Nome Area Tribes including the Nome Eskimo Community, King Island Native Community, Native Village of Council, and the Village of Solomon 2024 Multi-Jurisdictional Hazard Mitigation Plan

Dates Active: XX, 2024 - XX, 2029

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KAWERAK, INC.

FAIRWEATHER SCIENCE

This document was prepared under a grant from the Bureau of Indian Affairs to Kawerak, Inc., and managed by the Emergency Preparedness Department of Kawerak, Inc.

Front Cover Photos

Top Left: Nome — Top Right: King Island

Bottom Left: Council — Bottom Right: Solomon

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Acronyms/Abbreviations

°F	Degrees Fahrenheit
AICC	Alaska Interagency Coordination Center
AK	Alaska
BRIC	Building Resilient Infrastructure and Communities
BSRHA	Bering Straits Regional Housing Authority
CFR	Code Of Federal Regulations
CS	Cryosphere
DCCED	Department of Commerce, Community, and Economic Development
DCI	Disaster Cost Index
DCRA	Division of Community and Regional Affairs
DGGS	Division of Geological and Geophysical Survey
DHS	Department of Homeland Security
DHS&EM	Division of Homeland Security and Emergency Management
DMA 2000	Disaster Mitigation Act Of 2000
DMVA	Department of Military and Veterans Affairs
ENSO	El Niño/La Niña Southern Oscillation
EPA	Environmental Protection Agency
EQ	Earthquake
ER	Erosion
FEMA	Federal Emergency Management Agency
FL	Flood
ft	Feet
GF	Ground Failure (Landslide)
GIS	Geographic Information System
HMA	Hazard Mitigation Assistance
HMGP	Hazard Mitigation Grant Program
HMP	Hazard Mitigation Plan
KINC	King Island Native Community
Kts	Knots
M	Magnitude
MAP	Mitigation Action Plan
MH	Multi-Hazard
MJHMP	Multi-Jurisdictional Hazard Mitigation Plan
MLLW	Mean Lower Low Water
MMI	Modified Mercalli Intensity
mph	Miles Per Hour
NCAR CCSM4	National Center for Atmospheric Research Community Climate System Model 4.0
NEC	Nome Eskimo Community
NFIP	National Flood Insurance Program
NOAA	National Oceanic and Atmospheric Administration
NPS	National Park Service
NRCS	Natural Resources Conservation Service
NVC	Native Village of Council
NWS	National Weather Service
PGA	Peak Ground Acceleration
RA	Radon
RCP(s)	Representative Concentration Pathway(s)
SHMP	2023 Alaska State Hazard Mitigation Plan
SNAP	Scenarios Network for Alaska + Arctic Planning

Acronyms/Abbreviations

Stafford Act	Robert T. Stafford Disaster Relief and Emergency Assistance Act
SW	Severe Weather
TS	Tsunami
UAF	University of Alaska Fairbanks
US, U.S., or USA	United States
USACE	United States Army Corps of Engineers
USDA	United States Department of Agriculture
USDM	U.S. Drought Monitor
USGCRP	United States Global Change Research Program
USGS	United States Geological Survey
VOS	Village of Solomon
WF/CF	Wildland Fire/Community Fire

EXECUTIVE SUMMARY

This Executive Summary meets the State of Alaska, Division of Homeland Security and Emergency Management's (DHS&EM) Element H: Additional State Requirements in the Local Mitigation Plan Review Tool.

The purpose of hazard mitigation planning is to reduce or eliminate long-term risk to people and property from natural hazards. The Nome Area Tribes (including Nome Eskimo Community, King Island Native Community, Native Village of Council, and the Village of Solomon) developed a Hazard Mitigation Plan (HMP) to make the residents and infrastructure in the Nome area and historical Village sites less vulnerable to future hazard events. This plan was prepared following the requirements of the Disaster Mitigation Act of 2000 so that the Tribes would be eligible for the Federal Emergency Management Agency's (FEMA) Hazard Mitigation Assistance (HMA) grant programs and other federal programs.

This HMP was originally intended to protect Tribal assets in the Nome area as King Island, Council, and Solomon are abandoned townsites and most Tribal members reside in Nome. However, throughout the planning process, the Planning Team expressed desire to include Tribally-owned facilities/assets in their abandoned townsites in this HMP as there is desire to reinhabit these Villages in the future. The original townsites are commonly used by Tribal members for subsistence hunting, fishing, and gathering during the summer months.

The Tribes followed a planning process prescribed by FEMA, which began with the formation of a Hazard Mitigation Planning Team comprised of key Tribal representatives from each jurisdiction. The Planning Team conducted a risk assessment that identified and profiled hazards that pose a risk to Nome as well as their historic townsites; assessed their vulnerability to those hazards; and examined the capabilities currently in place to mitigate them.

The people, property, and lands that the community members depend on are vulnerable to several hazards that are identified, profiled, and analyzed within this Plan. Earthquake, flood, erosion, severe weather, wildland/tundra fire, landslide, changes in the cryosphere, tsunami, and radon are among the hazards that could have a significant impact on the people, property, and lands in Nome, King Island townsite, Council townsite, and Solomon townsite.

The hazards of greatest concern to the Planning Team are XX.

Based upon the risk assessment review and goal setting process, the Planning Team developed the following overarching goals for this Plan:

1.
2.
3.

The 2024 MJHMP establishes a series of specific mitigation strategies that were developed collaboratively with the intent to meet the identified mitigation goals, by the Planning Team. These strategies provide a basis for continued planning to develop specific action plans. These will be implemented over time and can provide a means to measure progress towards hazard reduction. The Plan also describes future update and maintenance procedures.

Community Profile

This HMP includes the Federally Recognized Tribes in the Nome area including Nome Eskimo Community, King Island Native Community, Native Village of Council, and the Village of Solomon.

King Island, Council, and Solomon do not have year-round populations and most residents have relocated to Nome. However, the Tribes still have assets in these Villages and some members travel to the townsites during the summer for subsistence and recreational activities.

This MJHMP was developed to protect each Federally Recognized Tribe's assets in the Nome area as well as their assets in their historical townsites.

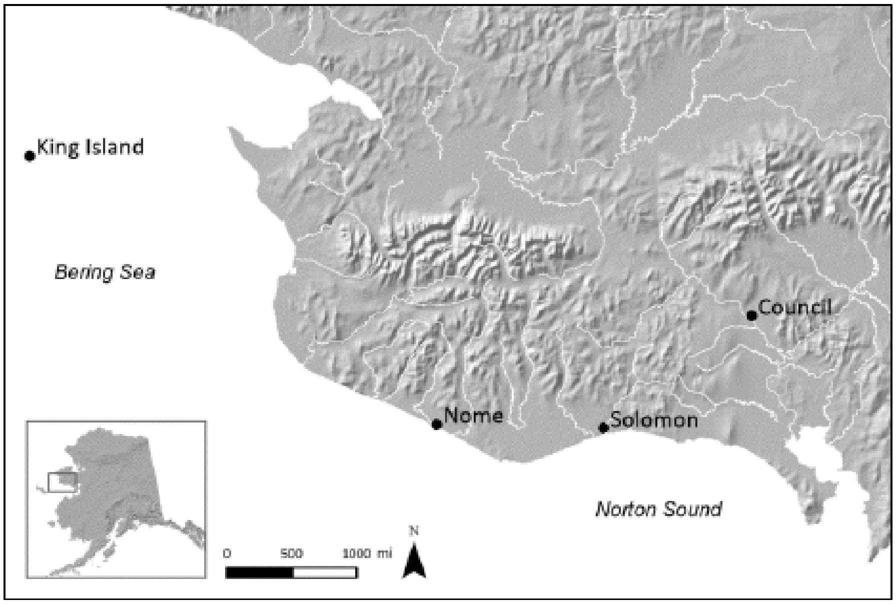


Figure ExSummary-0-1 Map of the Planning Area

Location

Nome

Nome was built along the Bering Sea on the south coast of the Seward Peninsula, facing Norton Sound. It lies 539 air miles northwest of Anchorage, a 75-minute flight. It lies 102 miles south of the Arctic Circle and 161 miles east of Russia.

Nome encompasses 12.5 square (sq) miles of land and 9.1 sq miles of water. Nome is the transportation and commercial hub community for the communities in the Bering Strait Region.

King Island

King Island is located 40 miles west of Cape Douglas in the Bering Sea, northwest of Nome. The island is primarily precipitous rock, 700 feet high, and approximately one mile long.

Council

Council is located at the terminus of the Nome/Council road, 60 miles northeast of Nome. It lies on the left bank of the Niukluk River.

Solomon

Solomon is located on the west bank of the Solomon River, 30 miles east of Nome. It lies one mile north of Norton Sound.

History

Nome Eskimo Community

Malemiut, Kauweramiut, and Unalikmiut Inupiat have occupied the Seward Peninsula historically, with a well-developed culture adapted to the environment. Around 1870 to 1880, the caribou declined on the Peninsula and the resident Inupiat changed their diets. Gold discoveries in the Nome area had been reported as far back as 1865 by Western Union surveyors seeking a route across Alaska and the Bering Sea. But it was a $1500-to-the-pan gold strike on tiny Anvil Creek in 1898 by three Scandinavians, Jafet Lindeberg, Erik Lindblom, and John Brynteson, that brought thousands of miners to the "Eldorado." Almost overnight an isolated stretch of tundra fronting the beach was transformed into a tent-and-log cabin city of 20,000 prospectors, gamblers, claim jumpers, saloon keepers, and prostitutes. The gold-bearing creeks had been almost completely staked, when some entrepreneur discovered the "golden sands of Nome." With nothing more than shovels, buckets, rockers and wheel barrows, thousands of idle miners descended upon the beaches. Two months later the golden sands had yielded one million dollars in gold (at $16 an ounce). A narrow-gauge railroad and telephone line from Nome to Anvil Creek was built in 1900. The City of Nome was formed in 1901. By 1902 the more easily reached claims were exhausted and large mining companies with better equipment took over the mining operations. Since the first strike on tiny Anvil Creek, Nome's gold fields have yielded $136 million. The gradual depletion of gold, a major influenza epidemic in 1918, the Great Depression, and World War II each influenced Nome's population. A disastrous fire in 1934 destroyed most of the city.

The population of Nome is home to Inupiat and non-native residents. Today, Nome is a regional hub for communities across the Seward Peninsula and Norton Sound, providing medical and jet services for locals and residents of the surrounding communities. Subsistence activities are prevalent in the community. Former villagers from King Island, Council, and Solomon also live in Nome. Nome is the finish line for the 1,100-mile Iditarod Trail Sled Dog Race from Anchorage, held each March.

King Island Native Community

King Island was historically occupied by Inupiat natives, who called themselves "Uguivangmuit." The Island was named by Captain Cook in 1778 for Lt. James King, a member of his party. In 1900, the Inupiaq name was reported to be "Ukivok." The village was occupied during the winter by approximately 200 Inupiat, who achieved fame as hunters and ivory carvers and who lived in walrus-skin dwellings lashed to the face of the cliff. The islanders subsisted on walrus, seal, birds, berries, and green plants. Every summer, the entire population would travel to the mainland by kayak and umiak and remain for a few months. Once Nome was founded, they customarily camped near town each summer to sell their intricate ivory carvings. In 1937, Lt. Commander R.C. Sarratt reported that the village was comprised of 190 residents, 45 houses, a Catholic church, and a school with electric lights, heat, and running water. That year, 200 walruses and 2,000 seals were harvested by villagers. During this time, the Navy Cutter Northland was transporting islanders to Nome for their annual summer trek. Beginning in the 1950s, fewer and fewer residents returned to the island each September. In 1960, 49 residents were counted by the U.S. Census. By 1970, no villagers continued to live on the Island.

Today, the King Islanders are year-round residents of Nome.

Native Village of Council

Historically, Council was a fish camp for the Fish River Tribe, who originally lived 12 miles downstream. Council's history is synonymous with the gold rush period. Gold was first discovered in the area by Daniel B. Libby and party in 1897. By 1898 there were 50 log houses. The gold found at Ophir Creek was the second richest claim in the world. During the summers of 1897-99, the population of "Council City" was estimated at 15,000. It had a hotel, wooden boardwalks, a 20-bed hospital, a post office, and numerous bars. The discovery of more gold at Nome in 1900 caused many of the boomers to leave Council. However, the population in 1910 was 686. The depletion of gold, the flu epidemic of 1918, the Depression, and World

War II all contributed to the decline of the population. By 1950, only nine people remained. The post office closed in 1953.

Today, the community is not occupied year-round. Council is primarily a summer fish camp site for Nome residents.

Village of Solomon

The village was originally settled by Inupiat of the Fish River tribe and was noted on a map as "Erok" in 1900. The original site for Solomon was in the delta of the Solomon River; it became a mining camp. The gold rush during the summers of 1899 and 1900 brought thousands of people to the Solomon area. Three enormous dredges worked the Solomon River. By 1904, Solomon had seven saloons, a post office, and a ferry dock and was the southern terminus of a narrow-gauge railroad that ran to the Kuzitrin River. In 1913, the railroad was washed out by storms, and in 1918 the flu epidemic struck. This site is known as Dickson today, and remains of structures and railroad equipment exist. In 1939, the community relocated to the present site, which was formerly known as Jerusalem. The Bureau of Indian Affairs (BIA) constructed a large school in 1940. During World War II, many families moved away from Solomon. The post office and BIA school were discontinued in 1956. The Solomon Roadhouse operated until the 1970s.

In 2006, the Solomon Bed and Breakfast opened, which is owned by the Tribe.

Solomon is currently a subsistence-use area used by descendants of the families that once resided here.

Climate

Nome, King Island, Council and Solomon fall within the transitional climate zone, characterized by tundra interspersed with boreal forests, and weather patterns of long, cold winters and shorter, warm summers. Over the course of the year, the temperature typically varies from -1°F to 58°F and is rarely below -26°F or above 69°F.

Table ExSummary-1 shows average weather data recorded at the Nome Airport.

Table ExSummary-1 Average Weather Data for Nome (2016-2023)

Month	Avg Temp (ºF)	Avg Rainfall (in)	Avg Snowfall (in)	Avg Wind Speed (mph)
January	6º	0.1	8.6	15.7
February	8º	0.2	7.8	15.4
March	11º	0.1	5.3	14.2
April	22º	0.3	4.4	12.4
May	37º	0.8	1.5	10.7
June	48º	1.0	0.1	9.5
July	52º	2.1	0.0	10.1
August	51º	2.8	0.0	11.7
September	43º	2.1	0.2	13.1
October	30º	1.2	2.3	14.3
November	18º	0.6	7.3	15.7
December	10º	0.2	8.6	15.9

Data collected at the Nome Airport.
Source: Weather Spark (2024)

Transportation

Nome is a regional center of transportation for surrounding villages. The Port of Nome plays an essential role in regional transportation infrastructure. Nome is primarily accessible by air, although containerized household goods, building materials, vehicles, heavy equipment, and all petroleum products arrive by water during summer months. There are 10-12 cargo barges and 8-10 fuel barges/tankers that make scheduled deliveries each season. An additional trans-loading facility in the Inner Harbor was built in 2013 to address congestion at the existing barge ramp and allow more efficient transfers of cargo and rolling stock. The Small Boat Harbor plays host to about 25 commercial fishing vessels and a large offshore mining fleet which at times exceeds capacity. Alaska Department of Transportation (DOT's) Snake River Bridge Replacement Project was completed in 2013 and will facilitate the increased traffic to and from the Port. Two state-owned airports are located in the community. The Nome Airport, located one mile northwest of the City, has two paved runways. Nome City Field, less than one mile north of the City, offers an additional gravel strip. Scheduled jet flights are available, as well as charter and helicopter services. Regional travel is facilitated by a network of 230 miles of gravel roads between Nome and the communities of Teller, Solomon, and Council. A network of winter trails links with outlying communities during winter months.

