistance (DFDA) Crisis Counseling Program (CCP). Provides grants to State and Borough Mental Health Departments, which in turn provide training for screening, diagnosing and counseling techniques. Also provides funds for counseling, outreach, and consultation for those affected by disaster. (http://dialoguemakers.org/Resourses4states+Nonprofits.htm)
- Denali Commission. Introduced by Congress in 1998, the Denali Commission is an independent federal agency designed to provide critical utilities, infrastructure, and economic support throughout Alaska. With the creation of the Denali Commission, Congress acknowledged the need for increased inter-agency cooperation and focus on Alaska's remote communities. Since its first meeting in April 1999, the commission is credited with providing numerous cost-shared infrastructure projects across the State that exemplifies effective and efficient partnership between federal and state agencies, and the private sector. (http://www.denali.gov/grants)
  - The Energy Program primarily funds design and construction of replacement bulk fuel storage facilities, upgrades to community power generation and distribution

systems, alternative-renewable energy projects, and some energy cost reduction projects. The Commission works with the Alaska Energy Authority (AEA), Alaska Village Electric Cooperative (AVEC), Alaska Power and Telephone and other partners to meet rural communities' fuel storage and power generation needs.

  - The goal of the solid waste program at the Denali Commission is to provide funding to address deficiencies in solid waste disposal sites which threaten to contaminate rural drinking water supplies.

- Lindbergh Foundation Grants. Each year, the Charles A. and Anne Morrow Lindbergh Foundation provides grants of up to $10,580 (a symbolic amount representing the cost of the Spirit of St. Louis) to men and women whose individual initiative and work in a wide spectrum of disciplines furthers the Lindbergh's vision of a balance between the advance of technology and the preservation of the natural/human environment. (http://www.thelindberghfoundation.org/awards)
- Rasmussen Foundation Grants. The Rasmussen foundation invests both in individuals and well-managed 501(c)(3) organizations dedicated to improving the quality of life for Alaskans.

  Rasmussen Foundation awards grants both to organizations serving Alaskans through a base of operations in Alaska, and to individuals for projects, fellowships and sabbaticals. To be considered for a grant award, grant seekers must meet specific criteria and complete and submit the required application according to the specific guidelines of each program. (http://www.rasmuson.org/index.php?switch=viewpage&pageid=5)

  - Tier 1 Awards: Grants of up to $25,000 for capital projects, technology updates, capacity building, program expansion, and creative works.
  - Tier 2 Awards: Grants over $25,000 for projects of demonstrable strategic importance or innovative Hazard Characteristics.
  - Pre-Development Program: Guidance and technical resources for planning new, sustainable capital projects.

  The foundation trustees believe successful organizations can sustain their basic operations through other means of support and prefer to assist organizations with specific needs, focusing on requests which allow the organizations to become more efficient and effective. The trustees look favorably on organizations which demonstrate broad community support, superior fiscal management and matching project support. (http://www.rasmuson.org/index.php)

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APPENDIX 13.25 SHMP REFERENCES

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Alaska Earthquake Center: https://earthquake.alaska.edu

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Resources – Coastal Erosion

Alaska Department of Commerce, Community, and Economic Development (DCCED)

Alaska Climate Change Impact Mitigation Program (ACCIMP)

The Alaska Climate Change Impact Mitigation Program (ACCIMP) was established to provide technical assistance and funding to communities imminently threatened by climate-related natural hazards such as erosion, flooding, storm surge, and thawing permafrost. The intent of the program is to help impacted communities develop a planned approach to shoreline protection, building relocation and/or eventual relocation of the village.
https://www.commerce.alaska.gov/web/dcra/PlanningLandManagement/ACCIMP.aspx

Alaska Community Coastal Protection Project (ACCPP)

The Alaska Community Coastal Protection Project focuses on three of the most imminently threatened villages in Western Alaska: the communities of Kivalina, Shaktoolik and Shishmaref. The objective of the project has been to increase community resilience and sustainability to the impacts of natural hazards threatening these communities while protecting the natural coastal environment. The project is based on the premise that careful planning, agency collaboration and strong community leadership are essential to successfully addressing the needs of imperiled communities.

https://www.commerce.alaska.gov/web/dcra/PlanningLandManagement/AlaskaCommunityCoastalProtectionProject.aspx

Alaska Risk MAP Program

The Alaska Risk MAP Program is funded through a Cooperating Technical Partnership between the State of Alaska and FEMA. The program provides communities with flood and other hazard information, risk assessment tools and outreach support to increase local understanding of risk, inform community decisions regarding risk, and ultimately lead to local actions which will reduce risk. Increasing community resilience to natural hazards is a goal.
https://www.commerce.alaska.gov/web/dcra/PlanningLandManagement/RiskMAP.aspx

Alaska Division of Geological & Geophysical Surveys (DGGS)

Alaska's extensive shorelines are incompletely mapped and under-instrumented for the evaluation of coastal dynamics. The Coastal Hazards Program at DGGS is engaged in ongoing investigations that will expand our understanding of how the coastline has evolved and how it will respond to hazardous events and long-term changes. This program is dedicated to fostering partnerships that will improve the quality and quantity of the critical baseline data that are necessary to fuel informed decision making throughout the state.
http://dggs.alaska.gov/sections/engineering/profiles/coastalhazards.html

DGGS tools for understanding coastal erosion are the Alaska Shoreline Change Tool http://maps.dggs.alaska.gov/shoreline/ and the Alaska Coastal Profile Tool http://maps.dggs.alaska.gov/acpt/

Denali Commission

The Denali Commission Village Infrastructure Protection (VIP) program is dedicated to assisting rural Alaska communities that are threatened by erosion, flooding and permafrost degradation. The program goal is to mitigate the impact of these threats with respect to safety, health and the protection of infrastructure. https://www.denali.gov/programs

National Oceanic and Atmospheric Administration (NOAA)

The National Oceanic and Atmospheric Administration is an American scientific agency within the U.S. Department of Commerce that focuses on the conditions of the oceans, major waterways, and the atmosphere. From daily weather forecasts, severe storm warnings, and climate monitoring to fisheries management, coastal restoration and supporting marine commerce, NOAA's products and services support economic vitality and affect more than one-third of America's gross domestic product. NOAA's dedicated scientists use cutting-edge research and high-tech instrumentation to provide citizens, planners, emergency managers, and other decision makers with reliable information they need when they need it.

Summary of NOAA facilities and programs based in, or focused on, Alaska:
https://www.legislative.noaa.gov/NIYS/NIYSAK.pdf

NOAA Sea Level Information: https://oceanservice.noaa.gov/facts/sealevel.html

U.S. Army Corps of Engineers (USACE)

The Planning Section of the Alaska Army Corps of Engineers conducts the reconnaissance and feasibility level studies on potential water resource projects in Alaska. These studies, usually requested by a community in Alaska, analyze and solve water resource issues of concern to the local communities. These issues may involve navigational improvements, flood risk

management, riverbank or coastal shoreline protection, or ecosystem restoration. The studies may result in the preparation of a reconnaissance or feasibility report, technical report or other type of planning document. The section also conducts economic analyses to determine the economic viability of a potential water resources project.
http://www.poa.usace.army.mil/Missions/Civil-Works-and-Planning/

USACE Floodplain Management:
http://www.poa.usace.army.mil/About/Offices/Engineering/Floodplain-Management/

U.S. Department of Agriculture (USDA), Natural Resources Conservation Service (NRCS)

USDA Natural Resources Conservation Service Alaska: "The Secretary of Agriculture is authorized to undertake emergency measures, including the purchase of floodplain easements, for runoff retardation and soil erosion prevention, in cooperation with landowners and land users, as the Secretary deems necessary to safeguard lives and property from floods, drought, and the products of erosion on any watershed whenever fire, flood, or any other natural occurrence is causing or has caused a sudden impairment of that watershed."
https://www.nrcs.usda.gov/wps/portal/nrcs/ak/programs/financial/ewp/

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More Information

Glacial Lake Outburst Floods

DGGS Climate & Cryosphere Hazards Program Newsroom: Monitoring of glacial lake outburst floods in Alaska - ArcGIS StoryMap: http://soa-dnr.maps.arcgis.com/apps/Cascade/index.html?appid=2c0ea4f0543f44c7a78741c2da30cbbb

Post, Austin, and Mayo, L.R., 1971, Glacier dammed lakes and outburst floods in Alaska: USGS Hydrologic Investigations Atlas 455, 10 p., 3 sheets, scale 1:1,000,000: http://ak.water.usgs.gov/glaciology/glacier_dammed_lakes/HA455/HA-455%20Text.pdf

USGS Newsroom: Second-Largest Glacial Flood Worldwide in Historic Times Occurs as Russell Lake Glacier Dam Ruptures: http://www.usgs.gov/newsroom/article.asp?ID=356

USGS Advancing Glacier Coming Close to Blocking Fiord Near Yakutat, Alaska: http://www.usgs.gov/newsroom/article.asp?ID=373 and Photos: http://www.usgs.gov/features/glaciers.html

USGS 2002 Russell Fjord Closure and Russell Lake Outburst: https://www2.usgs.gov/climate_landuse/clu_rd/glacierstudies/hubbard.asp

Permafrost

Permafrost Laboratory, University of Alaska Fairbanks Geophysical Institute: http://permafrost.gi.alaska.edu/

Section 3.4 Ground Failure References

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COMET® (Cooperative Program for Operational Meteorology, Education, and Training) is a meteorological support & education program out of UCAR (University Corporation for Atmospheric Research), established by NOAA's National Weather Service. See: http://www.comet.ucar.edu/who_about_us.php

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Other Resources

The USGS has developed useful information to help the public understand and mitigate for landslides:

- Landslide Types and Processes Fact Sheet: https://pubs.usgs.gov/fs/2004/3072/fs-2004-3072.html and https://pubs.usgs.gov/fs/2004/3072/pdf/fs2004-3072.pdf
- Landslide Handbook: Highland, L.M., and Bobrowsky, Peter, 2008, The landslide handbook—A guide to understanding landslides: Reston, Virginia, USGS Circular 1325, 129 p. https://pubs.usgs.gov/circ/1325/

The Alaska Department of Transportation & Public Facilities maintains an interactive web map that tracks debris flows, landslides, and rockfalls that impact roads throughout the state:

http://akdot.maps.arcgis.com/home/webmap/viewer.html?webmap=ee1ad659cc89480a86584a3c90416465

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Lander, J. F., 1996, Tsunamis affecting Alaska, 1737-1996: Boulder, CO, NOAA National Geophysical Data Center (NGDC), Key to Geophysical Research Documentation, v. 31, 195 p.