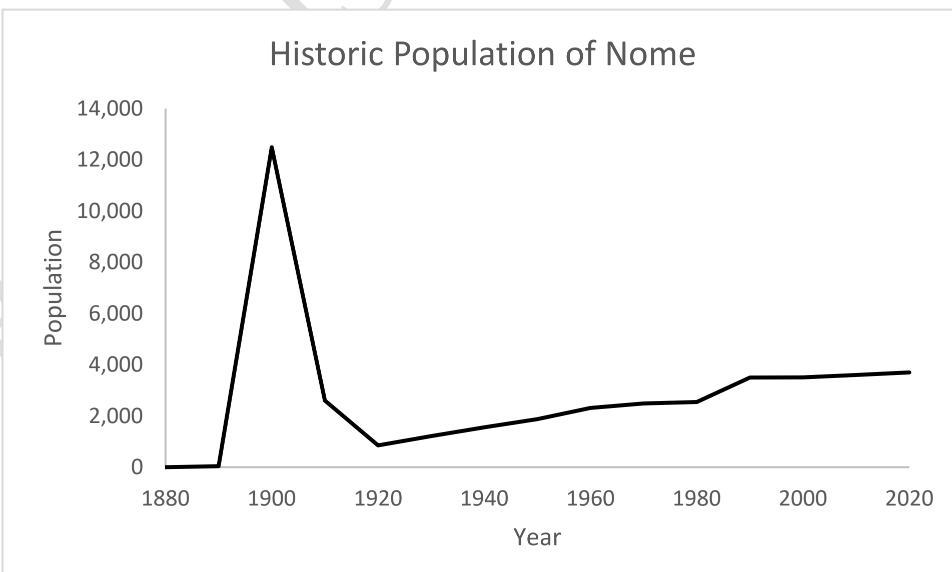
During summer months, tribal members travel to King Island in boats to subsistence hunt.

Demographics

In 2022, the Alaska Department of Community and Regional Affairs (DCRA) certified population in Nome was 3,463 residents, down from 3,699 residents in 2020. The population is relatively young, and the median age is 31.0 years. Nome is a diverse communtiy- 53.64% of residents identifiy themselves as Alaska Native, 26.77% White, 2.99% Asian, 1.83% Black or African American, 14.2% as two or more races, and 1.57% as other race (DCRA 2024). The composition of the population is 50.08% female and 49.92% male.

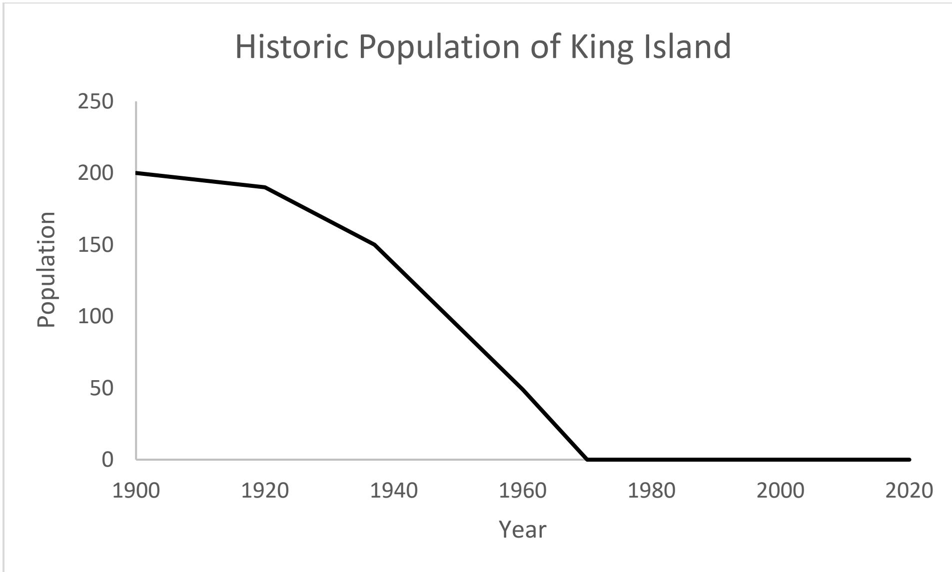
There are an estimated 1,173 households in this community with the average household size of 2.90 (US Census 2022).

King Island, Solomon, and Council do not currently have year-round populations.



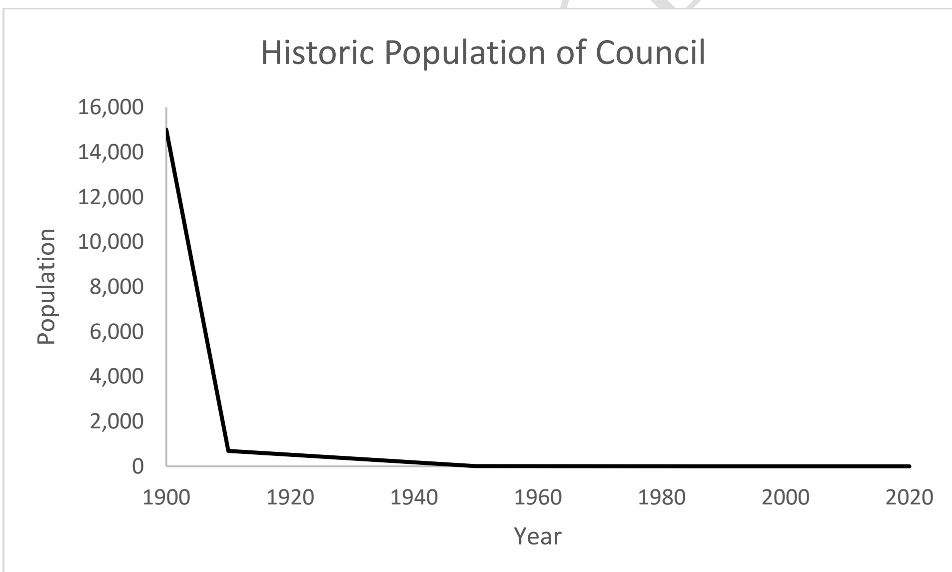
Data from DCRA (2024)

Figure ExSummary-0-2 Historical Population of Nome



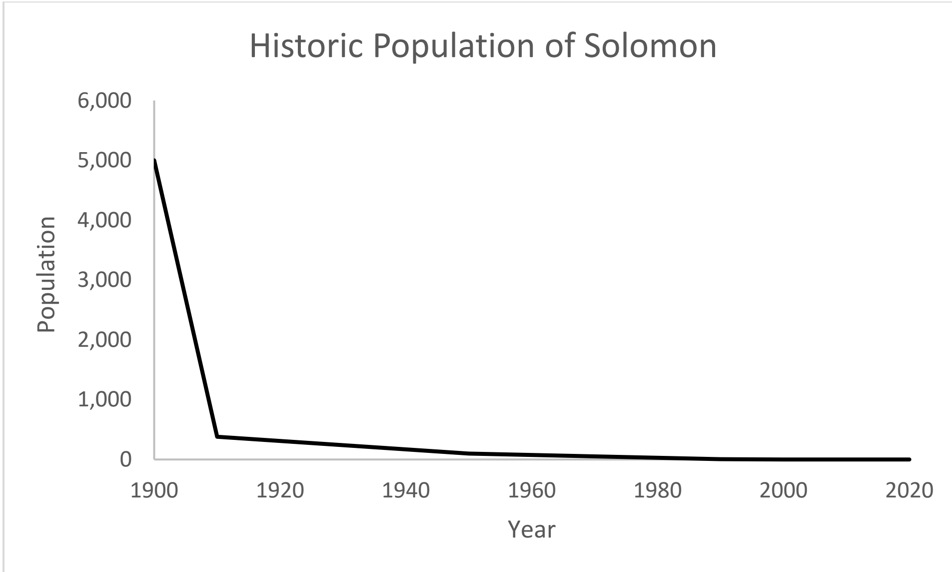
Data from DCRA (2024)

Figure ExSummary-0-3 Historical Population of King Island



Data from DCRA (2024)

Figure ExSummary-0-4 Historical Population of Council



Data from DCRA (2024)

Figure ExSummary-0-5 Historical Population of Solomon

Economy

The population of Nome is a mixture of Inupiat Eskimos and non-Natives. Although some employment opportunities are available, subsistence activities are prevalent in the community (Kawerak 2024).

The potential work force (those aged 16 to 64) in Nome was estimated to be 2,461, of which, 1,209 (49.1%) were actively employed year-round (US Census 2022). The unemployment rate in Nome is estimated at 16.3% by American Community Surveys, while the state unemployment rate is currently 4.7% (as of January 2024) and nationally 3.8% (as of March 2024).

A 5-year average from 2018-2022 places the median household income at $103,542. Two hundred and twelve (212) people are below the poverty level, and 337 people are below 125% of the poverty level (DCRA 2024).

VULNERABILITY SNAPSHOTS

Executive Summary Snapshot- Nome (Non-Tribal Assets)

	Estimated Losses				Extent	Annual Probability
	# of CF:	$ of CF:	# of residences	$ of residences		
Earthquake	59	$795,490,826	1,495	$1,083,707,560	Negligible	Likely
Severe Weather	59	$795,490,826	1,495	$1,083,707,560	Limited to Critical	Highly Likely
Wildland/Tundra Fire	59	$795,490,826	1,495	$1,083,707,560	Negligible	Unlikely
Changes in the Cryosphere	59	$795,490,826	1,495	$1,083,707,560	Critical	Likely
Radon	Radon is a public health concern but is not anticipated to impact infrastructure.				Limited	Highly Likely
Flood	18	$316,388,957	35	$25,371,080	Critical	Likely
Tsunami	18	$316,388,957	35	$25,371,080	Negligible	Unlikely
Erosion	-	-	-	-	Critical	Likely
Landslide	-	-	-	-	Limited	Possible
Volcano	This hazard does not pose a direct threat to the Nome area					

CF= critical facilities

Executive Summary Snapshot- Nome Eskimo Community

	Estimated Losses		Extent (Nome)	Annual Probability (Nome)
	# of CF:	$ of CF:		
Earthquake	2	$1,100,000	Negligible	Likely
Severe Weather	2	$1,100,000	Limited to Critical	Highly Likely
Wildland/Tundra Fire	2	$1,100,000	Negligible	Unlikely
Changes in the Cryosphere	2	$1,100,000	Critical	Likely
Radon	Radon is a public health concern but is not anticipated to impact infrastructure.		Limited	Highly Likely
Flood	1	$100,000	Critical	Likely
Tsunami	1	$100,000	Negligible	Unlikely
Erosion	0	$0	Critical	Likely
Landslide	0	$0	Limited	Possible
Volcano	This hazard does not pose a direct threat to the Nome area.			

CF= critical facilities

Executive Summary Snapshot- King Island Native Community

	Estimated Losses				Extent		Annual Probability	
	# and $ of CF in Nome:		# and $ of CF at King Island townsite:		Nome	King Island townsite	Nome	King Island townsite
Earthquake	# of CF: 6	$ of CF: $4,050,000	# of CF: 3	$ of CF: Unknown	Negligible	Negligible	Likely	Likely
Severe Weather	# of CF: 6	$ of CF: $4,050,000	# of CF: 3	$ of CF: Unknown	Limited to Critical	Limited to Critical	Highly Likely	Highly Likely
Wildland/Tundra Fire	# of CF: 6	$ of CF: $4,050,000	N/A	N/A	Negligible	N/A	Unlikely	N/A
Changes in the Cryosphere	# of CF: 6	$ of CF: $4,050,000	# of CF: 3	$ of CF: Unknown	Critical	Critical	Likely	Likely
Radon	Radon is a public health concern but is not anticipated to impact infrastructure.				Limited	Limited	Highly Likely	Highly Likely
Flood	# of CF: 1	$ of CF: $750,000	N/A	N/A	Critical	N/A	Likely	N/A
Tsunami	# of CF: 1	$ of CF: $750,000	N/A	N/A	Negligible	N/A	Unlikely	N/A
Erosion	# of CF: 1	$ of CF: $750,000	N/A	N/A	Critical	N/A	Likely	N/A
Landslide	# of CF: 0	$ of CF: $0	# of CF:	$ of CF: Unknown	Limited	Limited	Possible	Possible
Volcano	This hazard does not pose a direct threat to the Nome area or King Island townsite.							

CF= critical facilities

N/A: Not Applicable. This hazard does not threaten the King Island townsite.

Executive Summary Snapshot- Native Village of Council

	Estimated Losses				Extent		Annual Probability	
	# and $ of CF in Nome:		# and $ of CF at Council townsite:		Nome	Council townsite	Nome	Council townsite
Earthquake	# of CF: 1	$ of CF: $300,000	# of CF: 6	$ of CF: $6,050,000	Negligible	Negligible	Likely	Likely
Severe Weather	# of CF: 1	$ of CF: $300,000	# of CF: 6	$ of CF: $6,050,000	Limited to Critical	Limited to Critical	Highly Likely	Highly Likely
Wildland/Tundra Fire	# of CF: 1	$ of CF: $300,000	# of CF: 6	$ of CF: $6,050,000	Negligible	Critical	Unlikely	Possible
Changes in the Cryosphere	# of CF: 1	$ of CF: $300,000	# of CF: 6	$ of CF: $6,050,000	Critical	Critical	Likely	Likely
Radon	Radon is a public health concern but is not anticipated to impact infrastructure.				Limited	Limited	Highly Likely	Highly Likely
Flood	# of CF: 0	$ of CF: $0	# of CF: 1	$ of CF: $100,000	Critical	Critical	Likely	Likely
Tsunami	# of CF: 0	$ of CF: $0	N/A	N/A	Negligible	N/A	Unlikely	N/A
Erosion	# of CF: 0	$ of CF: $0	# of CF:	$ of CF: $	Critical	Critical	Likely	Likely
Landslide	# of CF: 0	$ of CF: $0	# of CF:	$ of CF: $	Limited	Limited	Possible	Possible
Volcano	This hazard does not pose a direct threat to the Nome area or Council townsite.							

CF= critical facilities

N/A: Not Applicable. This hazard does not threaten the Council townsite.

Executive Summary Snapshot- Village of Solomon

	Estimated Losses				Extent		Annual Probability	
	# and $ of CF in Nome:		# and $ of CF at Solomon townsite:		Nome	Solomon townsite	Nome	Solomon townsite
Earthquake	# of CF: 3	$ of CF: $1,800,000	# of CF: 31	$ of CF: $34,610,000	Negligible	Negligible	Likely	Likely
Severe Weather	# of CF: 3	$ of CF: $1,800,000	# of CF: 31	$ of CF: $34,610,000	Limited to Critical	Limited to Critical	Highly Likely	Highly Likely
Wildland/Tundra Fire	# of CF: 3	$ of CF: $1,800,000	# of CF: 31	$ of CF: $34,610,000	Negligible	Critical	Unlikely	Unlikely
Changes in the Cryosphere	# of CF: 3	$ of CF: $1,800,000	# of CF: 31	$ of CF: $34,610,000	Critical	Critical	Likely	Likely
Radon	Radon is a public health concern but is not anticipated to impact infrastructure.				Limited	Limited	Highly Likely	Highly Likely
Flood	# of CF: 0	$ of CF: $0	# of CF: 21	$ of CF: $23,360,000	Critical	Critical	Likely	Likely
Tsunami	# of CF: 0	$ of CF: $0	# of CF: 21	$ of CF: $23,360,000	Negligible	Negligible	Unlikely	Unlikely
Erosion	# of CF: 0	$ of CF: $0	# of CF: 22	$ of CF: $24,360,000	Critical	Critical	Likely	Likely
Landslide	# of CF: 0	$ of CF: $0	# of CF: 1	$ of CF: $1,000,000	Limited	Limited	Possible	Possible
Volcano	This hazard does not pose a direct threat to the Nome area or Solomon townsite.							

CF= critical facilities

CRITICAL FACILITIES

Critical Facilities in Nome That Are Utilized By All Tribes In The Area

Facility Type	# of Occupants	Facility Name	Address	Latitude	Longitude	Facility Value	Building Type	Facility Owner	Cryosphere	Earthquake	Flood	Erosion	Landslide	Severe Weather	Tsunami	Volcano	Wildfire	Radon
Transportation & Equipment	30	Airport – Cargo, Passenger Lynden, NAC, AK Air, Bering)		64°30’39”N	165°26’40”W	$80,000,000	-	SOA/ Private	x	x	x			x	x		x	
	0	Airport Runways (Engstrom’s, City, State)		64°30’39”N	165°26’40”W	$3,000,000	-	SOA	x	x				x			x	
	0	Heavy Equipment- Tumet		64°32’14”N	165°24’35”W	$50,000,000	-	Private	x	x				x			x	
	0	Heavy Equipment- DOT/PF		64°32’32”N	165°24’30”W	$50,000,000	-	SOA	x	x				x			x	
	0	Heavy equipment/Rock quarry Cape Nome Quarry		64°26’13”N	165°00’26”W	$100,000,000	-	Private	x	x				x			x	
	0	Grader Greg- Heavy Equipment storage		64°30’20”N	165°23’56”W	$948,130	W2	CON	x	x				x			x	
	0	Small Boat Harbor		64°30’05”N	165°25’12”W	$5,000,000	-	CON	x	x	x			x	x		x	
	0	Port, Cape Nome - BSNC		64°29’37”N	165°26’22”W	$100,000,000	-	Private	x	x	x			x	x		x	
	5	Port office building		64°30’08”N	165°25’16”W	$120,668	W2	CON	x	x	x			x	x		x	
	0	Port/ Shipping Services Alaska Logistics, AML – Barges		64°30’07”N	165°26’02”W	$20,000,000	-	Private	x	x				x			x	
Emergency Services	5	Police station/animal shelter		64°30’18”N	165°23’43”W	$13,276,363	W2	CON	x	x				x			x	
	2	Fire/Building Inspector Department		64°30’05”N	165°24’29”W	$2,451,269	W2	CON	x	x				x			x	
	4	Fire Dept- Icy View Station		64°31’10”N	165°22’28”W	$354,874	W2	CON	x	x				x			x	
	2	Search and rescue team 1-13ldg..		64°30’05”N	165°24’29”W	$750,000	W2	CON	x	x				x			x	

Facility Type	# of Occupants	Facility Name	Address	Latitude	Longitude	Facility Value	Building Type	Facility Owner	Cryosphere	Earthquake	Flood	Erosion	Landslide	Severe Weather	Tsunami	Volcano	Wildfire	Radon
Medical	20	Health NSHC Facilities		64°29'53"N	165°22'46"W	$1,000,000	W2	NSHC	x	x				x			x	
Education	20	Nome Elementary School		64°29'51"N	165°22'59"W	$2,500,000	W2	CON	x	x				x			x	
	75	Nome High School		64°32'31"N	165°24'18"W	$2,500,000	W2	CON	x	x				x			x	
	75	Nome Charter School		64°32'32"N	165°24'26"W	$2,500,000	W2	CON	x	x				x			x	
	30	Nome Preschool		64°29'48"N	165°22'56"W	$2,500,000	W2	CON	x	x				x			x	
Utilities	0	Fuel/Tank farm (Bonanza, Crowley, NJUS)		64°30'11"N	165°26'15"W	$70,000,000	OTF	Private	x	x				x			x	
	0	Utility System – Nome joint utility system		64°30'23"N	165°25'45"W	$100,000,000	-	CON/ NJUS	x	x	x			x	x		x	
	5	Public works building		64°29'53"N	165°24'34"W	$1,748,241	W2	CON	x	x	x			x	x		x	
Shelters	50	Aurora Inn – room, rental, BSNC		64°29'47"N	165°23'51"W	$3,000,000	W2	Private	x	x	x			x	x		x	
	0	Old Youth Facility – rooms, rental		64°29'48"N	165°23'08"W	$2,000,000	W2	Private	x	x				x			x	
	15	Bering Sea Women's – for women and children		64°30'06"N	165°24'33"W	$4,000,000	W2	Non-profit	x	x				x			x	
	20	BSRHA/Munqsri/NEST at winter houses homeless population (elder and special needs population)		64°29'57"N	165°24'29"W	$2,000,000	W2	Non-profit	x	x				x			x	
	15	Office building Kawerak Facilities (main, old)		64°30'03"N	165°24'40"W	$20,000,000	W2	Kawerak	x	x				x			x	
	5	Kawerak Head Start		64°29'55"N	165°23'16"W	$3,419,000	W2	Kawerak	x	x				x			x	
	3	Office Building Old Federal Building – BSNC		64°29'51"N	165°24'19"W	$2,000,000	W2	Private	x	x	x			x	x		x	

Facility Type	# of Occupants	Facility Name	Address	Latitude	Longitude	Facility Value	Building Type	Facility Owner	Cryosphere	Earthquake	Flood	Erosion	Landslide	Severe Weather	Tsunami	Volcano	Wildfire	Radon
Community	3	USPS		64°29’49”N	165°24’19”W	$2,000,000	W2	USPS	x	x	x			x	x		x	
	20	Prison–Anvil Mountain Correctional Center		64°32’14”N	165°24’46”W	$5,000,000	W2	SOA	x	x				x			x	
	15	Prison–Seaside Center – privately owned		64°29’50”N	165°24’14”W	$1,000,000	W2	Private	x	x	x			x	x		x	
	0	Building/fire inspector		64°30’05”N	165°24’29”W	$2,451,269	W2	CON	x	x				x			x	
	0	Garco		64°30’05”N	165°25’58”W	$935,922	W2	CON	x	x	x			x	x		x	
	0	Landfill/dump building combined		64°31’19”N	165°16’53”W	$1,062,212	W2	CON	x	x				x			x	
	2	Library, museum-old		64°30’10”N	165°23’55”W	$4,566,689	W2	CON	x	x				x			x	
	1	Mini Convention Center		64°29’53”N	165°24’48”W	$1,242,473	W2	CON	x	x	x			x	x		x	
	2	Cemetery Morgue		64°30’14”N	165°25’17”W	$423,847	W2	CON	x	x				x			x	
	0	Community Cemetery		64°30’18”N	165°25’16”W	$2,500,000	-	CON	x	x				x			x	
	0	NEC Cemetery		64°30’05”N	165°26’21”W	$2,500,000	-	CON	x	x				x			x	
	0	Fort Davis Post Cemetery		64°29’13”N	165°18’36”W	$2,500,000	-	CON	x	x				x			x	
	1	St. Joe’s Church		64°29’56”N	165°24’07”W	$2,720,269	W2	CON	x	x				x			x	
	5	Recreation Center		64°30’04”N	165°23’44”W	$8,573,948	W2	CON	x	x				x			x	
	2	Richard Foster museum/library		64°30’10”N	165°23’55”W	$21,091,545	W2	CON	x	x				x			x	
	2	Visitor Center		64°29’52”N	165°24’36”W	$275,957	W2	CON	x	x	x			x	x		x	
	15	XYZ Senior Center		64°29’54”N	165°24’34”W	$2,399,029	W2	CON	x	x	x			x	x		x	
	0	NACTEC 1-15ldg. and garage		64°32’35”N	165°24’12”W	$3,179,121	W2	CON	x	x				x			x	
	7	Grocery Store- AC		64°30’20”N	165°24’18”W	$5,000,000	W2	Private	x	x				x			x	
	7	Grocery Store- Hanson’s		64°30’03”N	165°24’29”W	$5,000,000	W2	Private	x	x				x			x	
	3	Hardware Stores- Grizzley		64°30’21”N	165°24’03”W	$3,000,000	W2	Private	x	x				x			x	
	3	Hardware Store- Builder’s Industrial Supply		64°30’06”N	165°24’56”W	$3,000,000	W2	Private	x	x	x			x	x		x	
	10	Fish Plant (NSEDC)		64°30’05”N	165°25’19”W	$10,000,000	W2	NSEDC	x	x	x			x	x		x	

Facility Type	# of Occupants	Facility Name	Address	Latitude	Longitude	Facility Value	Building Type	Facility Owner	Cryosphere	Earthquake	Flood	Erosion	Landslide	Severe Weather	Tsunami	Volcano	Wildfire	Radon
	5	Credit Union 1		64°30’03”N	165°24’31”W	$1,666,667	W2	Private	x	x				x			x	
	5	Wells Fargo		64°29’49”N	165°24’17”W	$1,666,667	W2	Private	x	x	x			x	x		x	
	5	Northrim Bank		64°30’08”N	165°24’21”W	$1,666,667	W2	Private	x	x				x			x	
	3	Court house in old hospital		64°30’08”N	165°24’21”W	$1,000,000	W2	Private	x	x				x			x	
	1	Pioneer Hall – cooking facilities		64°29’49”N	165°24’06”W	$2,000,000	W2	Private	x	x				x			x	
	5	Churches – cooking facilities (Multiple locations)				$50,000,000	W2	Non-profit	x	x				x			x	
	0	Armory – gym facility		64°29’46”N	165°23’55”W	$2,000,000	W2	SOA	x	x	x			x	x		x	

Total: 503 **Total: $795,490,826**

Nome Eskimo Community Critical Facilities in Nome

Nome Eskimo Community’s Assets in Nome																		
Facility Type	**# of Occupants**	**Facility Name**	**Address**	**Latitude**	**Longitude**	**Facility Value**	**Building Type**	**Facility Owner**	**Cryosphere**	**Earthquake**	**Flood**	**Erosion**	**Landslide**	**Severe Weather**	**Tsunami**	**Volcano**	**Wildfire**	**Radon**
Government	5	Tribal Offices and Hall		64°30’04”N	165°24’11”W	$1,000,000	W2	NEC	x	x				x			x	
Community	0	Empty lot		64°29’46”N	165°23’33”W	$100,000	Gravel	NEC	x	x	x			x	x		x	
	0	Culturally Sacred or Significant Sites																
	0	Subsistence Camps																
Total:	**5**				**Total:**	**$1,100,000**												

The locations of culturally sacred sites and subsistence camps are sensitive. Contact the Tribal office if you need further information

King Island Native Community Critical Facilities

King Island Native Community's Assets in Nome

Facility Type	# of Occupants	Facility Name	Address	Latitude	Longitude	Facility Value	Building Type	Facility Owner	Cryosphere	Earthquake	Flood	Erosion	Landslide	Severe Weather	Tsunami	Volcano	Wildfire	Radon
Government	3	Tribal Offices and Hall		64°29'49"N	165°23'15"W	$1,000,000	W2	KINC IRA	x	x				x			x	
Community	4	1 duplex in town		64°29'53"N	165°23'22"W	$500,000	W2	KINC IRA	x	x				x			x	
	8	2 duplex in Icy View		64°31'19"N	165°22'21"W	$700,000	W2	KINC IRA	x	x				x			x	
	1	Old Grizzley shop		64°31'18"N	165°22'18"W	$1,000,000	W2	KINC IRA	x	x				x			x	
	0	Vacant lot		64°30'08"N	165°23'55"W	$100,000	Gravel	KINC IRA	x	x				x			x	
	0	Woolley Lagoon		64°51'20"N	166°24'01"W	$750,000	N/A	Corporation	x	x				x			x	
	0	Culturally Sacred or Significant Sites																
	0	Subsistence Camps																
Total:	**16**				**Total:**	**$4,050,000**												

King Island Native Community's Assets in King Island

Facility Type	# of Occupants	Facility Name	Address	Latitude	Longitude	Facility Value	Building Type	Facility Owner	Cryosphere	Earthquake	Flood	Erosion	Landslide	Severe Weather	Tsunami	Volcano	Wildfire	Radon
Community	0	Former BIA School		64°57'41"N	168°04'15"W	Unknown	W2	Corporation	x	x			x	x				
	0	Cemetery		64°57'43"N	168°04'15"W	Unknown	N/A	Corporation	x	x			x	x				
	0	Old Church		64°57'41"N	168°04'14"W	Unknown	W2	Corporation	x	x			x	x				
	0	Culturally Sacred or Significant Sites																
	0	Subsistence Camps																
Total:	**0**				**Total:**	**Unknown**												

Radon is a public health concern but is not anticipated to impact infrastructure.

The locations of culturally sacred sites and subsistence camps are sensitive. Contact the Tribal office if you need further information

Native Village of Council Critical Facilities

Native Village of Council's Assets in Nome

Facility Type	# of Occupants	Facility Name	Address	Latitude	Longitude	Facility Value	Building Type	Facility Owner	Cryosphere	Earthquake	Flood	Erosion	Landslide	Severe Weather	Tsunami	Volcano	Wildfire	Radon
Government	3	Tribal Office		64°29'54"N	165°23'19"W	$300,000	W2	NVC	x	x				x			x	
Community	0	Culturally Sacred or Significant Sites																
	0	Subsistence Camps																
Total:	**3**				**Total:**	**$300,000**												

Native Village of Council's Assets in Council

Facility Type	# of Occupants	Facility Name	Address	Latitude	Longitude	Facility Value	Building Type	Facility Owner	Cryosphere	Earthquake	Flood	Erosion	Landslide	Severe Weather	Tsunami	Volcano	Wildfire	Radon
Utility/ Transportation	0	Pumphouse		64°53'39"N	163°40'24"W	$100,000	W2	None	x	x	x	x		x			x	
	0	1300 ft airstrip		64°53'44"N	163°41'40"W	$5,000,000	Gravel	SOA	x	x	x	x		x			x	
Community	0	Camp Bendeleben		64°53'33"N	163°40'26"W	$300,000	W2	CNC	x	x			x	x				
	0	Community Building		64°53'37"N	163°40'13"W	$200,000	W2	NVC	x	x			x	x				
	0	Fish Camps		64°53'40"N	163°40'35"W	$200,000	W2	Private	x	x			x	x				
	0	Cemetery		64°53'56"N	163°40'47"W	$250,000												
	0	Culturally Sacred or Significant Sites																
	0	Subsistence Camps																
Total:	**0**				**Total:**	$6,050,000												

Radon is a public health concern but is not anticipated to impact infrastructure.
The locations of culturally sacred sites and subsistence camps are sensitive. Contact the Tribal office if you need further information or assistance.