Other Tsunami and Seiche Resources

National Oceanic and Atmospheric Association (NOAA) tsunami information: https://www.tsunami.noaa.gov/

NOAA/National Weather Service U.S. Tsunami Warning System: https://tsunami.gov

Volcano References

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Schaaf, J. M., 2004, Witness, firsthand accounts of the largest volcanic eruption in the twentieth century: Anchorage, AK, National Park Service, Lake Clark-Katmai Studies Center, unpaged.

Other Volcano Resources

General

USGS's Volcano Hazards Program

The mission of the USGS Volcano Hazards Program (VHP) is to enhance public safety and minimize social and economic disruption from eruptions through delivery of effective forecasts, warnings, and information of volcano hazards based on scientific understanding of volcanic processes. The VHP monitors and studies active and potentially active volcanoes, assesses their hazards, and conducts research on how volcanoes work in order for the USGS to issue "timely warnings" of potential volcanic hazards to emergency-management professionals and the public. Thus, in addition to collecting and interpreting the best possible scientific information, the program works to effectively communicate its scientific findings and volcanic activity alerts to authorities and the public.

USGS Fact Sheet 002-97:

What Are Volcano Hazards? http://pubs.usgs.gov/fs/fs002-97

PDF http://pubs.usgs.gov/fs/fs002-97/fs002-97.pdf

Spanish PDF http://pubs.usgs.gov/fs/fs144-00/fs144-00.pdf

Alaska Volcano Observatory (AVO)

The Alaska Volcano Observatory is a joint program of the USGS, the Geophysical Institute of the University of Alaska Fairbanks (UAFGI), and the State DGGS. AVO was formed in 1988, and uses federal, state, and university resources to monitor and study Alaska's hazardous volcanoes, to predict and record eruptive activity, and to mitigate volcanic hazards to life and property. https://avo.alaska.edu/

Hazards from Alaska Volcanoes https://avo.alaska.edu/volcanoes/hazards.php

Volcanic Ashfallout and Ash Clouds

Airports Council International 2014 World Traffic Report
http://www.aci.aero/News/Releases/Most-Recent/2015/08/31/ACI-releases-2014-World-Airport-Traffic-Report-Airports-in-advanced-economies-rebound-in-2014--global-passenger-traffic-up-by-over-5-air-cargo-volumes-rise-after-three-years-of-stagnation-

USGS Fact Sheet 027-00: Volcanic Ash—A "Hard Rain" of Abrasive Particles

Webpage http://pubs.usgs.gov/fs/fs027-00/

PDF http://pubs.usgs.gov/fs/fs027-00/fs027-00.pdf

USGS: Volcanic Ash Impacts & Mitigation: http://volcanoes.usgs.gov/ash/

International Volcano Health Hazard Network's (IVHHN) http://www.ivhhn.org/

The Health Hazards of Volcanic Ash and Guidelines on Preparedness Before, During and After an Ashfall:
http://www.ivhhn.org/images/pamphlets/preparedness_guidelines_english_print_imposed.pdf

Alaska Volcano Observatory Event-Specific Information: Okmok 2008:
http://www.avo.alaska.edu/volcanoes/volcact.php?volcname=Okmok&eruptionid=604&page=basics

2018 SHMP References

Ballistics

Volcanic Hazards – Ballistic Projectiles: http://uwiseismic.com/General.aspx?id=18

The Communication and Risk Management of Volcanic Ballistic Hazards: https://link.springer.com/chapter/10.1007%2F11157_2016_35

How to protect people and property from volcanic ballistics: https://physicsworld.com/a/how-to-protect-people-and-property-from-volcanic-ballistics/

Pyroclastic Flows and Surges and Lava Domes

USGS Fact Sheet 075-98: Can Another Great Volcanic Eruption Happen in Alaska?

Webpage http://pubs.usgs.gov/fs/fs075-98/

Volcanic Gases

2005 Volcanic activity in Alaska, Kamchatka, and the Kurile Islands: Summary of events and response of the Alaska Volcano Observatory: http://pubs.usgs.gov/sir/2007/5269/pdf/sir20075269.pdf

Volcanic gases can be harmful to health, vegetation and infrastructure: https://volcanoes.usgs.gov/vhp/gas.html

Volcanic Gases, Michigan Tech Volcano Page: http://www.geo.mtu.edu/volcanoes/hazards/primer/gas.html

Acidification

Alaska Volcano Observatory Event Specific Information: Chiginagak 2005: http://www.avo.alaska.edu/volcanoes/volcact.php?volcname=Chiginagak&eruptionid=535&page=basics

Historic Volcanic Activity in Alaska

USGS Fact Sheet 030-97:Volcanic Ash—Danger to Aircraft in the North Pacific

Webpage http://pubs.usgs.gov/fs/fs030-97/; PDF http://pubs.usgs.gov/fs/fs030-97/fs030-97.pdf

Alaska Volcano Observatory: About Alaska's Volcanoes: http://www.avo.alaska.edu/volcanoes/about.php

USGS Fact Sheet 075-98: Can Another Great Volcanic Eruption Happen in Alaska?

Webpage http://pubs.usgs.gov/fs/fs075-98/

Alaska Volcano Observatory Event Specific Information:

Augustine 1986: https://avo.alaska.edu/volcanoes/activity.php?volcname=Augustine&eruptionid=411&page=basic

Augustine 2005: https://avo.alaska.edu/volcanoes/activity.php?volcname=Augustine&eruptionid=547&page=basic

Augustine 1883: https://avo.alaska.edu/volcanoes/activity.php?volcname=Augustine&eruptionid=332&page=basic

Redoubt 1989:
https://avo.alaska.edu/volcanoes/activity.php?volcname=Redoubt&eruptionid=442&page=basic

Alaska interagency operating plan for volcanic ash episodes (2008):
http://www.avo.alaska.edu/pdfs/cit3996_2008.pdf

Redoubt Volcano, Cook Inlet, Alaska, 2009

Alaska Volcano Observatory Event Specific Information: Redoubt 2009:
https://avo.alaska.edu/volcanoes/activity.php?volcname=Redoubt&eruptionid=610&page=basic

Alaska Department of Environmental Conservation Unified Command: Drift River Terminal Coordination:
http://www.dec.state.ak.us/spar/perp/response/sum_fy09/090324201/090324201_index.htm

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APPENDIX 13.26 LEGACY 2013 MEDIUM AND LOW PRIORITY PROJECTS

(Projects Not Included within Mitigation Action Plan)

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Table 9-7a Alaska SHMP Update – Medium and Low Priority Actions

(Blue text items are the legacy 2018 SHMPMAP actions and their respective status determinations)

Goals		Status			Actions
No.	**Description**	**Responsible Agency (ies)**	**New *Considered, Selected* Brought Forward *Complete, Deferred, Deleted, or Ongoing***	**Explain Status**	**Description**
EQ 6	Reduce earthquake (EQ) damage and loss possibilities	***Medium EQ Priority will not be addressed in 2018 SHMP***			
		Lead: AEIC, DOT/PF **Support:** UAFGI, USGS, DNR/DGGS, UAA, Advanced National Seismic Safety (ANSS)	Deferred Former timeline: 10 years	No available funding Combined objective and action into one concise action	Objective 5.1: Develop a real-time preliminary damage assessment capability.
					Action 5.1.1: Deploy modern seismic instrumentation in critical facilities, infrastructure, and major transportation arteries.
					Develop a real-time preliminary damage assessment capability using real time data to project potential damages to critical facilities and infrastructure.
		Lead: AEIC, UAA **Support:** USGS, ASHSC, DHS&EM	Deferred Former timeline: 10 years	No available funding Moved to MH 1 Combined objective and action into one concise action to reflect all-hazard focus	EQ Objective 5.2: Record and evaluate the seismic response of built infrastructure for opportunities to improve design and construction.
					EQ Action 5.2.1: Expand the number and locations of modern free field and built environment seismic recording instruments.
				No available funding Moved to MH 1 Combined objective and action into one concise action to reflect all-hazard focus	EQ Action 5.2.2: Expand the number and locations of modern strong motion and broadband seismic recording instruments in "low-noise" installations throughout Alaska.
					Edited EQ Obj 5.2, Action 5.2.1, & 5.2.2: Expand the number and locations of modern strong motion and broadband seismic recording instruments in "low-noise" installations throughout Alaska to record and evaluate the seismic response of built infrastructure for opportunities to improve design and construction in all hazard locations.
		Lead: DHS&EM **Support:** ARC, ASHSC, FEMA	Deferred Former timeline: 5 years	Move to MH1 No available funding Combined objective and action into one concise action	Objective 6.1: Promote statewide earthquake preparation and response training.
					Action 6.1.1: Conduct earthquake preparation and response training.
					Edited: Promote and conduct earthquake preparedness and response training throughout Alaska.
				No available funding	Action 6.1.2: Update the Department of Education and Early Development and State school districts with the most current earthquake education materials.
		Lead: DNR/DGGS	Delete	Completed 2013	Objective 7.1: Provide a publicly accessible map of active earthquake faults in Alaska.