Village of Solomon Critical Facilities

Village of Solomon's Assets in Nome																		
Facility Type	# of Occupants	Facility Name	Address	Latitude	Longitude	Facility Value	Building Type	Facility Owner	Cryosphere	Earthquake	Flood	Erosion	Landslide	Severe Weather	Tsunami	Volcano	Wildfire	Radon
Government	8	Solomon Building (3 apartments/1 office)		64°30'04"N	165°24'22"W	1,000,000	W2	VOS	x	x				x			x	
Community	0	5 lots (E 6th Ave)		64°29'56"N	165°23'13"W	$650,000	Gravel	VOS	x	x				x			x	
	2	Tiny Home (at Solomon Building)		64°30'04"N	165°24'22"W	$150,000	W2	VOS	x	x				x			x	
	0	Culturally Sacred or Significant Sites																
	0	Subsistence Camps																
Total:	**10**				**Total:**	**$1,800,000**												

Village of Solomon's Assets in Solomon																		
Facility Type	# of Occupants	Facility Name	Address	Latitude	Longitude	Facility Value	Building Type	Facility Owner	Cryosphere	Earthquake	Flood	Erosion	Landslide	Severe Weather	Tsunami	Volcano	Wildfire	Radon
Transportation	0	Road maintained by the State		Throughout the Village		$5,000,000	Gravel	SOA	x	x	x	x		x	x		x	
	0	Old Runway		64°33'42"N	164°26'34"W	$5,000,000	Gravel	SNC	x	x				x			x	
	0	Boat Launch at Bonanza		64°32'03"N	164°29'05"W	$1,000,000	W2	SNC	x	x	x	x		x	X		x	
	0	Safety Bridge		64°28'19"N	164°44'49"W	$250,000		SOA	x	x				x			x	
	0	Bonanza Bridge		64°32'41"N	164°26'12"W	$ 250,000		SOA	x	x	x	x		x	x		x	
	0	East Fork Bridge		64°41'32"N	164°16'49"W	$250,000		SOA	x	x				x			x	
	0	Big Hurrah Bridge		64°39'19"N	164°19'05"W	$250,000		SOA	x	x				x			x	

Village of Solomon’s Assets in Nome

Facility Type	# of Occupants	Facility Name	Address	Latitude	Longitude	Facility Value	Building Type	Facility Owner	Cryosphere	Earthquake	Flood	Erosion	Landslide	Severe Weather	Tsunami	Volcano	Wildfire	Radon
Utilities	0	200-gallon water tank		64°33’36”N	164°26’29”W	$10,000	PWTS	VOS	x	x	x	x		x	x		x	
	0	Well House and Pump		64°33’36”N	164°26’28”W	$300,000	W2	VOS	x	x	x	x		x	x		x	
	0	7kW rooftop Solar Panel System (on B&B w/ 10 li-ion batteries and solar ark inverter		64°33’35”N	164°26’32”W	$1,000,000	Solar	VOS	x	x				x			x	
	0	Generator house w/ 10 kW diesel aurora generator		64°33’35”N	164°26’33”W	$150,000	W2	VOS	x	x	x	x		x	x		x	
	0	Shovel Creek and Minala Creek – Solomon Native Corp material gravel site		64°35’46”N	164°23’35”W	$3,500,000	Gravel	SOA	x	x				x			x	
Community	4	Solomon Bed and Breakfast		64°33’35”N	164°26’32”W	$5,000,000	W2	VOS	x	x	x	x		x	x		x	
	0	Okitkon ER Shelter Cabin		64°33’34”N	164°26’40”W	$100,000	W2	VOS	x	x	x	x		x	x		x	
	0	Subsistence Camps x10		Multiple locations		$500,000	W2	Private	x	x	x	x		x	x			
	0	Cemetery		64°33’46”N	164°26’25”W	$1,000,000	N/A	SNC	x	x	x	x	x	x	x		x	
	0	Subsistence Lands/Water (Bonanza Channel, Solomon, Bonanza)		64°32’16”N	164°29’13”W	$10,000,000	N/A	SNC	x	x	x	x		x	x		x	
	0	Last Train to Nowhere		64°32’45”N	164°26’10”W	$1,000,000	N/A	SNC	x	x	x	x		x	x		x	
	2	Tiny Home on Wheels		64°33’36”N	164°26’32”W	$50,000	W2	SNC	x	x	x	x		x	x		x	
	0	Culturally Sacred or Significant Sites																
	0	Subsistence Camps																
Total:	6				**Total:**	$34,610,000												

Radon is a public health concern but is not anticipated to impact infrastructure.
The locations of culturally sacred sites and subsistence camps are sensitive. Contact the Tribal office if you need further information or assistance.

MITIGATION ACTION PLAN (MAP)

The Nome Eskimo Community, King Island Native Community, Native Village of Council, and Village of Solomon's MAPs depicts how each mitigation action will be implemented and administered by the Tribe/Planning Team. Each MAP details each selected mitigation action, its priorities, the responsible entity, the anticipated implementation timeline, and provides a brief explanation as to how the overall benefit/costs and technical feasibility were taken into consideration.

Nome Eskimo Community 2024 MAP

Action ID	Action Description	Priority	Responsible Department	Potential Funding	Timeframe	Benefit-Costs / Technical Feasibility	*Other Plans to Include Development Action In
MH 1							
MH 2							
MH 3							
MH 4							
MH 5							
MH 6							
MH 7							
MH 9							
MH 10							

*The planning mechanisms into which the ideas, information, and strategy from this MJHMP may be integrated.

King Island Native Community 2024 MAP

Action ID	Action Description	Priority	Responsible Department	Potential Funding	Timeframe	Benefit-Costs / Technical Feasibility	*Other Plans to Include Development Action In
MH 1							
MH 2							
MH 3							
MH 4							
MH 5							
MH 6							
MH 7							
MH 9							
MH 10							

*The planning mechanisms into which the ideas, information, and strategy from this MJHMP may be integrated.

Native Village of Council's 2024 MAP

Action ID	Action Description	Priority	Responsible Department	Potential Funding	Timeframe	Benefit-Costs / Technical Feasibility	*Other Plans to Include Development Action In
MH 1							
MH 2							
MH 3							
MH 4							
MH 5							
MH 6							
MH 7							
MH 9							
MH 10							

*The planning mechanisms into which the ideas, information, and strategy from this MJHMP may be integrated.

Village of Solomon's 2024 MAP

Action ID	Action Description	Priority	Responsible Department	Potential Funding	Timeframe	Benefit-Costs / Technical Feasibility	*Other Plans to Include Development Action In
MH 1							
MH 2							
MH 3							
MH 4							
MH 5							
MH 6							
MH 7							
MH 9							
MH 10							

*The planning mechanisms into which the ideas, information, and strategy from this MJHMP may be integrated.

FEMA APPROVAL LETTER

PLAN DISTRIBUTION LIST

The Nome Area Tribes 2024 Multi-Jurisdictional Hazard Mitigation Plan is distributed to:

- Nome Eskimo Community
- King Island Native Community
- Native Village of Council
- Village of Solomon
- Kawerak, Inc.
- Federal Emergency Management Agency (FEMA)
- State of Alaska Division of Military and Veterans Affairs (DMVA), Department of Homeland Security and Emergency Management (DHS&EM)

RECORD OF CHANGES

Hazard Mitigation Plans should be continually updated as circumstances change, new data becomes available, hazards are mitigated, etc. This Record of Changes Table is included to summarize and document changes to this document as they are made throughout time.

Change ID	Description of Changes	Date
01	Created a Multi-Jurisdictional HMP for the Tribes in the Nome area, including the Nome Eskimo Community, King Island Native Community, Native Village of Council, and the Village of Solomon	XX

1. PLAN INTRODUCTION AND BACKGROUND

Hazard mitigation planning is required under the Disaster Mitigation Act of 2000 (DMA 2000) which identified the need for Tribal, Local, and State jurisdictions to coordinate mitigation planning and implement mitigation efforts. It also provided the legal basis for the Federal Emergency Management Agency's (FEMA) mitigation plan requirements for mitigation grant assistance.

1.1 PURPOSE

Disasters may cause loss of life, damage buildings and infrastructure, and have devastating effects on a community's economic, social, and environmental well-being. The Nome Area Tribes intend to reduce or eliminate the long-term risk to life and property from hazards by implementing a Hazard Mitigation Plan. The Plan is intended to reduce community risk and promote long-term sustainability by:

- Protecting the public and preventing loss of life and injury.
- Reducing harm to existing and future community assets.
- Preventing damage to a community's cultural, economic, and environmental assets.
- Minimize downtime and speed up recovery following disasters.
- Reducing the costs of disaster response and recovery and the exposure of first responders to risk.
- Help accomplish other community objectives, such as leveraging capital improvements, infrastructure protection, and economic resiliency.

1.2 MULTI-JURISDICTIONAL HAZARD MITIGATION PLAN LAYOUT DESCRIPTION

The Nome Area Tribes 2024 Multi-Jurisdictional Hazard Mitigation Plan (MJHMP) consists of the following sections and appendices:

- **Executive Summary**

  Provides information to meet Element H- Additional State Requirements. Provides general history and background for each Village, including historical trends for population, the demographic and economic conditions that have shaped the area, as well as the government and leadership within the Tribes. Lists hazards that impact the planning area, critical facilities, and prioritized Mitigation Action Plan (MAP).

- **Section 1- Introduction and Background**

  Defines what a hazard mitigation plan is and its purpose.

- **Section 2- Planning Process**

  Describes the planning process for the MJHMP, identifies Planning Team members, lists the meetings held as part of the planning process, and lists the key stakeholders within the surrounding area. This section documents public outreach activities performed by the Tribes (support documents are in Appendix D); including document reviews and relevant plans, reports, and other appropriate information data utilized for MJHMP development.

- **Section 3- Risk Assessment/Hazard Analysis/Summary of Vulnerability**

  Describes the process through which the Planning Team identified, screened, and selected the hazards for profiling in this MJHMP. The hazard analysis includes the nature of the hazard, previous occurrences (history), location, extent, and impact of past events, and future event recurrence probability for each hazard. The influence of climate change is also discussed within each hazard profile.

Identifies the Tribes' potentially vulnerable assets—people, critical facilities, critical infrastructure, and residential and non-residential buildings (where available). The resulting information identifies the full range of hazards that the community could face and the potential damages, economic losses, and social impacts. Land use and development trends are also discussed.

- **Section 4- Mitigation Strategy**

  Defines the Tribes' mitigation strategy which provides a blueprint for reducing the potential losses identified in the vulnerability analysis. This section lists the community's policies, programs, available resources, and governmental authorities.

  The Planning Team developed a list of specific mitigation goals and potential actions to address the risks facing each Village. Mitigation actions include structural projects, emergency services, natural resource protection strategies, property protection techniques, preventive initiatives, and public information and awareness activities.

- **Section 5- Plan Maintenance**

  Describes the formal Plan maintenance process to ensure that the MJHMP remains an active and applicable document. This section includes an explanation of how the Tribes' Planning Team intends to organize their efforts to ensure that improvements and revisions to the MJHMP occur in an efficient, well-managed, and coordinated manner, actions that the Tribes plans to implement to assure continued public participation, and their methods and schedule for keeping the plan current.

- **Section 6- Plan Update**

  This section describes hazard events that have occurred and changes in development, changes in mitigation priorities, and describes how the mitigation plan was integrated into other planning mechanisms.

- **Section 7- Plan Adoption**

  Describes the Tribes' adoption process of the MJHMP. Supporting documentation can be found in Appendix C.

- **Section 8- References**

  Lists reference materials and resources used to prepare this MJHMP.

- **Section 9- Appendices**

  Appendix A: Delineates federal, state, and other potential mitigation funding sources. This section will aid the Tribes with researching and applying for funds to implement their mitigation strategy.

  Appendix B: Provides the FEMA Tribal Mitigation Plan Review Tool, which documents compliance with FEMA criteria.

  Appendix C: Provides the Tribes' adoption resolutions.

  Appendix D: Provides public outreach information, including newsletters and survey.

2. PLANNING PROCESS

This section provides an overview of the planning process; identifies the key stakeholders and Planning Team members, documents public outreach efforts, and summarizes the review and incorporation of existing plans, studies, and reports used to develop this MJHMP. Meeting information regarding the Planning Team and public outreach efforts are included below and outreach support documents are provided in Appendix D.

This section addresses a portion of Element A of the Tribal Mitigation Plan regulation checklist.

Regulation Checklist- 44 Code of Federal Regulations (CFR) § 201.7 Tribal Mitigation Plans
ELEMENT A. Planning Process
A1. Does the plan document the planning process, including how it was prepared and who was involved in the process? [44 CFR § 201.7(c)(1)]
A2. Does the plan document an opportunity for public comment during the drafting stage and prior to plan approval, including a description of how the tribal government defined "public"? [44 CFR § 201.7(c)(1)(i)]
A3. Does the plan document, as appropriate, an opportunity for neighboring communities, tribal and regional agencies involved in hazard mitigation activities, agencies that have the authority to regulate development as well as other interests to be involved in the planning process? [44 CFR § 201.7(c)(1)(ii)]
A4. Does the plan describe the review and incorporation of existing plans, studies, and reports? [44 CFR § 201.7(c)(1)(iii)]
A5. Does the plan include a discussion on how the planning process was integrated, to the extent possible, with other ongoing tribal planning efforts as well as other FEMA programs and initiatives? [44 CFR § 201.7(c)(1)(iv)]
Source: FEMA 2017 (Tribal)

2.1 OVERVIEW

Kawerak Inc. (Kawerak) received a project grant from Bureau of Indian Affairs to fund Tribal Hazard Mitigation Plans in the region. Kawerak contracted Fairweather Science, LLC (Fairweather Science) to facilitate the Plan developments.

This MJHMP follows the following guidance for mitigation planning:

- FEMA 2019 Tribal Mitigation Planning Handbook, which is a companion to the Tribal Mitigation Plan Review Guide, released by FEMA in 2017.
- State of Alaska DHS&EM Element H- Additional State Requirements, Effective April 1, 2024.

The planning process began in February 2024 with the formation of the Planning Team with members from each Tribe.

The Kickoff Meeting occurred on February 23, 2024. Representatives from the Nome Eskimo Community, King Island Native Community, Native Village of Council, Village of Solomon, Kawerak, and Fairweather Science were in attendance. The purpose of this meeting was to discuss the purpose of a HMP, the planning process, expectations, and the project schedule. There was discussion of critical facilities, hazard identification and screening, initial ideas for mitigation projects, and opportunities for public involvement. The Planning Team discussed recent hazard events, including Typhoon Merbok. The Planning Team was tasked with reviewing a preliminary list of critical facilities to make any edits and provide additional information, and to share the survey on social media and post flyers in common places in the community.

On May 24, 2024, the Planning Team met to discuss the draft Risk Assessment that they reviewed. The Planning Team shared feedback on the draft Risk Assessment and strategies for public involvement.

On June 14, 2024, the Planning Team met to develop their mitigation strategy. The Planning Team reviewed a comprehensive list of potential mitigation actions, selected, and prioritized which actions they wanted to pursue during the next 5 years.

In summary, the following five-step process took place from February 2024 through July 2024.

1. Organize resources: members of the Planning Team identified resources needed in the development of the hazard mitigation plan update- including staff, agencies, and local community members who could provide technical expertise and historical information.
2. Assess risks: with the assistance of a hazard mitigation planning consultant (Fairweather Science), the Planning Team identified the hazards specific to each Tribe and the consultant developed the risk assessment for the identified hazards. The Planning Team reviewed the risk assessment prior to and during the development of the mitigation strategy.
3. Assess capabilities: the Planning Team reviewed current capabilities to determine whether existing provisions and requirements adequately addressed relevant hazards. Examples of these capabilities are administrative and technical, legal, and regulatory, and fiscal.
4. Develop a mitigation strategy: after reviewing the risks posed by each defined hazard, the Planning Team developed a comprehensive range of potential mitigation goals and actions. The Planning Team then identified and prioritized the actions for implementation.
5. Monitor, evaluate, and update the Plan: the Planning Team developed a process to monitor the plan to ensure it was used as intended while fulfilling the needs of the community. The team then developed a process to evaluate the plan to compare how their decisions affected recognized hazard impacts. The Team then outlined a method to share their successes with members of the community. By sharing their successes, the team aimed to encourage support for mitigation activities and to provide data for incorporating mitigation actions into existing planning mechanisms and to provide data for the plans five-year update.

Table 2-1 describes Planning Team meetings convened to develop this MJHMP.

Table 2-1 Hazard Mitigation Planning Team Meetings

Date	Agenda	Attendees	
02/23/2024	Project Kickoff Meeting. MJHMP overview; project schedule; roles and responsibilities, review a list of hazards; initial suggestions for mitigation projects; current critical facilities; discussion about community input via an online survey.	Nome Area Tribes Planning Team	Jacob Martin (NEC) Janice Knowlton (KINC) Kaitlyn Painter (KINC) Barb Gray (NVC) Deilah Johnson (VOS)
		Kawerak, Inc.	Kevin Knowlton
		Fairweather Science	Laura Young Olivia Kavanaugh
05/24/2024	Review of Draft Risk Assessment. Review of draft risk assessment and discuss current ideas for mitigation projects.	Nome Area Tribes Planning Team	Janice Knowlton (KINC) Heather Payenna (KINC) Barb Gray (NVC) Deilah Johnson (VOS) Kevin Bahnke (NEC)
		Kawerak, Inc.	Kevin Knowlton Carol Piscoya
		Fairweather Science	Laura Young
06/14/2024	Develop Mitigation Strategy Review, select, and prioritize a comprehensive list of potential mitigation actions.	Nome Area Tribes Planning Team	Kevin Bahnke (NEC) Janice Knowlton (KINC) Heather Payenna (KINC) Barb Gray (NVC) Deilah Johnson (VOS)

Date	Agenda	Attendees	
		Kawerak, Inc.	Kevin Knowlton
		Fairweather Science	Laura Young Olivia Kavanaugh

NEC: Nome Eskimo Community, KINC: King Island Native Community, NVC: Native Village of Council, VOS: Village of Solomon

2.2 HAZARD MITIGATION PLANNING TEAM

Table 2-2 identifies the complete hazard mitigation Planning Team.

Table 2-2 Hazard Mitigation Planning Team

Name	Title	Organization	Key Input
Kevin "Humpy" Bahnke	Secretary/Treasurer	Nome Eskimo Community	Nome planning team lead, data input, and MJHMP review.
Jacob Martin	Vice President	Nome Eskimo Community	Nome planning team member, data input, and MJHMP review.
Heather Payenna	Tribal Chief	King Island Native Community	King Island planning team lead, data input, and MJHMP review.
Janice Knowlton	Tribal Coordinator	King Island Native Community	King Island planning team member, data input, and MJHMP review.
Kaitlyn Painter	Tribal Member	King Island Native Community	King Island planning team member, data input, and MJHMP review.
Leona Mayac	Council Member	King Island Native Community	King Island planning team member, data input, and MJHMP review.
Barb Gray	Tribal Administrator	Native Village of Council	Council planning team lead, data input, and MJHMP review.
Rhonda West	Tribal Coordinator	Native Village of Council	Council planning team member, data input, and MJHMP review.
Nina Hanebuth	Tribal Member	Native Village of Council	Council planning team member, data input, and MJHMP review.
Kirsten Timbers	Tribal President	Village of Solomon	Solomon planning team member, data input, and MJHMP review.
Sherri Lewis	Tribal Coordinator	Village of Solomon	Solomon planning team member, data input, and MJHMP review.
Deilah Johnson	Environmental Coordinator/Grant Writer/Council Member	Village of Solomon	Solomon planning team member, data input, and MJHMP review.
Kevin Knowlton	Emergency Preparedness Specialist	Kawerak, Inc.	Project Manager, responsible for project coordination.
Laura Young	Project Manager, Hazard Mitigation Planner	Fairweather Science, LLC	Responsible for project management/ coordination, subject matter expertise in plan development, and MJHMP review.
Olivia Kavanaugh	Staff Scientist, Hazard Mitigation Planner	Fairweather Science, LLC	Responsible for MJHMP development, writer, research, and data analysis.

2.3 OPPORTUNITIES FOR COLLABORATORS AND OTHER INTERESTED PARTIES TO PARTICIPATE

Fairweather Science extended an invitation to all individuals and entities identified on the project mailing list in which they described the planning process and announced the upcoming communities' planning activities. The announcement was emailed to relevant academia, nonprofits, and local, state, and federal agencies on June 18, 2024.

Nome, King Island, Council, and Solomon are rural Alaska Villages and do not have any typical neighboring communities. However, the Planning Team invited the following communities to participate in the planning process as Nome area leadership relies on them for resources after a hazard event: City of Nome, Teller, Brevig Mission, Fairbanks, and Anchorage.

- Alaska Department of Community, Commerce, and Economic Development (DCCED)
  - DCCED, Division of Community and Regional Affairs (DCRA)
  - DCCED, National Flood Insurance Program (NFIP)
  - DCCED, Risk Mapping, Assessment and Planning (Risk MAP)
- Alaska Department of Environmental Conservation (DEC)
  - DEC, Division of Spill Prevention and Response (DSPR)
- Alaska Department of Fish and Game (ADF&G)
- Alaska Department of Health and Social Services (DHSS)
- Alaska Department of Military and Veterans Affairs (DMVA)
  - DMVA, Division of Homeland Security and Emergency Management (DHS&EM)
    - DHS&EM All-Hazards Resilience Programs
    - DHS&EM Hazard Mitigation Programs
- Alaska Department of Natural Resources (DNR)
  - DNR, Division of Forestry (DOF)
  - DNR, Division of Geological and Geophysical Surveys (DGGS)
    - DGGS, Coastal Hazards
    - DGGS, Geology
  - DNR, Mining, Land, and Water (MLW)
- Alaska Department of Public Safety (DPS)
- Alaska Department of Transportation and Public Facilities (DOT&PF)
  - DOT&PF Northern Region
- Alaska Native Tribal Health Consortium (ANTHC)
  - ANTHC Community Development
- Alaska State Troopers
  - C Detachment, Nome Post
- Alaska Village Electric Cooperative (AVEC)
- American Red Cross of Alaska- Disaster Program Manager
- Association of Village Council Presidents (AVCP)
- Bering Strait School District (BSSD)
- Bering Straits Native Corporation (BSNC)
  - Bering Straits Development Company

- Bering Straits Regional Housing Authority (BSRHA)
- Bureau of Indian Affairs (BIA)
  - BIA, Tribal Climate Resilience
  - BIA, Tribal Operations
- Council Native Corporation
- Denali Commission
- FEMA Region 10
- King Island Native Corporation
- National Oceanic and Atmospheric Administration (NOAA)
  - NOAA, National Weather Service (NWS)
    - NWS Northern Region
  - NOAA, Regional Preparedness
- Neighboring Communities
  - City of Nome
  - Teller
  - Brevig Mission
  - Anchorage
  - Fairbanks
- Norton Sound Economic Development Corporation (NSEDS)
- Norton Sound Health Corporation (NSHC)
- Rural Alaska Community Action Program, Inc. (RurAL CAP)
- Sitnasuak Native Corporation (Nome)
- Solomon Native Corporation
- University of Alaska Fairbanks (UAF)
  - UAF, Alaska Center for Climate Assessment and Policy (ACCAP)
  - UAF, Alaska Earthquake Information Center (AEC)
  - UAF, Alaska Volcano Observatory (AVO)
  - UAF, Geophysical Institute (GI)
  - UAF, Scenarios Network for Alaska + Arctic Planning (SNAP)
- US Army Corps of Engineers (USACE), Alaska Region
- US Bureau of Land Management (BLM)
- US Department of Agriculture (USDA)
  - USDA, Division of Rural Development (RD)
  - USDA, Forest Service (USFS)
  - USDA, Natural Resources Conservation Service (NRCS)
- US Department of Housing and Urban Development (HUD)
- US Department of the Interior
  - National Park Service (NPS)
  - Bureau of Indian Affairs (BIA)
    - BIA, Tribal Climate Resilience

- US Environmental Protection Agency (EPA)
- US Fish & Wildlife Service (USFWS)
- US Geological Survey (USGS)
  - USGS, Alaska Science Center

2.4 PUBLIC INVOLVEMENT AND TRIBAL DEFINITION OF MEMBERSHIP

Nome Eskimo Community defines their tribal population as anyone with lineal descent and anyone who enrolled during open enrollment. For the purposes of this HMP, the Tribe defines “public” as anyone in the Nome region (Tribal and non-Tribal members) or Tribal members who live outside the Nome area. This assures that anyone within the community is eligible to attend and participate in public tribal meetings regarding hazard mitigation plan development and implementation activities.

King Island Native Community defines their tribal population as anyone with lineal descent. For the purposes of this HMP, the Tribe defines “public” as anyone in the Nome region (Tribal and non-Tribal members) or Tribal members who live outside the Nome area. This assures that anyone within the community is eligible to attend and participate in public tribal meetings regarding hazard mitigation plan development and implementation activities.

Native Village of Council defines their tribal population as anyone with lineal descent from the original 1971 enrollment. For the purposes of this HMP, the Tribe defines “public” as anyone in the Nome region (Tribal and non-Tribal members) or Tribal members who live outside the Nome area. This assures that anyone within the community is eligible to attend and participate in public tribal meetings regarding hazard mitigation plan development and implementation activities.

Village of Solomon defines their tribal population as anyone with enrollment approved via enrollment and lineage descendant family trees. For the purposes of this HMP, the Tribe defines “public” as anyone in the Nome region (Tribal and non-Tribal members) or Tribal members who live outside the Nome area. This assures that anyone within the community is eligible to attend and participate in public tribal meetings regarding hazard mitigation plan development and implementation activities.

The public was encouraged to provide input regarding local hazards and ideas for mitigation projects via an online survey.

Feedback received from the public was used in confirming natural hazards that impact the Nome area as well as the King Island, Council, and Solomon historical townsites, level of concern of each hazard, and critical facilities that the public relies on.

Outreach support documents and survey results are provided in Appendix D.

2.5 REVIEW AND INCORPORATION OF EXISTING PLANS, STUDIES, AND REPORTS

During the development of this MJHMP, Fairweather Science and the Planning Team reviewed and incorporated pertinent information from available resources into the document. Data included available plans, studies, reports, and technical research, which is listed in Table 2-3. The data was reviewed and referenced throughout the document.

Table 2-3 Documents Reviewed

Existing plans, studies, reports, ordinances, etc.	Contents Summary (How will this information improve mitigation planning?)	Data Used (How was this information incorporated into this MJHMP?)
2023 State of Alaska Hazard Mitigation Plan (SHMP)	Defines statewide hazards and their potential locational impacts.	Compared hazard profiles, history, and impacts of events for risk assessment.
Other regional HMPs: White Mountain MJHMP (2023), Golovin MJHMP (2023), Elim THMP (2023), City of Nome (2016)	Defines hazards, resources, and mitigation projects for communities in the area.	Compared hazard profiles, history, and impacts of events for risk assessment.
2007 USACE Erosion Information Paper- Nome and Council	Baseline erosion assessment of the communities.	Used to describe historical erosion locations and impacts in Nome and Council.
Shoreline Change in Nome (1950-2012) (Overbeck et al. 2020)	Map of erosion locations and rate of erosion in Nome from 1951-2015.	Used map in erosion hazard profile to discuss extent and rate of erosion.
Color-indexed elevation maps for flood-vulnerable coastal communities in western Alaska- Nome (Overbeck et al. 2017)	Serve as a temporary tool to communicate about elevations in at-risk coastal communities until true inundation mapping can be completed	Used in the flood hazard section to show elevations in Nome.
2017 Floodplain Manager's Report- Council	Provides details on historic flood events in the community.	Used to describe historical flood impacts and locations in Council.
Erosion Exposure Assessment- Nome (Buzard et al. 2021)	This is a summary of results from an erosion forecast near infrastructure at Nome, Alaska.	Report was used in the erosion hazard profile to determine severity of erosion, future impacts, and infrastructure threatened by erosion.
2019 Denali Commission Statewide Threat Assessment	Determines and ranks individual communities and infrastructure on their risk level by erosion, flooding, and thawing permafrost.	Used group classification rankings in flooding, erosion, and permafrost degradation hazard profiles.
2018 and 2023 National Climate Assessment	Assesses the science of climate change and variability and its impacts across the U.S., now and throughout the century.	Assessment cited several times in hazard sections describing how climate change will influence future conditions.
UAF/SNAP Database	Provides historical data and future projections on climate change impacts, wildfire danger, and other applicable hazards.	Cited several figures and other data in hazard profiles.
October 2022 DHS&EM Disaster Cost Index	Provides details for historic statewide disasters.	Incorporated relevant disaster descriptions in each applicable hazard profile to strengthen the hazard history, extent, and impact sections.
2017 Nome Tribal Climate Adaptation Plan	The Nome Eskimo Community (NEC), in collaboration with the Alaska Center for Climate Assessment and Policy (ACCAP), developed a climate adaptation plan with the Nome-based tribes. This includes tribal members of NEC, Village of Solomon, Native Village of Council, and King Island Native Community. The project goals were to familiarize tribal members with climate science and local knowledge, provide an opportunity to identify and discuss climate impacts and adaptation strategies,	Information cited throughout the hazard profiles and projects references in the Mitigation Action Plan

Table 2-3 Documents Reviewed

Existing plans, studies, reports, ordinances, etc.	Contents Summary (How will this information improve mitigation planning?)	Data Used (How was this information incorporated into this MJHMP?)
	develop a plan, and share information with other rural Alaska and Native communities. This project was funded by the Bureau of Indian Affairs.	
FY15-FY20 Village of Solomon EPA Tribal Environmental Plan	VOS' Environmental Plan was created to assist the Tribe of Solomon, Environmental Coordinator, Kawerak, Solomon Native Corporation and other various entities to better identify and find solutions, as well as to build capacity to start addressing the environmental issues in and around Solomon, AK.	Information cited throughout the hazard profiles and projects references in the Mitigation Action Plan
2013 Village of Solomon Integrated Solid Waste Plan, revised 2016	Discusses the solid waste issues in Solomon and provides suggestions to upgrade.	Information reviewed during plan development.
2017 Village of Solomon Renewable Energy Plan, revised 2018	Discusses Solomon's energy vision, with a goal of returning Solomon to a year-round village.	Information reviewed during plan development.
Council Local Economic Development Plan (2010-2015)	Describes the economic development program of the Native Village of Council and charts the course of action over a five-year time period.	Documents reviewed during plan development and incorporated information into relevant sections as applicable. Priority projects from LEDPs used in Section 3.4.8- Future Development.
Native Village of Council Organizational Strategic Plan 2004-2009	Provides community development strategic vision, values, and goals over the next 5 years.	
King Island Local Economic Development Plan (1999, 2010-2014, 2014-2019	Describes the economic development program of the King Island Native Community and charts the course of action over a five-year time period.	
Solomon Local Economic Development 1998, 2017-2020, 2021-2026	Describes the economic development program of the Village of Solomon and charts the course of action over a five-year time period.	
Nome Eskimo Community Strategic Plan 2009-2013	Provides top 10 priority projects aimed at growing and strengthening the NEC over a 5 year period.	
Nome Comprehensive Plan (1968)	Determines community goals and aspirations in terms of community development.	
Nome Native Community Strategic Development Plan 2004-2009	The LEDP process facilitated a consolidated effort to implement development strategies that will subsequently increase cultural heritage, local employment opportunities for tribal members, decrease dependency, and reduce duplication of efforts in various projects and programs. Overall, the goal is to improve the cultural, economic and social well-being of the Nome Native community.	
Northwest Area Transportation Plan – Nome Area Tourism Demand, Potential, and Infrastructure Study 2003	This study addresses if, how, and to what degree Nome's state highways and transportation infrastructure play a role in fostering tourism industry growth and economic development into the future, especially with expedition-class cruise travelers and birders. The findings and recommendations of this study will fit into the Northwest Alaska Transportation Plan.	

A complete list of references in provided in Section **Error! Reference source not found.**.

2.6 OTHER ONGOING TRIBAL EFFORTS

Once the 2024 MJHMP is completed, the Nome Eskimo Community, King Island Native Community, Native Village of Council, and Village of Solomon intend to apply for available Hazard Mitigation Assistance Grant funding and will work closely with the FEMA Region X Tribal Liaison in doing so. In addition, on completion of the 2024 MJHMP, information will be incorporated into future planning efforts and the creation of Tribal plans as well as other FEMA programs and initiatives.

Other ongoing Tribal efforts include:

- Kawerak Transportation's continued efforts to develop/update Long-Range Transportation Plans in the region
- Bering Straits Regional Housing Authority's continue efforts to build new residential housing, and in some communities, relocate housing out of hazard areas.
- ANTHC's ongoing efforts to upgrade and replace critical water and wastewater infrastructure
- Ongoing efforts to upgrade and replace critical power infrastructure
- Kawerak Emergency Preparedness' ongoing efforts to provide water purification systems for safe drinking water and emergency food supplies to address food sovereignty concerns for residents
- VOS's Tribal Enrollment Department's ongoing efforts to issue tribal identification cards to Tribal members
- VOS's ongoing efforts to promote economic development by running the Solomon B&B, increasing connection to the Tribe (holding youth camp regularly), establishing and maintaining affordable housing (including logistics like water, sewer, electricity), establishing and maintaining a tribal court (children's cases, civil diversion agreements and culturally appropriate sentencing), protecting and maintaining the environment, protecting watershed habitats including protection from mining, increasing focus on health and well-being of tribal members, and teaching youth about gatherings, food, hunting, and preserving their language
- VOS's Environmental Program's ongoing efforts to partner with Michigan State University, a grantee of National Science Foundation, to conduct home energy assessments for all Tribal households
- VOS's Environmental Program's ongoing efforts to partner with King Island Native Community, Nome Eskimo Community, and Native Village of Council on conducting a greenhouse gas emissions inventory to develop a priority climate action plan- mitigating greenhouse gases
- VOS's Environmental Program's ongoing efforts to help relaunch the Ban the Bag campaign in Nome to encourage the City of Nome to approve a city ordinance in banning single use plastic bags

3. RISK ASSESSMENT/HAZARD ANALYSIS

This section identifies and profiles the hazards that could affect Nome, King Island townsite, Council townsite, and Solomon townsite.