Legacy 2013 Projects Not Included within Mitigation Action Plan

Table 9-7a Alaska SHMP Update – Medium and Low Priority Actions

(Blue text items are the legacy 2018 SHMPMAP actions and their respective status determinations)

Goals		Status			Actions
No.	**Description**	**Responsible Agency (ies)**	**New *Considered, Selected* Brought Forward *Complete, Deferred, Deleted, or Ongoing***	**Explain Status**	**Description**
		Support: Alaska Earthquake Center (AEC), USGS, ASHSC			Action 7.1.1: Identify and map active earthquake faults in Alaska.
		Lead: DNR/DGGS **Support:** DHS&EM, AEC, USGS, FEMA	Deferred Former timeline: 10 years	No available funding Combined objective and action into one concise action	Objective 8.1: Promote developing large-scale area earthquake-hazard maps. Action 8.1.1: Create and update seismic hazard area maps in Alaska. **Edited:** Develop large-scale (similar to those created for tsunami prone areas) earthquake area hazard maps of Alaska
		Lead: DHS&EM, FEMA, **Support:** ASHSC, DNR/DGGS, AEC, USGS, NEHRP, Earthquake Engineering Research Institute (EERI)	Ongoing Former timeline: 5 years		Objective 8.2: Promote the development and use of scientific seismic scenarios for planning, zoning and response. Action 8.2.1: Develop training seismic scenarios for Alaska communities.
		Lead: University of Alaska (UA) **Support:** ASHSC	Delete	Move to MH 1 Complete – UA currently offers a M.S. degree in Geophysics with an emphasis in seismology	Objective 9.1: Support advanced earthquake sciences education in Alaska's Universities. Action 9.1.1: Encourage the University of Alaska to develop and offer advanced earthquake science degrees.
FL 7	Reduce flood, coastal storm surge, and erosion related damage and loss possibilities	***Medium Flood Priority***			
		Lead: DCCED **Support:** DHS&EM, DNR, DOT/PF	Ongoing	Move to MH 1 Communities affected by disasters are receiving floodplain management training	Action 2.1.2: Educate Alaska communities about floodplain management.
		Lead: DCCED **Support:** DHS&EM	Ongoing	Move to MH 1 DCCED conducts routine outreach in coordination with FEMA.	Action 2.2.1: Publicize the benefits and availability of flood insurance in NFIP communities.
		Lead: DCCED, Insurance Servicing Organization	Deferred Former timeline: 3-5 years	Move to MH 2 Nome has become a CRS participant.	Action 3.1.1: Encourage CRS applications from appropriate NFIP communities.

Table 9-7a Alaska SHMP Update – Medium and Low Priority Actions
(Blue text items are the legacy 2018 SHMPMAP actions and their respective status determinations)

Goals		Status			Actions
No.	**Description**	**Responsible Agency (ies)**	**New *Considered, Selected* Brought Forward *Complete, Deferred, Deleted, or Ongoing***	**Explain Status**	**Description**
		(ISO) **Support:** Denali Commission, DHS&EM		Bethel, Mat-Su Borough, and Fairbanks North Star Borough are considering this program.	
		Lead: DCCED **Support:** DHS&EM, DOT&PF, FEMA	Deferred Former timeline: 2-years	Move to MH 2 Combined objective with action, then edited for clarity and to better allow for fulfilling regulatory intent	Objective 3.2: Encourage FEMA to create special considerations for Alaska building conditions and engineer certification to the CRS program. Action 3.2.1: Seek an appropriate change in FEMA policy, procedure, and regulation where necessary. **Edited for clarity:** Encourage FEMA to modify building and engineer certification policy, procedure, and regulations to recognize rural Alaska's environmental conditions that will allow rural communities to fulfill CRS programmatic requirements.
		Lead: DCCED **Support:** DHS&EM, DOT/PF, DEED, DEC	Deferred Former timeline: 2-years	Move to MH 2 Edited objective and associated action to better fulfill intent	Objective 3.3: Encourage FEMA to permit applicable agencies to develop and enforce ordinances in the Unincorporated Communities within the Unorganized Borough. Action 3.3.1: Seeking similar NFIP waiver that was approved for HMP planning requirement for rural Unincorporated communities within Alaska's Unorganized Borough. **Edited for clarity:** Encourage FEMA to develop a waiver process for permitting applicable agencies to develop and enforce ordinances in the Unincorporated Communities within the Unorganized Borough. i.e.: NFIP membership and CRS participation
		Lead: DOT/PF, Local Communities **Support:** FEMA, ADF&G, DNR, DEC, USACE, USGS, EPA, NMFS	Ongoing	Combined redundant objective and actions into one concise action	Objective 4.1: Reduce flooding caused by undersized culverts statewide . Action 4.1.1: Support studies identifying culvert capacities that accommodate floodwaters and prevent flood damage. Action 4.1.2: Support culvert replacement projects that meet or exceed expected floodwater discharges. **Edited for clarity:** Replace undersized culverts by identifying and mitigating culvert capacities that exceed expected capacity or do not accommodate flood water damage. This could help reduce or prevent statewide flooding events
		Lead: USACE,	Deferred Former	Combined objective and	Objective 4.2: Reduce flooding and damage caused by ice jams statewide.

Legacy 2013 Projects Not Included within Mitigation Action Plan

Table 9-7a Alaska SHMP Update – Medium and Low Priority Actions
(Blue text items are the legacy 2018 SHMPMAP actions and their respective status determinations)

Goals		Status			Actions
No.	**Description**	**Responsible Agency (ies)**	**New *Considered, Selected* Brought Forward *Complete, Deferred, Deleted, or Ongoing***	**Explain Status**	**Description**
		DCCED, NRCS, FEMA **Support:** DHS&EM	Timeline: 5-years	action into one concise action	Action 4.2.1: Support studies focused upon ice jam flood mitigation and ice impact damage in Alaska.
					Edited for clarity: Fund ice jam mitigation and impact avoidance studies to reduce repetitive ice jam location damage and losses.
		Low Flood Priority			
		Lead: NWS **Support:** DHS&EM, USGS, USACE, DCCED, DOT/PF	Ongoing	Combined objective and actions into one concise action	Goal 5: Improve forecasting and warning systems
					Objective 5.1: Increase the water discharge, flood, and tidal data available.
					Action 5.1.1: Install additional stream and precipitation gauges.
					Edited for Clarity: Install additional stream and precipitation gauges to improve flood forecasting and warnings with readily available water discharge, flood, and tidal data.
		Lead: DCCED **Support:** DHS&EM, USACE, UAF/GI, FEMA, DNR/DGGS, DEED, USGS	Ongoing	Convert Objective and edited as a statewide action. No available funding for statewide remote communities	Objective 6.1 - Carry forward as a stand-alone project: Increase the coverage and accuracy of Alaska's flood-prone communities by developing flood hazard area mapping.
		Lead: DCCED **Support:** DHS&EM, USACE, UAF/GI, FEMA, DNR/DGGS, DEED, USGS	Ongoing	No available funding for statewide remote communities	Action 6.1.1: Implement RISK *Map principles in high-risk communities.*
					Reformatted for clarity: Develop statewide Risk Mapping initiatives to provide fact based locational discharge rates and future and ongoing flood estimates for all "at risk-flood prone" communities along Alaska's complex river systems.
		Lead: FEMA and City & Borough of Juneau **Support:** DCCED, DHS&EM, USACE, UAF/GI, FEMA, DNR/DGGS, DEED	**Delete**	**Completed May 2010**	Action 6.2.1: Update flood hazard maps for the Juneau area and produce Flood Insurance Rate Maps (FIRM) in digital and GIS formats.
		Lead: DCEED, FEMA **Support:** DHS&EM,	Ongoing	Combined objective and action into one concise action	Objective 6.3: Update and digitize all NFIP participating Community FIRM maps.
					Action 6.3.1: Continue to digitize FIRM's through the RISK Mapping.
					Combined for clarity: Encourage DCCED

Table 9-7a Alaska SHMP Update – Medium and Low Priority Actions
(Blue text items are the legacy 2018 SHMPMAP actions and their respective status determinations)

Goals		Status			Actions
No.	**Description**	**Responsible Agency (ies)**	**New *Considered, Selected* Brought Forward *Complete, Deferred, Deleted, or Ongoing***	**Explain Status**	**Description**
		USACE, UAF/GI, FEMA, DNR/DGGS, DEED			to continue updating and digitizing all NFIP participating Community FIRM maps through the State's RISK Map program.
		Lead: DOT/PF **Support:** USGS	Ongoing	Combined objective and action into one concise action	Objective 6.4: Improve methods for estimating the magnitude of potential floods.
					Action 6.4.1: Collect annual peak flow and flood hydrograph data at representative streams throughout Alaska.
					Action 6.4.2: Maintain updated flood-frequency regression equations.
					Combined for clarity: Improve annual peak flow and flood hydrographic data collection to provide accurate flood-frequency regression equations and reporting for Alaska rivers and streams.
		Lead: DOT/PF **Support:** DHS&EM, DCCED, DNR, UAF/GI, DEC	Ongoing	Combined objective and action into one concise action	Objective 7.1: Identify alluvial fans and investigate strategies or incentives to preclude construction or improvements to private lands within these flood corridors.
					Action 7.1.1: Develop strategic planning incentives and model strategies addressing land-use planning and permitting initiatives in alluvial fan areas.
					Combined for clarity: Identify alluvial fans develop strategies or incentives to preclude construction or improvements to private lands within alluvial fan flood corridors.
		Lead: DOT/PF **Support:** DHS&EM, DCCED, DNR, UAF/GI, DEC	Ongoing	Combined objective and action into one concise action	Objective 7.2: Maintaining debris flow corridors
					Action 7.2.1: Develop strategic planning incentives and strategies addressing land-use planning and permitting initiatives in debris flow corridors to maintain their intended purpose.
					Edited to clarify: Develop strategic planning incentives, permitting initiatives, and strategies to maintain intended land-use purposes in debris flow corridors
		Lead: All SME agencies, local governments, ADF&GHD. **Support:** DHS&EM, DEC, DNR, DCCED, and local communities	Ongoing	Combined objective and actions to eliminate duplication Created one concise action	Objective 8.1: Create habitat protection corridors and restore damaged habitat.
					Action 8.1.1: Encourage local enforcement policies, and education
					Action 8.1.2: Encourage communities to adopt habitat protection corridors along streams and rivers.
					Section 5.9.3 Erosion Goals, Objectives, and Actions, Action 3.1.2: Encourage local action and education
					Edited for simplicity: Create localized

Table 9-7a Alaska SHMP Update – Medium and Low Priority Actions
(Blue text items are the legacy 2018 SHMPMAP actions and their respective status determinations)

Goals		Status			Actions
No.	**Description**	**Responsible Agency (ies)**	**New *Considered, Selected* Brought Forward *Complete, Deferred, Deleted, or Ongoing***	**Explain Status**	**Description**
					habitat protection corridors and encourage local community adoption and enforcement to protect and restore damaged habitat.
		Lead: Federal, State, and Local Communities with tax authorities. **Support:** DHS&EM, DEC, DNR, DCCED	Ongoing	Combined duplicated actions into one concise action	Action 8.1.3: Provide habitat tax credits for property owners who improve stream/river habitat or maintain a vegetative buffer adjacent to streams or rivers.
					Section 5.9.3 Erosion Goals, Objectives, and Actions, Action 3.1.3: Provide habitat tax credits for property owners who improve stream/river habitat or maintain a vegetative buffer adjacent to streams or rivers.
					Edited for clarity: Encourage State, federal and local jurisdictions with tax authority to provide habitat tax credits for property owners who improve stream/river habitat or maintain a vegetative buffer adjacent to streams or rivers.
		Lead: DCCED, Governor's Office, State Legislature **Support:** DHS&EM, local communities, Alaska Municipal League (AML)	Ongoing	Edited objective to create a more concise action	Goal 9: Encourage the adoption of Model State Legislation for Floodplain Management contained in the 1990 Flood Mitigation Plan.
					Edited for clarity: Encourage the State Legislature to adopt the "1990 Flood Mitigation Plan's, Model State Floodplain Management Legislation" initiative.
		Lead: DCCED, Governor's Office, State Legislature **Support:** DHS&EM, local communities, Alaska Municipal League (AML)	Ongoing	Edited objective to create a more concise action	Action 9.1.1: Encourage legislation to develop initiatives and authorities for local governments at all levels to develop land use ordinances and policies along with appropriate enforcement powers.
					Edited for clarity: Encourage local jurisdictions to develop floodplain management focused land use ordinances and policies along with appropriate enforcement powers.
		Lead: DCCED **Support:** DHS&EM, DOT/PF, ADF&G, NMFS, USGS, USACE, DNR, DEC, EPA	Ongoing	Edited goal to create a more concise action	Goal 10: Foster interagency coordination. Reduce potential debris jams by creating interagency cooperation and agreements concerning riverbank and riverbed management. Agencies need to coordinate and refine permitting processes and annual drainage system maintenance plans to minimize flood related damages.
					Edited as a direct action: Reduce potential debris jams by creating interagency cooperation and agreements concerning:

Table 9-7a Alaska SHMP Update – Medium and Low Priority Actions
(Blue text items are the legacy 2018 SHMPMAP actions and their respective status determinations)

Goals		Status			Actions
No.	**Description**	**Responsible Agency (ies)**	**New *Considered, Selected* Brought Forward *Complete, Deferred, Deleted, or Ongoing***	**Explain Status**	**Description**
					• Riverbank stabilization and riverbed management, • Coordinate, refine, and streamline emergency permitting processes, and • Develop annual drainage system maintenance plans to minimize flood related damages.
		Lead: DCCED **Support:** DHS&EM, DOT/PF, ADF&G, NMFS, USGS, USACE, DNR, DEC, EPA	Ongoing	Draft initiatives held up in SHMAC since 2011	Action 10.2.1: Develop groundwater recharge, nutrient transport, and wetland habitat initiatives throughout threatened watersheds.
					Edited for clarity: Develop agency coordinated groundwater recharge, nutrient transport, and wetland habitat initiatives throughout threatened watersheds.
		Lead: ADF&G, **Support:** DHS&EM, USACE, DCCED, DOT/PF, DEC, USACE, NMFS, EPA, USGS	Ongoing	Draft initiatives held up in SHMAC since 2011	Objective 11.1: Develop a State disaster mitigation grant program to fund projects and planning.
					Action 11.1.1: Research the feasibility of establishing a State fund for structural or channel modifying mitigation projects.
					Edited for clarity: Develop a State Disaster Mitigation Program to fund damaged public facility structural, riverine, or coastal channel modifications, that fall below federal disaster support criteria.
GF 8	Reduce ground failure (GF) damage and loss possibilities	***Medium Priority***			
		Lead: DCCED **Support:** DHS&EM, DGGS, and Local communities	Deferred Former timeline: 3-5 years	Moved to MH 3 Combined objective and action into one concise action Move to MH 1	Objective 2.1: Encourage construction practices that mitigate soil instability.
					Action 2.1.1: Provide education and training demonstrating improved construction practices.
					Objective 2.2: Encourage land-use planners to consider landslide zones.
					Action 2.2.1: Encourage the State and local communities to enact land use regulations addressing ground failure hazards in known areas.
					Action 3.4.2: Support building practices reducing damage from permafrost.
		Lead: Local communities, DOT/PF, DNR/DGGS, and Risk Management **Support:** DHS&EM	Deferred Former timeline: 2-5 years	Move to MH 2 No Available funding	Action 3.1.1: Include ground failure/landslide hazards in the risk and vulnerability assessment-mitigation planning so that at risk facilities, structures, and roadways are identified.
		Lead: DCCED, DOT/PF	Deferred Former timeline:	Combined objective and action into one	**GF Action 3.1.2:** Obtain funding for the mitigation of landslide prone structures, facilities, and roadways.

Legacy 2013 Projects Not Included within Mitigation Action Plan

Table 9-7a Alaska SHMP Update – Medium and Low Priority Actions

(Blue text items are the legacy 2018 SHMPMAP actions and their respective status determinations)

Goals		Status			Actions
No.	**Description**	**Responsible Agency (ies)**	**New *Considered, Selected* Brought Forward *Complete, Deferred, Deleted, or Ongoing***	**Explain Status**	**Description**
		Support: DHS&EM, FEMA, DNR/DGGS, State Risk Management, local communities	5 years	concise action	**GF Action 3.2.2:** Fund community acquisition of property in ground failure/landslide areas.
					GF Snow Avalanche Action 1.1.3: Encourage communities to relocate buildings out of the hazard area
					GF Actions 3.1.2, 3.2.2, & Snow Avalanche 1.1.3: Encourage communities to fund relocating residential and public structures away from ground failure (land subsidence, permafrost, landslide, and snow avalanche) locations.
		Lead: USACE and DNR/DGGS **Support:** DHS&EM and FEMA	Deferred Former timeline: 5 years	Combined objective and action into one concise action	Objective 3.3: Control and stabilize landslides where appropriate and cost-effective.
					Action 3.3.1: Support and fund landslide mitigation projects.
					Edited for simplicity: Fund landslide mitigation projects that relocate or prevent landslides by stabilizing threat areas.
		Lead: DGGS, UAF **Support:** USGS	Deferred Former timeline: 5 years	Combined objective and action into one concise action	Objective 3.4: Identify areas vulnerable to subsidence and determine mitigation solutions.
					Action 3.4.1: Identify permafrost areas
					Edited for simplicity: Identify permafrost and other ground failure locations or areas and develop a suite of potential mitigation solutions.
		Legacy 2013 SHMP Section 5.3.3 Snow Avalanche Goals, Objectives, and Actions			
		Medium Priority			
		Lead: DOT&PF, DPS, Avalanche centers, Local communities, Alaska State Parks **Support:** DHS&EM	Deferred Former timeline: 5 years	No available programmatic funding	Action 3.1.2: Support a standardized community avalanche warning sign program that clearly communicates avalanche danger areas.
		Lead: Avalanche centers, Alaska State Parks, DNR, USFS, NPS **Support:** AAIC	Ongoing	Edited for simplicity No available programmatic funding	Action 3.1.4: Distribute avalanche safety information through recreational equipment stores.
WF 12	Reduce tundra/wildland fire (WF) damage and loss	***Medium Priority***			
		Lead: *DHS&EM, Local communities*	*Ongoing Former Timeline: 1-year*	*Combined similar project Objectives and associated*	*Objective 3.1: Encourage communities susceptible to wildland fire to conduct a wildland/urban interface fire hazard assessment and risk analysis.*