This section addresses a portion of Element B of the Tribal Mitigation Plan regulation checklist.

Regulation Checklist- 44 CFR § 201.7 Tribal Mitigation Plans
ELEMENT B. Hazard Identification and Risk Assessment
B1. Does the plan include a description of the type, location, and extent of all natural hazards that can affect the tribal planning area? [44 CFR § 201.7(c)(2)(i)]
B2. Does the plan include information on previous occurrences of hazard events and on the probability of future hazard events for the tribal planning area? [44 CFR § 201.7(c)(2)(i)]
B3. Does the plan include a description of each identified hazard's impact, as well as an overall summary of the vulnerability of the tribal planning area? [44 CFR § 201.7(c)(2)(ii)]
Source: FEMA 2017 (Tribal)

3.1 OVERVIEW

Hazard identification is the process of recognizing any natural events that may threaten an area. Natural hazards result from uncontrollable or unexpected natural events of sufficient magnitude. This plan does not take in account any man-made, technological, or terrorism related hazards. Historical hazards are noted, but all natural hazards that have the potential to affect the study area must be considered. Any hazards that are determined to be unlikely to occur or cause little to no damage, are eliminated from consideration.

A hazard analysis includes the identification, screening, and profiling of each hazard.

Hazard profiling entails describing hazards in terms of their nature, history, location, magnitude, frequency, extent, and probability. Hazards are identified through historical and anecdotal information collected by members of the community, previous mitigation plans, studies, and study area hazard map preparations/reviews, when appropriate. Hazard maps are then used to define the geographic extent of a hazard, as well as define the approximate boundaries of the risk area.

3.2 HAZARD IDENTIFICATION AND SCREENING

On February 23, 2024, the Planning Team evaluated and screened the comprehensive list of potential hazards that could impact the communities. The Planning Team determined that nine hazards pose a threat to Nome and the historic townsites of King Island, Council, and Solomon: earthquake, flood, erosion, severe weather, wildland/tundra fire, landslide, changes in the cryosphere (permafrost degradation, sea ice extent, snow avalanche), tsunami, and radon. The Planning Team decided to discuss the influence of climate change within each individual hazard.

Tribal members of the Nome Area Tribes are primarily year-round residents of Nome, and all of the Tribes have assets in the Nome area. Therefore, those assets are located in the same geographic area and thus experience the same vulnerability to hazards. However, King Island, Council, and Solomon's historic townsites are located outside of Nome, and will have different vulnerability to natural hazards. The difference in vulnerability or applicability will be discussed within each hazard profile as well as summarized in Section 3.4.1.

The assets at risk of the identified hazards, both within and outside of the planning area, are identified in Section 3.4.5.

Table 3-1 Identification and Screening of Hazards

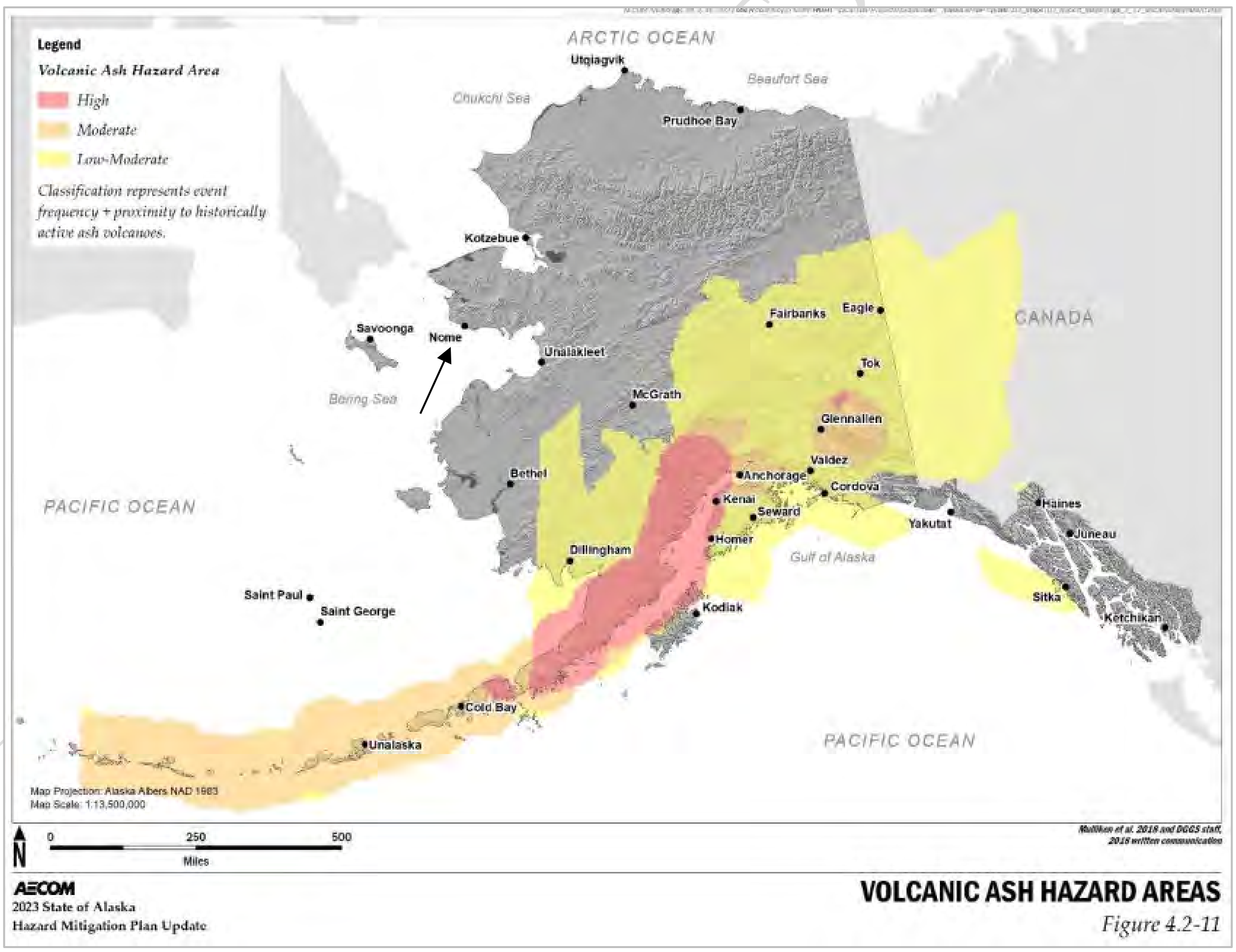
		Hazard Applicability			
Hazard Type	**Explanation**	**Nome**	**King Island townsite**	**Council townsite**	**Solomon townsite**
Earthquake	Nome, King Island, Council, and Solomon are not located near the Aleutian Subduction zone and historical earthquakes have been minor and fewer in number compared to areas along the subduction zone and the rest of the state. The faults near Nome are Pre-Quaternary faults which have not been active in over 1.6 million years and are not named. The named fault north of Nome, Solomon, and Council is named the Kigluaik Fault and is less than 15,000 years in age. It has a slip rate of 0.2-1.0 mm/yr with a dip direction of North. The communities have not been severely impacted by earthquakes.	✓	✓	✓	✓
Severe Weather (Cold, Drought, Rain, Snow, Wind, etc.)	Nome, King Island, Council, and Solomon experience severe weather events such as the following: extreme cold, freezing rain/ice storms, heavy and drifting snow, winter storms, blizzards, heavy rain, high winds, and droughts. Nome experiences severe storm conditions accumulating over 10-20 inches of snowfall within several hours. Wind chills of -80ºF have been recorded in Nome. Blizzards in Nome have caused school, airport, and business closures, freight delays, snow drifts, and loss of utilities.	✓	✓	✓	✓
Wildland/Tundra Fire	Nome, Council, and Solomon are located in the EC5 Level II Ecoregion which is classified as Bering Tundra. The Seward Peninsula is a predominantly treeless region and the vegetation/landcover class of this region is primarily made up of sparse vegetation containing trees, shrubs, and herbaceous cover. Ecoregion EC5 has a low fire load, but fires do happen under favorable conditions. Mainly short lived as moisture frequently impacts the west coast. However, with certain combinations of fuel availability, weather, topography, and sources of ignition, wildland fires may occur near Nome. Nome, Council, and Solomon is occasionally impacted by smoke from distant wildfires that impacts their air quality. Wildland/tundra fires do not pose a threat to King Island townsite due to the lack of vegetation (fuel).	✓		✓	✓
Changes in the Cryosphere	Hazards associated with permafrost degradation, sea ice extent, and snow avalanches occur in Nome, King Island townsite, Council townsite, and Solomon townsite. Nome, King Island, Council, and Solomon have historically had discontinuous permafrost. Thawing permafrost has led to subsidence and heaving on subsistence trails, roads and underneath some homes. Sea ice in the Bering Sea and Norton Sound has been declining and has impacted the communities' subsistence lifestyle.	Permafrost Sea Ice	Permafrost Sea Ice	Permafrost	Permafrost Sea Ice
Radon	Radon exposure is an ongoing issue for Nome, and Nome regularly tests for radon. Prior to the Nome High School renovation, there was an underground tunnel for students to travel through to avoid the winter weather when walking between buildings. This tunnel was regularly tested for radon and when levels were high, the tunnel was closed until radon levels were back to normal range. The high school has since undergone renovations and the tunnel is no longer in use.	✓	✓	✓	✓

		Hazard Applicability			
Hazard Type	**Explanation**	**Nome**	**King Island townsite**	**Council townsite**	**Solomon townsite**
	The entire Nome area, including King Island townsite, Council townsite, and Solomon townsite is located in EPA Radon Zone 3, which is an area predicted to have an average radon level of less than 2 pCi/L.				
Flood	Nome and Solomon are threatened by coastal flooding and Council is threatened by riverine flooding. King Island townsite is not threatened by flooding due to the village's location on top of steep, rocky cliffs. Nome and Solomon are located near the coastline and experience coastal flooding associated with Bering Sea and Norton Sound storms and storm surges. Council is located approximately 50 ft above the Niukluk River. There is no reported flooding of houses in the community, but there are some buildings on the west side of the river that may be subject to flooding. The Council Mine landing strip has been inundated with as much as 2 ft of water from Melsing Creek, which makes the airstrip unusable for approximately 3 weeks in the spring. The Denali Commission 2019 Statewide Threat Assessment provides statewide risk ratings for flooding. Nome is located in Group 1, which are the communities that are most threatened by flooding.	✓		✓	✓
Tsunami	A history of tsunamis along the Bering coast of the Kamchatka region over the past 4,000 years indicates that the northern Kuril-Kamchatka Subduction Zone produces tsunamigenic earthquakes every few centuries (Medvedeva et al. 2023). Analyzing the 4500-year paleoseismic record, 12–15 tsunamis have been documented in the southwestern part of the Bering Sea (Medvedeva et al. 2023). Local/Traditional Knowledge shared by Ellen Balto Stenberg in 1998 and others documents a tsunami impacting Nome in 1910. This tsunami caused devasting flooding in Nome and Solomon and exposed bodies buried in the permafrost. Nome does not have inundation mapping to determine if/how a tsunami would impact the community. Until mapping can be done, the Planning Team wanted to profile the hazard. For this HMP, Nome and Solomon townsite are thought to be threatened by tsunamis.	✓			✓
Erosion	Nome and Solomon are located on the coastline and experiences coastal erosion associated with Bering Sea storms. Council may experience riverine erosion but there is no documentation or monitoring. Erosion does not appear to threaten King Island townsite as the village is located on top of steep, rocky cliffs. Erosion protection in Nome has drastically reduced the rate of erosion and due to the erosion protection, an estimate of future erosion cannot be determined. Erosion is threatening subsistence areas such as Woolley Lagoon (north of Nome), which is an important site for the King Island Native Community.	✓		✓	✓
Landslide	Nome, Council townsite, and Solomon townsite are all threatened by landslides/rockfalls. A landslide occurred on June 9, 2018, on the Kougarok Road/Nome-Taylor Highway near Salmon Lake. This event is labeled as "Moderate Rockfall" and caused $592 worth of damage with only maintenance and operations (M&O) and heavy machinery needed to repair the road. There is high confidence that another slide will occur here in the future. King Island townsite is also threatened by landslides and rockfalls.	✓	✓	✓	✓

		Hazard Applicability			
Hazard Type	**Explanation**	**Nome**	**King Island townsite**	**Council townsite**	**Solomon townsite**
Climate Change	The Planning Team chose to incorporate the influence of climate change into each hazard rather than profiling it as a standalone hazard. Climate change is altering weather patterns, increasing global temperatures which is leading to permafrost degradation and impacting subsistence resources and threatening food sovereignty. Climate change is threatening Nome, King Island townsite, Council townsite, and Solomon townsite.	✓	✓	✓	✓

3.2.1 HAZARDS NOT PROFILED IN THIS MJHMP

- **<u>Volcano</u>:** The 2023 State of Alaska SHMP identifies volcanic ash hazard areas across the State (Figure 3-1). Nome is not located near any active volcanoes and volcanic ash does not pose a direct threat to the community. Nome may be indirectly impacted by a future volcanic eruption as travel/supplies may be delayed from Anchorage or Seattle if planes are not permitted to travel due to ash or other volcanic hazards.



Source: DHS&EM 2023

Figure 3-1 Statewide Volcanic Ash Hazard Areas

3.3 HAZARD PROFILES

The specific hazards selected by the Planning Team for profiling have been examined based on the following factors:

- Nature (type)
- History (previous occurrences)
- Location (where the hazard occurs in the Planning Area)
- Extent (includes magnitude and severity)
- Impact (provides general impacts associated with each hazard)
- Probability of Future Events (annual likelihood of hazard occurring in the Planning Area)
- Future Conditions Including Climate Change (how climate change is influencing the hazard)

Each hazard is assigned a rating based on the following criteria for magnitude/severity (Table 3-2) and probability of future event (Table 3-3). Estimating magnitude and severity are determined based on historic events using the criteria identified in the following tables.

Table 3-2 Hazard Magnitude/Severity Criteria

Magnitude / Severity	Criteria
4- Catastrophic	• Multiple deaths. • Complete shutdown of facilities for 30 or more days. • More than 50 percent (%) of property is severely damaged.
3- Critical	• Injuries and/or illnesses result in permanent disability. • Complete shutdown of critical facilities for at least two weeks. • More than 25% of property is severely damaged.
2- Limited	• Injuries and/or illnesses do not result in permanent disability. • Complete shutdown of critical facilities for more than one week. • More than 10% of property is severely damaged.
1- Negligible	• Injuries and/or illnesses are treatable with first aid. • Minor quality of life lost. • Shutdown of critical facilities and services for 24 hours or less. • Less than 10% of property is severely damaged.

Table 3-3 Hazard Probability of Future Events Criteria

Probability	Criteria
4- Highly Likely	• Event is probable within the calendar year. • Event has up to 1 in 1 year chance of occurring (1/1=100%). • History of events is greater than 33% likely per year.
3- Likely	• Event is probable within the next three years. • Event has up to 1 in 3 years chance of occurring (1/3=33%). • History of events is greater than 20% but less than or equal to 33% likely per year.
2- Possible	• Event is probable within the next five years. • Event has up to 1 in 5 years chance of occurring (1/5=20%).

Probability	Criteria
	• History of events is greater than 10% but less than or equal to 20% likely per year.
1- Unlikely	• Event is possible within the next ten years. • Event has up to 1 in 10 years chance of occurring (1/10=10%). • History of events is less than or equal to 10% likely per year.

The hazards profiled for the Nome Area Tribes are presented throughout the remainder of this section. The presentation order does not signify their importance or risk level.