Table 9-7a Alaska SHMP Update – Medium and Low Priority Actions
(Blue text items are the legacy 2018 SHMPMAP actions and their respective status determinations)

Goals		Status			Actions
No.	**Description**	**Responsible Agency (ies)**	**New *Considered, Selected* Brought Forward *Complete, Deferred, Deleted, or Ongoing***	**Explain Status**	**Description**
	possibilities	***Support:*** *DNR/DOF, BLM/AFS, USFS, USFWS*		*actions to create one viable action.* *The US Fish and Wildlife Service established a program assisting native communities in Alaska with wildland fire assessments and mitigation projects.* *DHS&EM began presenting planning techniques during their bi-annual disaster preparedness conferences in 2014.*	*Action 3.1.1: Provide technical assistance and grant funding to local jurisdictions conducting wildland fire hazard assessments and incorporate the results into their hazard mitigation planning.*
					Objective 3.2: Encourage communities to incorporate their wildland fire risk assessments into their community development (CDPs), capital improvement projects (CIPs), hazard mitigation (HMPs), and emergency response (ERPs) plans.
					Action 3.2.1: Provide technical assistance integrating wildland fire risk assessments with hazard mitigation and emergency operations plans.
					Edited: *Provide technical assistance and grant funding for local jurisdictions conducting wildland fire hazard assessments to incorporate the results into their hazard mitigation (HMP), community development (CDPs), capital improvement projects (CIPs), and emergency response (ERPs) plans*

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APPENDIX 13.27 2018 ALASKA HAZARD RISK LOCATION FIGURES

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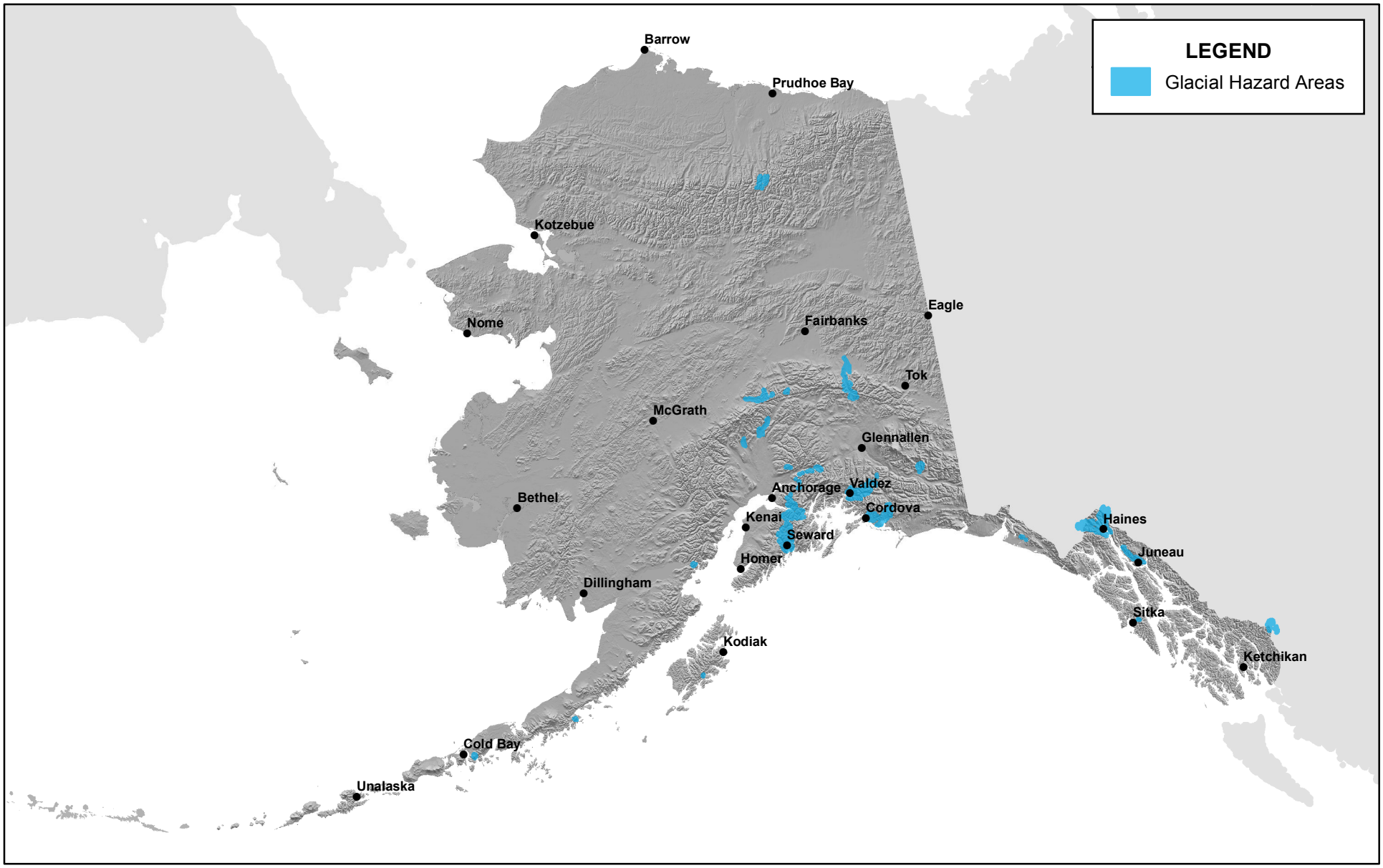

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GLACIAL HAZARD AREAS

STATE OF ALASKA
STATE HAZARD MITIGATION PLAN
OCTOBER 2018

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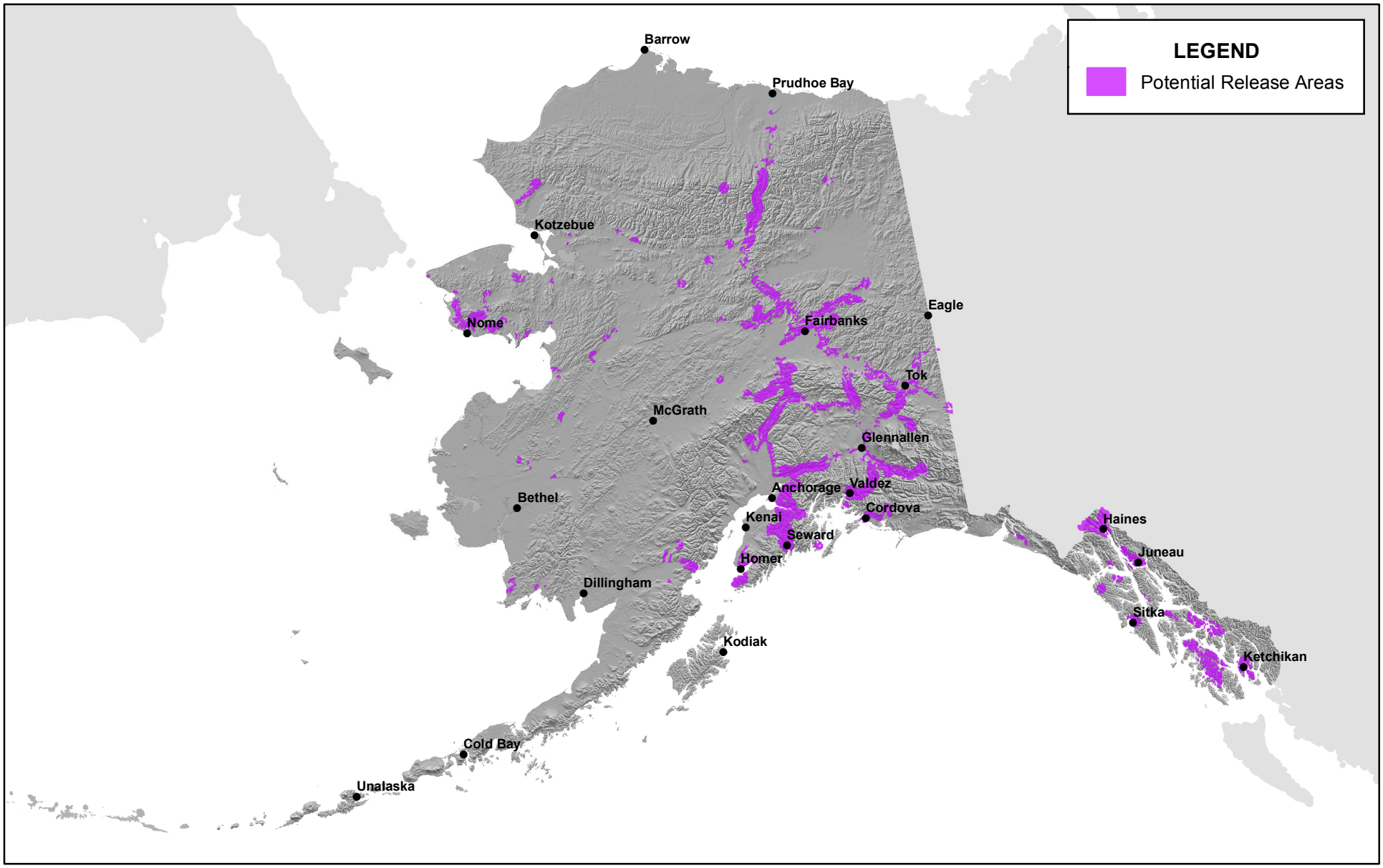

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AVALANCHE HAZARD AREAS

STATE OF ALASKA
STATE HAZARD MITIGATION PLAN
OCTOBER 2018

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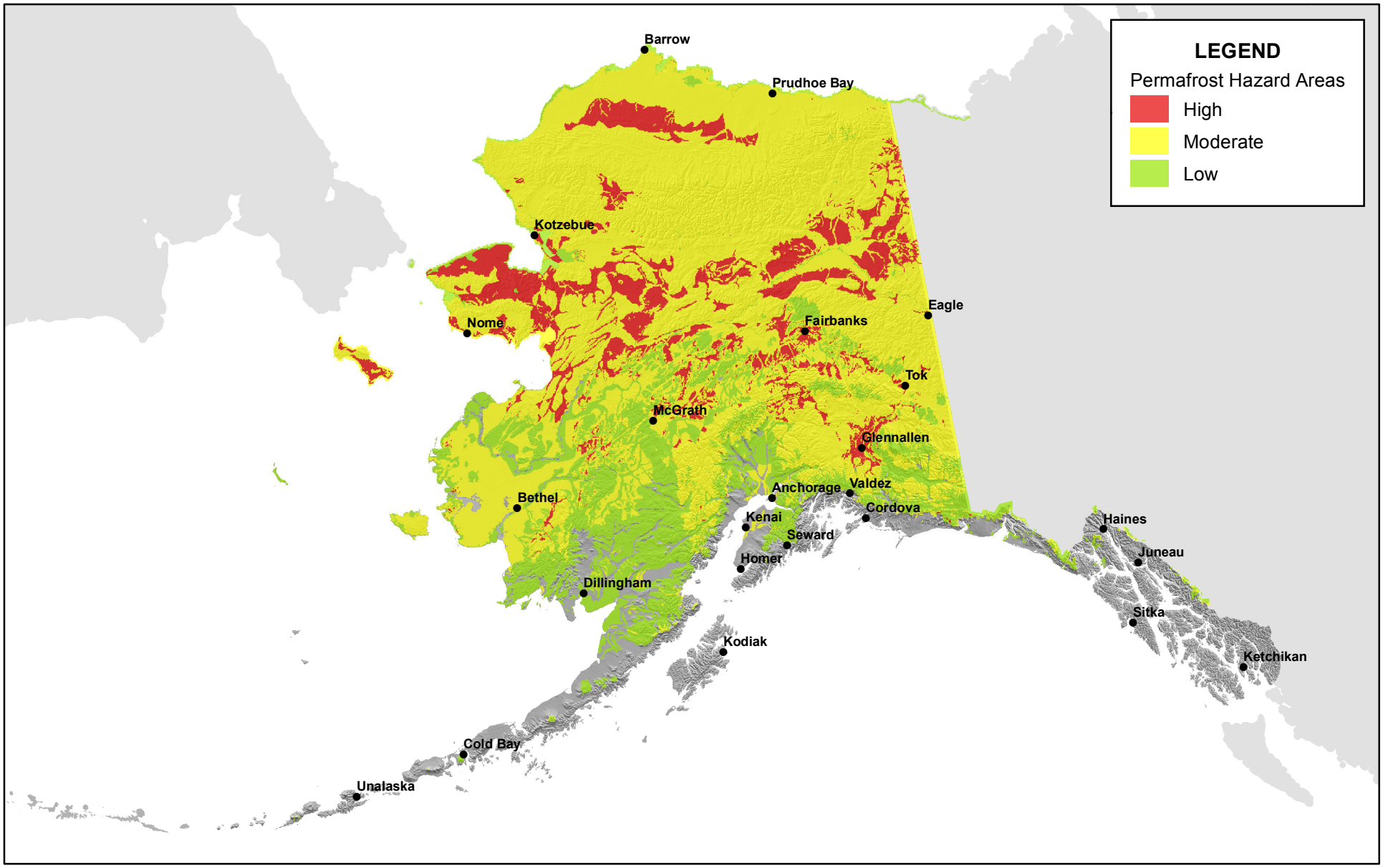

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PERMAFROST HAZARD AREAS

STATE OF ALASKA

STATE HAZARD MITIGATION PLAN

OCTOBER 2018

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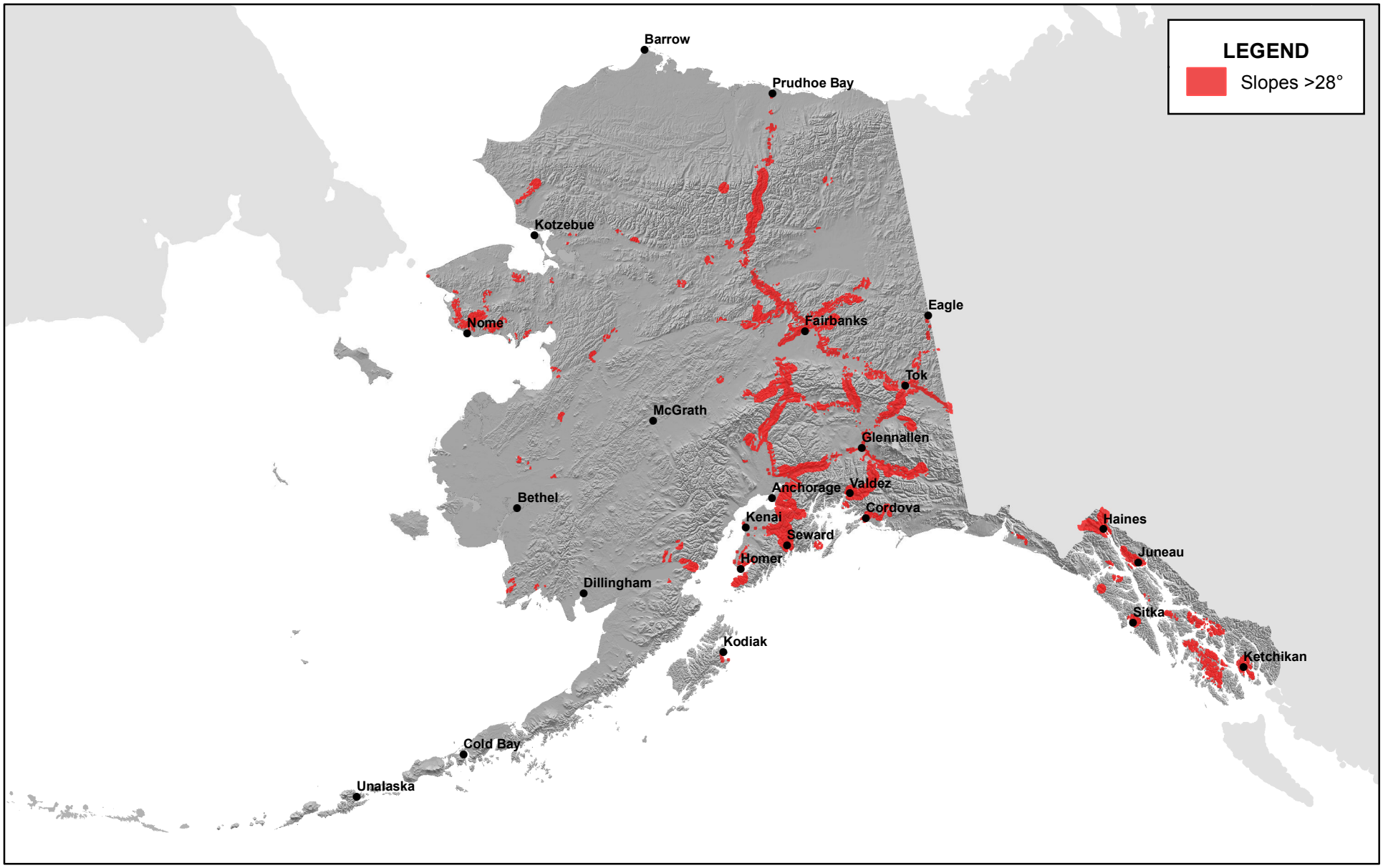