3.3.0 CLIMATE CHANGE

To meet FEMA guidelines, the Planning Team decided to incorporate the influence of climate change into each individual hazard rather than profile it as standalone hazard. General background information regarding climate change in Alaska, with emphasis on the Bering Strait Region, is described below.

Nature

Climate change is the long-term variation in Earth's average weather patterns and atmospheric composition. These variations may be natural, but since the 1800s, human activities have been the main driver of climate change, primarily due to the burning of fossil fuels (like coal, oil, and gas) which produce heat-trapping gases. These gases act as a blanket over the Earth, and with more gasses, the thicker the blanket, the warmer the earth. Trees and other plants are not able to absorb the excess carbon dioxide in the atmosphere, and this excess carbon dioxide changes precipitation and temperature patterns. These changes in precipitation patterns lead to increasing frequency and intensity of storms and floods, wildfires, and substantial changes in flora, fauna, fish, and wildlife habitats.

For the past million years the natural climate has oscillated between warm periods and ice ages. This shifting in and out of warm periods and ice ages is correlated strongly with Milankovitch cycles. These cycles affect the amount of sunlight and therefore, energy, that Earth absorbs from the Sun. They provide a strong framework for understanding long-term changes in Earth's climate, but Milankovitch cycles can't explain all climate change that's occurred over the past 2.5 million years. Milankovitch cycles cannot account for the current period of rapid warming Earth has experienced since the pre-Industrial period (years 1850-1900), and particularly since the mid-20th Century. Earth's recent and continual warming is primarily due to human activities- specifically, the direct input of carbon dioxide into Earth's atmosphere from burning fossil fuels. This is significant because hazard mitigation planning relies greatly upon the historical record.

As noted in the 2018 National Climate Assessment (USGCRP 2018), the effects of climate change in Alaska will include:

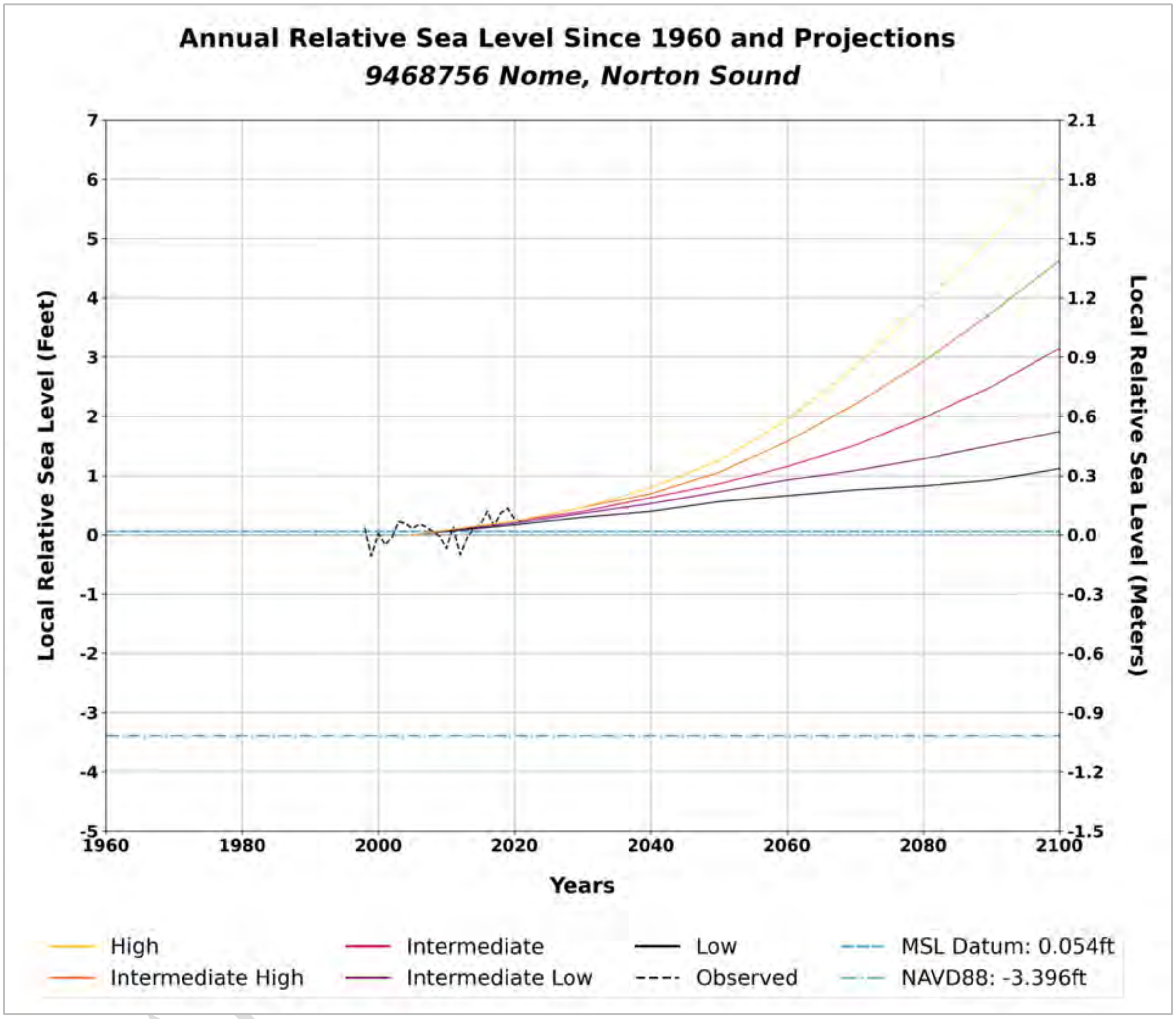
- Increase in ocean acidification which will affect marine habitats.
- Lack of sea ice, which will contribute to increased storm surge and coastal flooding and erosion.
- Increase in the size, intensity, and frequency of wildfires.
- Thawing permafrost, melting glaciers, and the associated effects on the state's infrastructure and hydrology.
- Increase of health threats, such as injuries, smoke inhalation, damage to vital infrastructure, decrease of food and water security, and new infectious diseases.

Location

Alaska has been called a ''climate canary'' because it is already seeing the early effects of global climate change. Climate researchers expect future climate change in Alaska and other Arctic places to be more pronounced than it is elsewhere in the world (Larsen et al. 2008).

Global sea level has risen between 6 and 8 inches (15-20 cm) over the last 100 years (NOAA 2021). About one third of the increase is due to the thermal expansion of ocean water as it has gotten warmer, and about two-thirds is due to meltwater flowing back to the ocean as glaciers and ice sheets on land melt.

Figure 3-2 depicts the rising sea level in the Nome area from 1992 to 2022. In those 29 years, the highest sea level was recorded in February 2019 and the lowest was recorded in March 1994.



Source: NOAA 2022

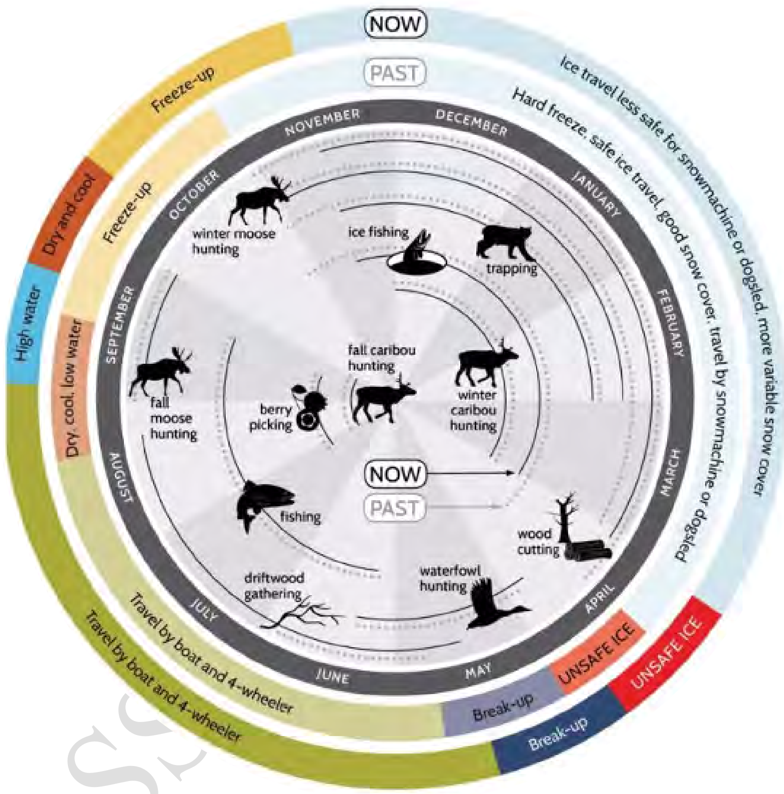
Figure 3-2 Annual Relative Sea Level in Nome and Future Projections (1960-2100)

Impact

Climate change in Alaska is causing widespread environmental change that is damaging critical infrastructure, especially in coastal communities. As climate change continues, infrastructure may become more vulnerable to damage, increasing risks to residents and resulting in large economic impacts (Melvin et al. 2016).

It is estimated that climate change in Alaska could add $3.6–$6.1 billion (+10% to +20% above normal wear and tear) to future costs for public infrastructure between 2008 and 2030 and $5.6–$7.6 billion (+10% to +12%) between 2008 and 2080 (Larsen et al. 2008). Climate change is impacting food security in Alaska, especially that of Indigenous Alaskans who rely on subsistence hunting, fishing, and gathering. Observed greening of tundra biomes and browning of boreal forest biomes is affecting the abundance and distribution of animals such as reindeer and salmon, reducing available harvests of these important subsistence species, and is impacting access to and availability of foraging plants (IPCC 2019).

Ocean acidification is a less commonly discussed impact of climate change in which the pH level of ocean waters decreases due to the absorption of atmospheric carbon dioxide. According to NOAA, the world's oceans have become 30% more acidic since the Industrial Revolution, and as atmospheric CO_2 rises, more of this gas is absorbed by the oceans (NOAA 2020). Ocean acidification has also been shown to disrupt some fish species and their ability to identify suitable habitats and detect predators and can impact the shells and sensory organs of crab. Additionally, ocean warming is impacting available fish stocks, and marine animal biomass is projected to decrease in the 21st century by as much as 6.4% in a low emissions scenario, and 24.1% in a high emissions scenario. Ocean acidification and warming are anticipated to be irreversible on human time scales, indicating that societies will be required to adapt to these changing conditions and reductions of fish availability (IPCC 2019).



Source: Steffen et al. 2021

Figure 3-3 How Climate Change is Affecting the Timing of Traditional Subsistence Activities

The combined impacts of changes to boreal forest and tundra biomes, ocean acidification, and ocean warming could prove highly disruptive to food security and the economy of Alaska, which relies heavily on subsistence and commercial hunting and fishing. The IPCC's 2019 report concludes that these ecosystem changes will further erode the cultural identities and livelihoods of Indigenous as well as non-Indigenous peoples (IPCC 2019).

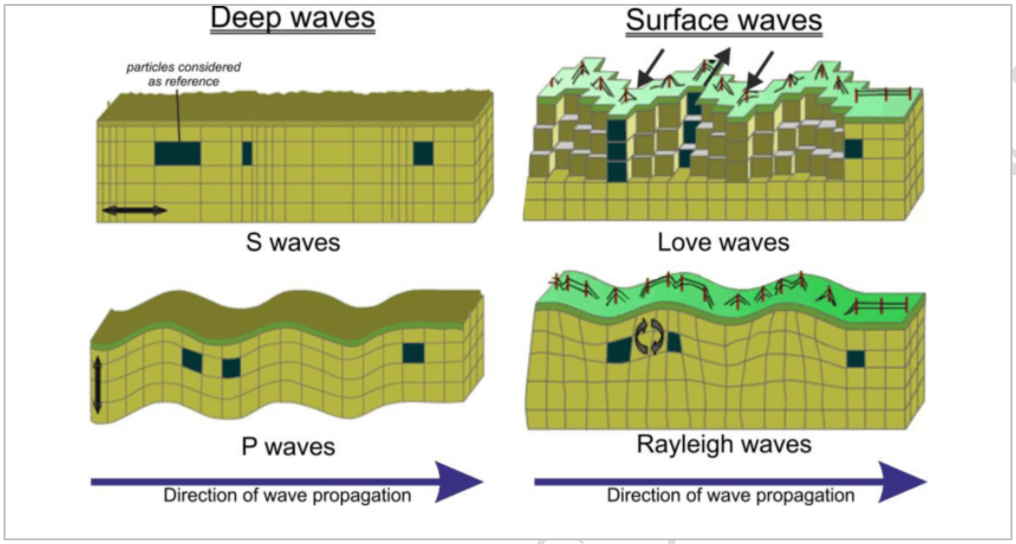
3.3.1 EARTHQUAKE

Hazard applicability: ☑Nome ☑King Island townsite ☑Council townsite ☑Solomon townsite

3.3.1.1 Nature

An earthquake can be defined as any shift along the Earth's tectonic plates and faults due to accumulated strain built up by friction which precipitates a sudden movement or trembling of the Earth's crust. This sudden movement can be felt at sometimes very distant sites from the epicentre, and it usually occurs without warning. The movement can build rapidly after just a few seconds and cause significant, sometimes catastrophic, damage and severe numbers of casualties, and this often-violent motion or shaking is the most common effect of earthquakes.

Like sound, the motion of the ground is the strongest near the source and increases in concert with the amount of energy released. It also attenuates with distance, i.e., decreases in force as you travel farther away from the epicentre of the earthquake. An earthquake causes several types of waves both with the Earth's interior (seismic waves) and along the surface of the Earth (surface waves). Two distinct types of seismic waves are produced during an earthquake. Primary waves (P waves) are compressional and longitudinal in nature, and this causes back and forth oscillation in parallel to the direction of travel (the vertical motion). Secondary waves (S or shear waves) are slower in nature than the P waves and cause vibrations that are in the side-to-side plane (horizontal motion). Additionally, there are two types of surface waves: both Rayleigh and Love waves travel more slowly and usually cause considerably less damage than the seismic waves. A visual depiction of each of these waves is shown below (Figure 3-4).



Source: Martinez-Moreno 2015

Figure 3-4 Types of Seismic Waves

Besides the motion and resultant damage, there are also several other hazards which occur due to earthquakes. These are:

Fault Displacement: this is distinct movement on the surface along the two sides of a seismic fault. These displacements can be very considerable in both length and width, i.e., as much as 7 meters vertically and more than 60 kilometers along the rupture line. This type of faulting can cause severe damage to surface structures such as pipelines, roads, railways, and tunnels.

Liquefaction: when granular soil or sediments that is saturated becomes distorted due to the vibrations and surface movements. The empty spaces between the granules can collapse, and water pressure within the pores may increase enough to make the soil/sediments behave more like a fluid during the earthquake causing sometimes serious deformations. Horizontal movements (i.e., lateral spreading) of 5 meters are common but can be as much as 30 meters. Massive flows (i.e., flow failures) that are typically tens to a hundred meters can sometimes extend even to 6-7 kilometers. Liquefaction can also cause a considerable loss of bearing strength, and this can result in structures settling significantly or tipping severely. All of this can result in severe property damage.

Both the intensity and magnitude are considered during the measurement of the severity of earthquakes. The observed level of damage and effects on people, nature, and human structures are variables when describing the intensity. The severity of intensity generally increases with the amount of energy released and decreases with distance from the fault or epicenter of the earthquake. The scale most often used in the U.S. to measure intensity is the Modified Mercalli Intensity (MMI) Scale.

As shown in Table 3-4, the MMI Scale consists of 10 increasing levels of intensity that range from imperceptible to catastrophic destruction. Peak ground acceleration (PGA) is also used to measure earthquake intensity by quantifying how hard the earth shakes in a given location, or measured as acceleration due to gravity (g). The USGS describes the MMI Scale as:

> *"The effect of an earthquake on the Earth's surface is called the intensity. The intensity scale consists of a series of certain key responses such as people awakening, movement of furniture, damage to chimneys, and finally - total destruction. Although numerous intensity scales have been developed over the last several hundred years to evaluate the effects of earthquakes, the one currently used in the United States is the Modified Mercalli (MM) Intensity Scale.*
>
> *The Modified Mercalli Intensity value assigned to a specific site after an earthquake has a more meaningful measure of severity to the non-scientist than the magnitude because intensity refers to the effects actually experienced at that place."*

The following table is an abbreviated description of the comparisons of earthquake magnitude, intensity, ground-shaking comparisons, perceived shaking, and damage.