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LAND FAILURE HAZARD AREAS

STATE OF ALASKA

STATE HAZARD MITIGATION PLAN

OCTOBER 2018

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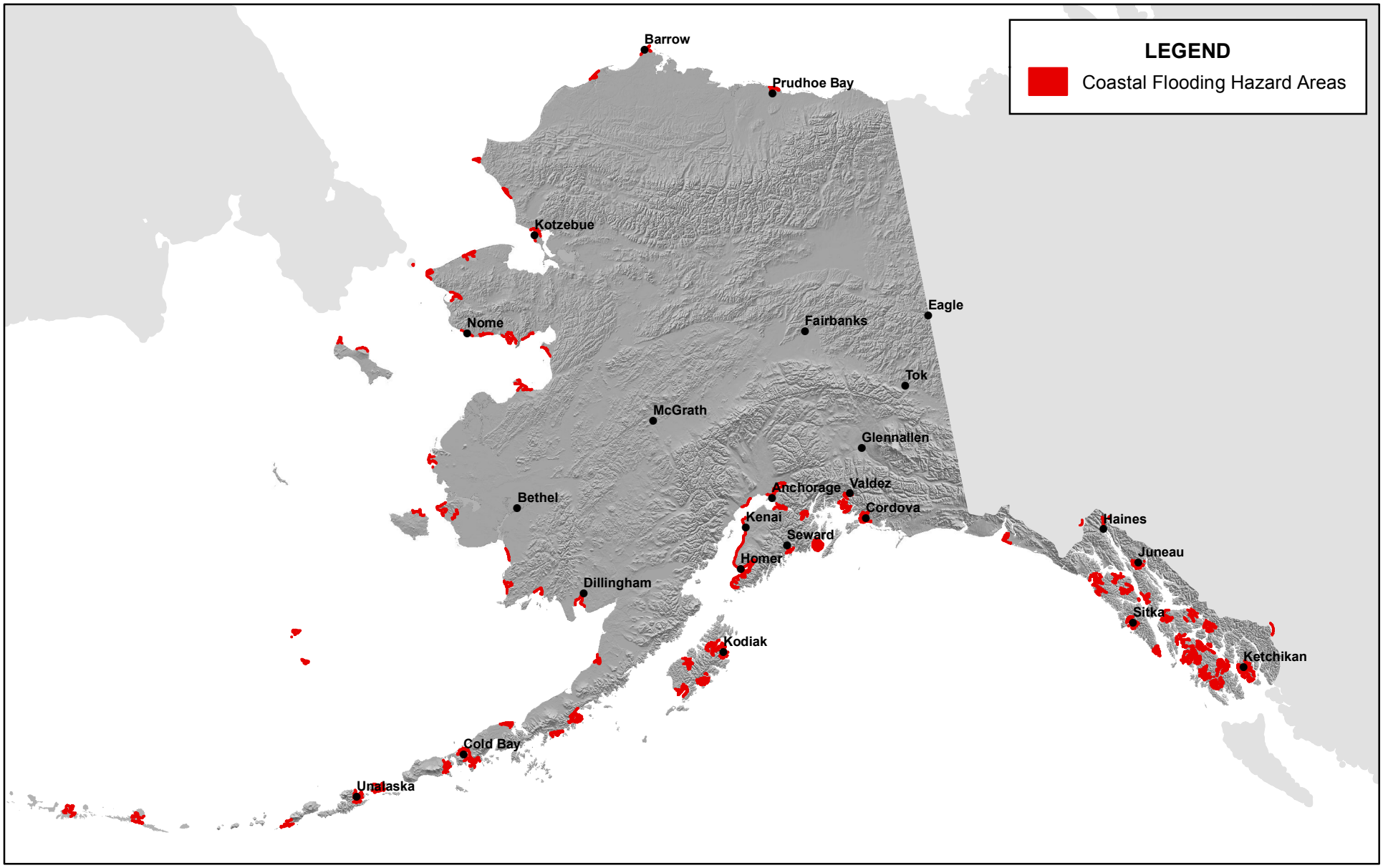

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COASTAL FLOODING HAZARD AREAS

STATE OF ALASKA
STATE HAZARD MITIGATION PLAN
OCTOBER 2018

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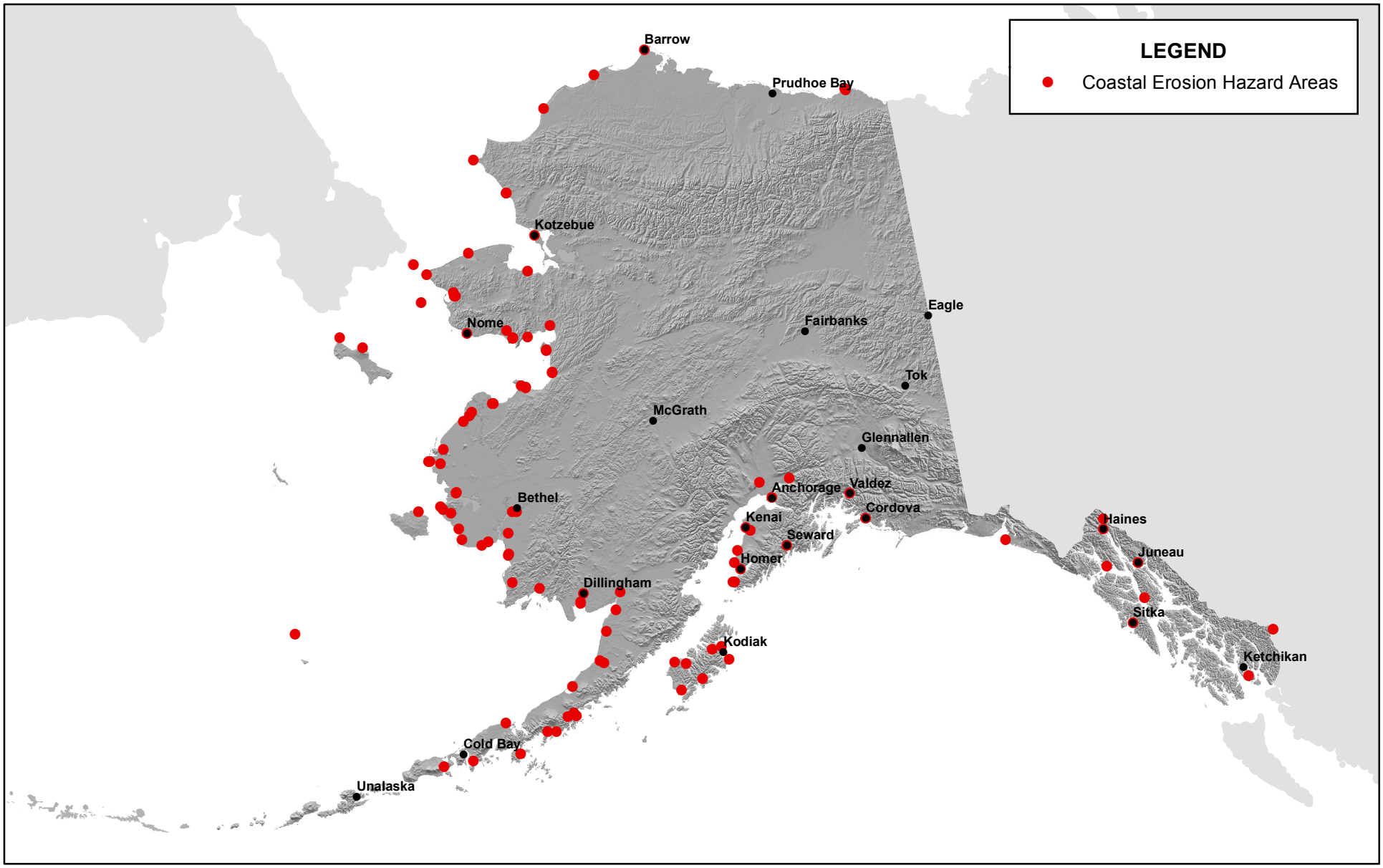

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COASTAL EROSION HAZARD AREAS

STATE OF ALASKA

STATE HAZARD MITIGATION PLAN

OCTOBER 2018

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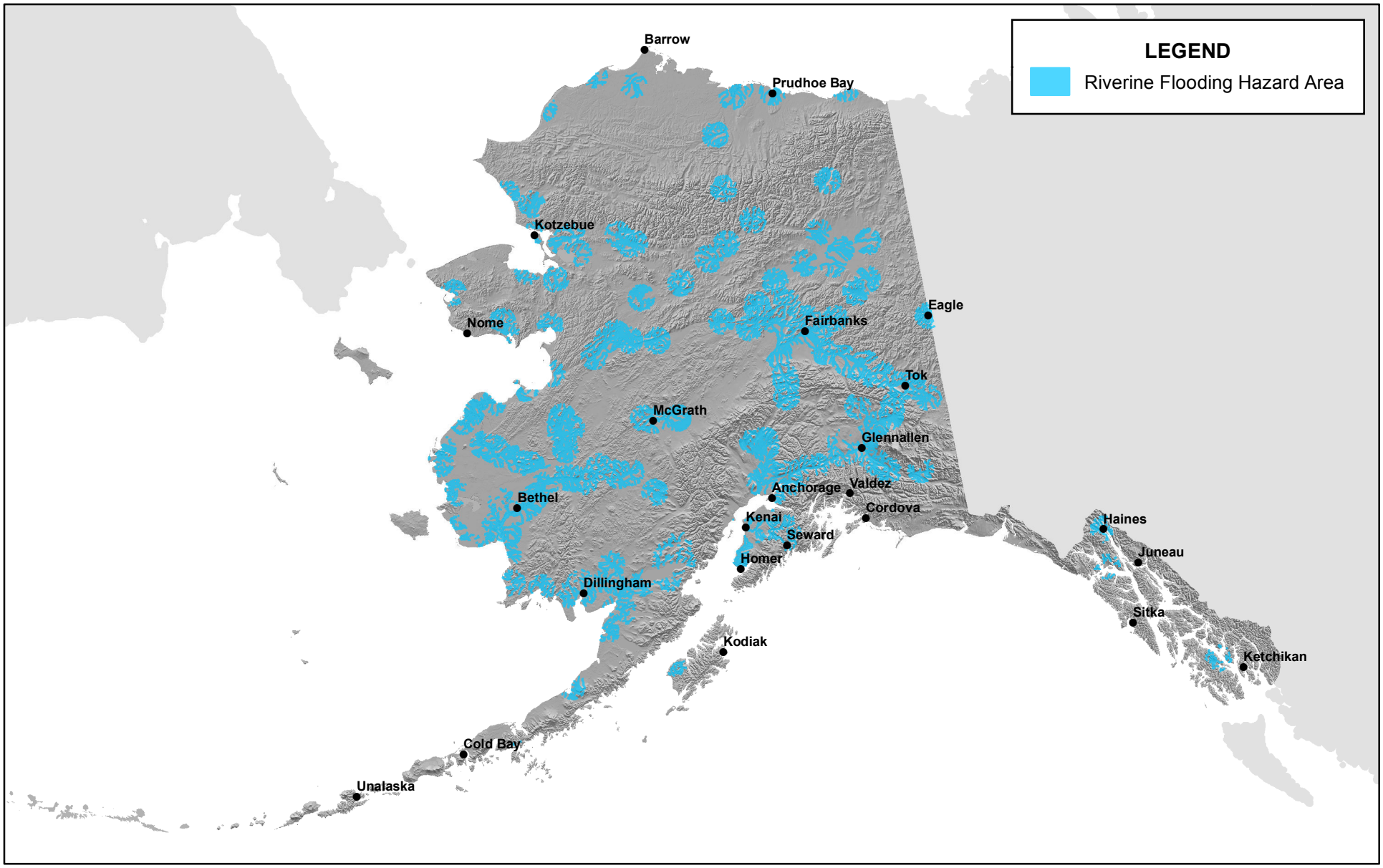

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RIVERINE FLOODING HAZARD AREAS

STATE OF ALASKA
STATE HAZARD MITIGATION PLAN
OCTOBER 2018

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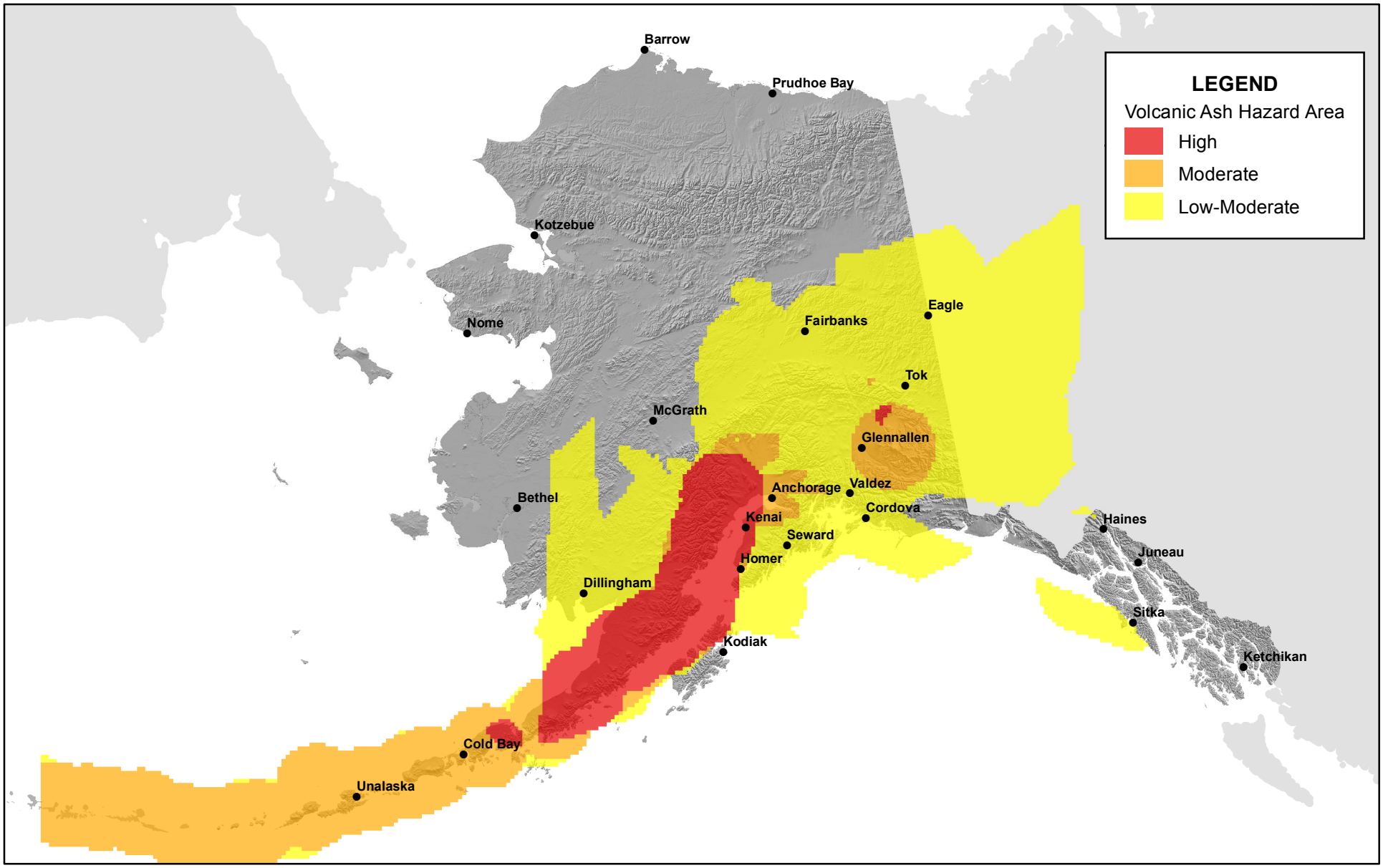

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VOLCANIC ASH HAZARD AREAS

STATE OF ALASKA
STATE HAZARD MITIGATION PLAN
OCTOBER 2018

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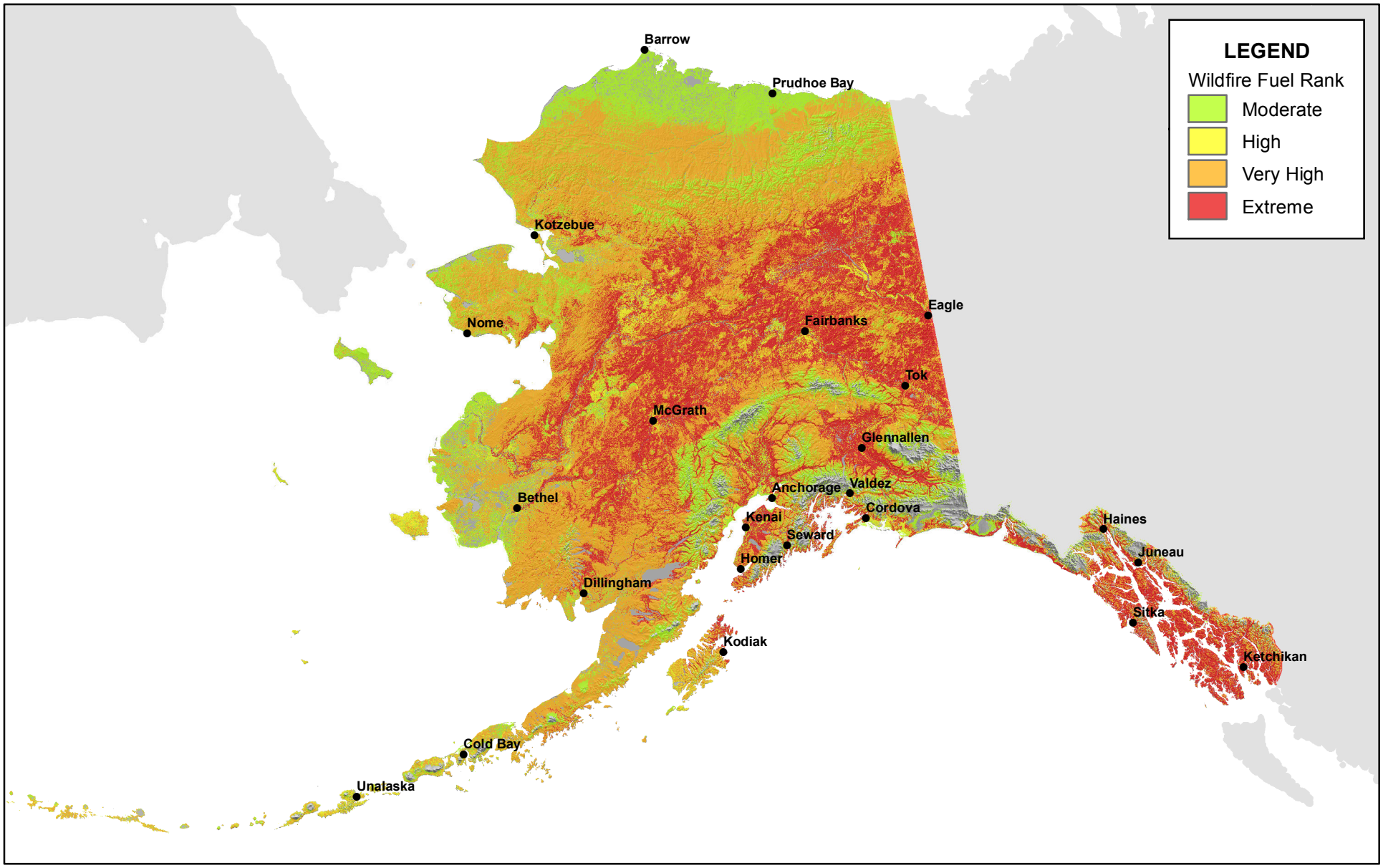

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WILDFIRE HAZARD AREAS

STATE OF ALASKA

STATE HAZARD MITIGATION PLAN

OCTOBER 2018

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