Table 3-4 Magnitude/Intensity/Ground-Shaking Comparisons

Magnitude	Intensity	PGA: Acceleration (g)	Perceived Shaking	Damage
1.0-3.0	I	<0.000464	Not felt	None
3.0-3.9	II-III	0.000464 - 0.00297	Weak	None
4.0-4.9	IV	0.00297 - 0.0276	Light	None
	V	0.0276 - 0.115	Moderate	Very light
5.0-5.9	VI	0.115 - 0.215	Strong	Light
	VII	0.215 - 0.401	Very Strong	Moderate
6.0-6.9	VIII	0.401 - 0.747	Severe	Moderate/Heavy
	IX	0.747 - 1.39	Violent	Heavy
7.0+	X+	>1.39	Extreme	Very Heavy

Adapted from: USGS (2008) and Er et al. (2010)

3.3.1.2 History

Reliable data in the seismology of Alaska has been recorded only since 1973 for most locations, and this makes the data relatively young compared to other areas. Obtained for the U.S. Geological Survey (USGS) and the archives of the UAF Geophysical Institute, State of Alaska, the information provided is based on the best-known data. Thorough research was conducted for all events since 1950 (1950-1972 data is less reliable than current data) and up to the present within the earthquake database of the USGS.

Alaska's strongest earthquake, and the second largest earthquake in the world, occurred on March 27, 1964, in Prince William Sound and was magnitude M9.2. Similar to most earthquakes in Alaska, this one occurred near the Alaska-Aleutian subduction zone and was felt by many residents throughout the State. Nome did not experience any damages from this event.

Another notable earthquake occurred on November 3, 2002. The Denali Fault Earthquake, which measured M7.9 in magnitude, lasted for roughly 90 seconds. The earthquake struck a sparsely populated region, and caused thousands of landslides, but little structural damage and no deaths were reported. Nome did not experience any damages from this event.

Table 3-5 lists the historical earthquakes M4.0 and greater within 100 miles of Nome. Historical earthquake data was pulled from the USGS Earthquake Catalog from January 1, 1900, through March 12, 2024. Since 1900, there have been 42 recorded earthquakes M4.0 and greater within 100 miles of Nome- the largest occurred on August 26, 1960, and registered as a M6.0.

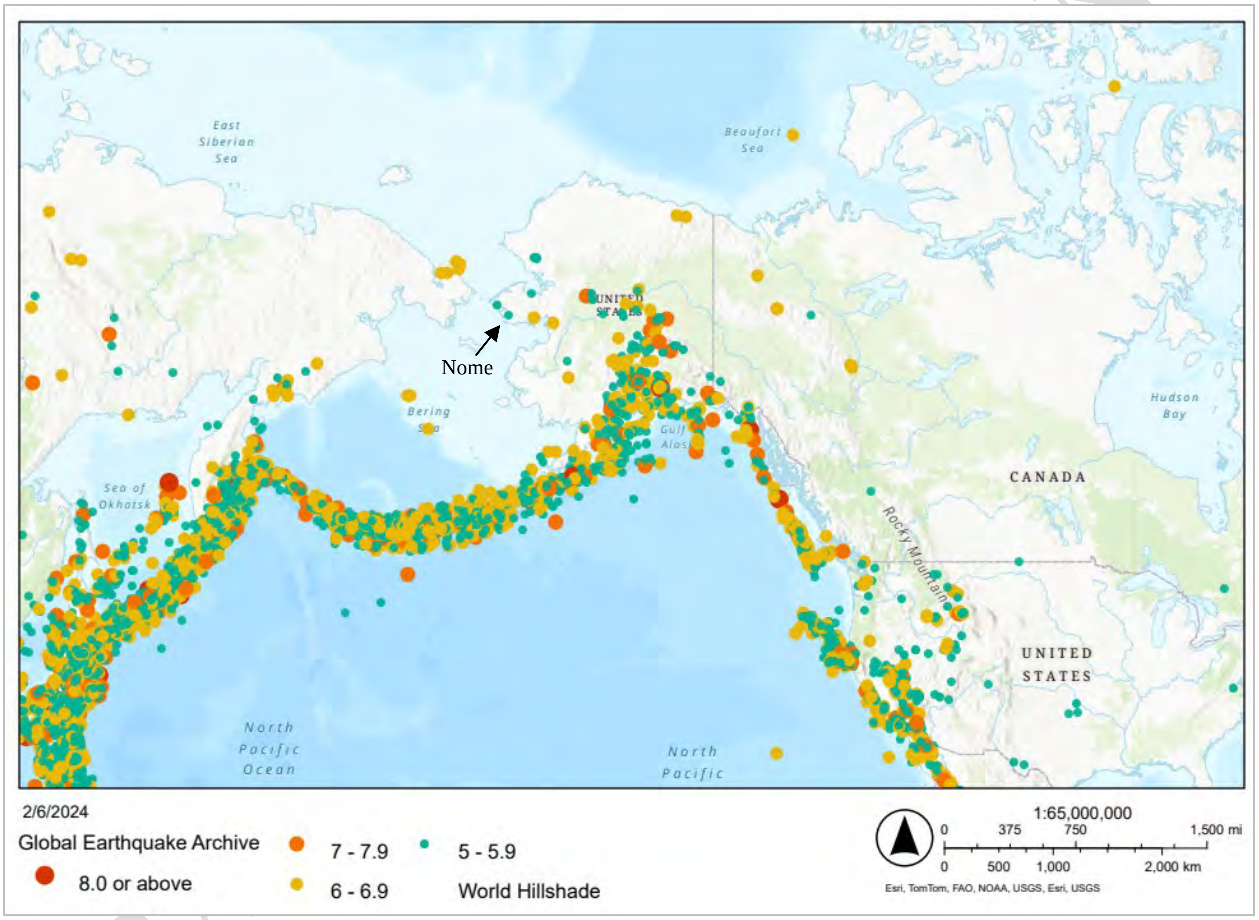
Table 3-5 Historical Earthquakes (M4.0 and greater within 100 miles of Nome)

Date	Latitude	Longitude	Magnitude
8/26/1950	64.814	-162.642	6
12/28/1952	65.49	-167.209	5.83
12/13/1964	64.948	-165.81	5.59
10/24/1979	65.238	-164.736	4.4
4/7/1985	65.016	-166.447	4.2
9/15/1985	63.33	-166.146	4.5
2/4/1987	65.04	-166.801	4.7
9/11/1988	65.468	-167.837	4.2
3/4/1990	64.4905	-164.5673	4.1
8/30/1992	64.7333	-165.6268	4.7
7/31/1993	64.5385	-162.3765	4
4/21/1994	64.813	-164.821	4.2
5/18/1995	64.7495	-162.3095	4.3
8/27/1996	65.204	-165.444	4.4
5/21/1997	65.389	-166.979	4.3
7/14/1997	64.961	-164.722	4.4
12/15/1997	64.5545	-162.6723	4.5
7/21/1998	64.881	-162.32	4
8/23/1998	65.5004	-163.8082	4
6/18/2000	65.2694	-164.3402	4.7
4/30/2001	64.5197	-163.7004	4.4
8/13/2002	64.2601	-163.9853	4.1
10/22/2003	65.4542	-167.4463	4.4
9/11/2004	65.8864	-166.2095	4
12/19/2004	63.5292	-165.7418	4.2
7/28/2005	64.5361	-163.5976	4.3
6/20/2009	63.3069	-166.8358	4.3
5/13/2010	65.663	-166.6912	4.4
8/8/2010	65.3053	-168.107	4
5/21/2011	65.3739	-166.8657	5
4/25/2014	65.334	-166.354	4.4
3/8/2015	64.06	-165.265	4.3
3/17/2015	64.8603	-167.9906	4
7/9/2016	65.7005	-166.1295	4.8
7/17/2016	65.6862	-166.1018	4.2
6/29/2017	65.2778	-168.0291	4.1

Date	Latitude	Longitude	Magnitude
11/16/2018	65.5781	-166.807	4.6
11/16/2018	65.5676	-166.779	4.2
11/21/2018	65.5734	-166.7829	4
7/3/2019	65.8176	-166.1906	4.1
6/16/2023	64.4223	-163.6323	4.3
1/16/2024	65.6298	-165.2551	4.5

Source: USGS 2024

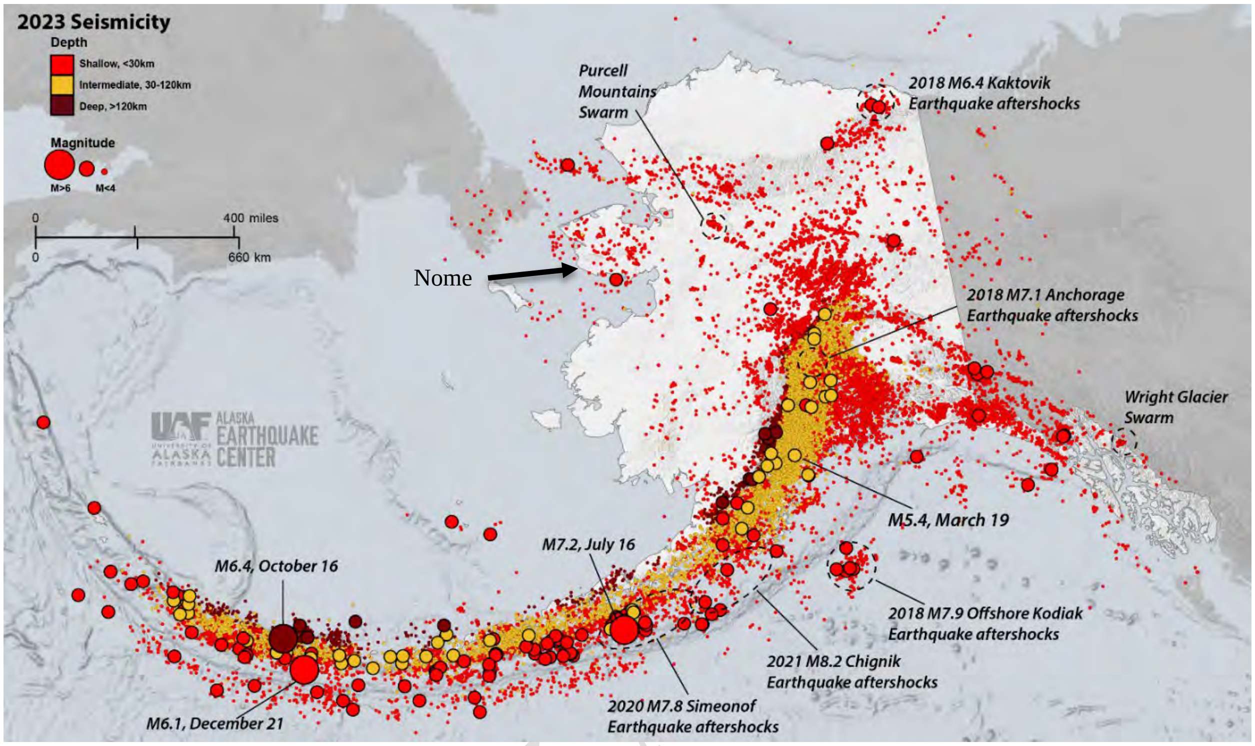
Figure 3-5 shows historical Alaska earthquakes from 1900 – February 6, 2024, M5.5 and greater.



Source: Global Earthquake Archive- Updated December 11, 2023, Accessed February 6, 2024

Figure 3-5 Historical Alaska Earthquakes Greater than M5.5, 1900 - February 6, 2024

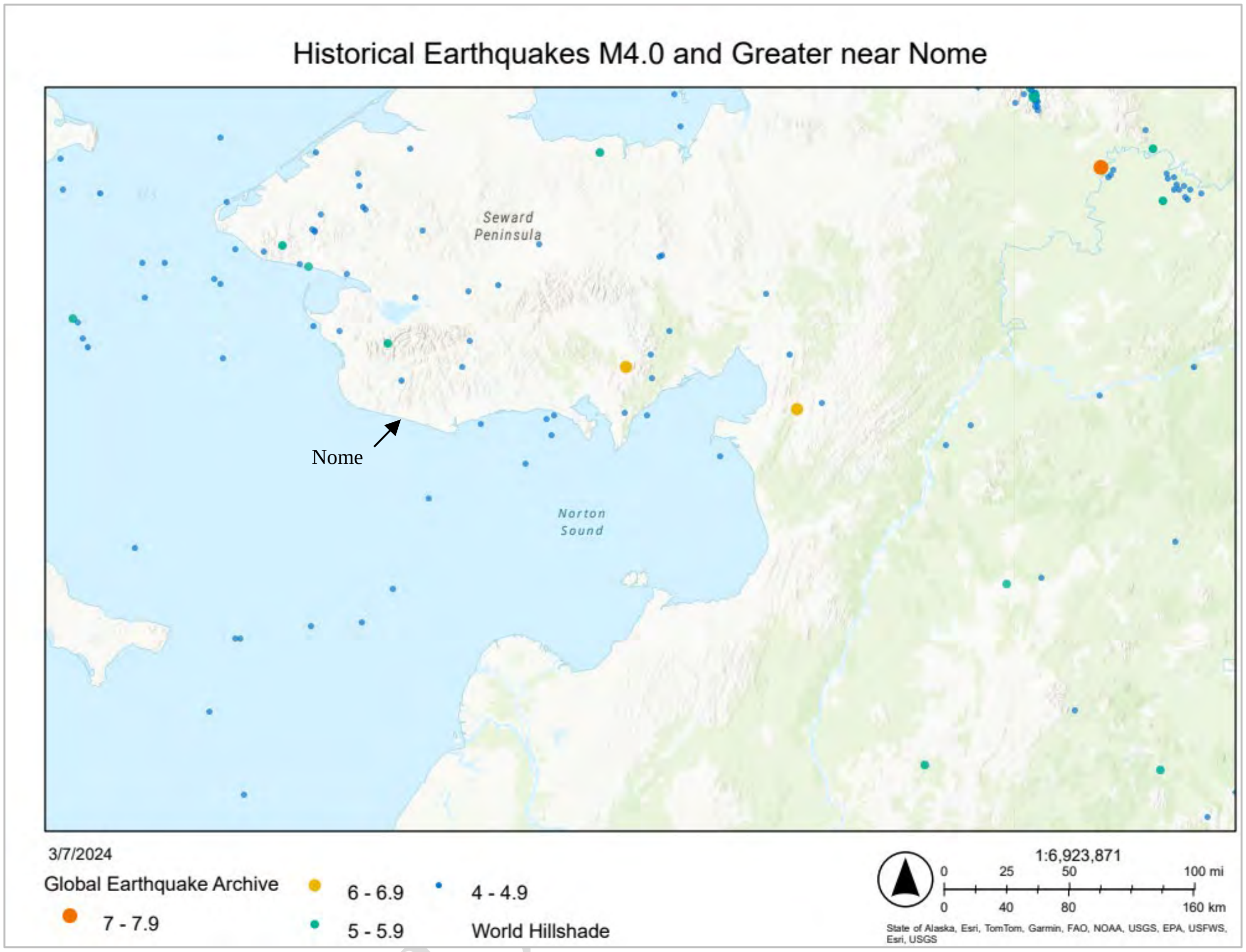
Figure 3-6 depicts one year of earthquake activity in Alaska during 2023. The Alaska Earthquake Center (AEC) states that "when Alaska has less than 50,000 earthquakes in a given year, we consider it quiet. 2023 was a quiet year for Alaska, with the AEC reporting 45,546 seismic events in Alaska and neighboring regions. This is ~1,500 less than in 2022, and about 8,900 less than the record-breaking 2018" (AEC 2024).



Source: AEC 2023- (Note, there is a lack of seismometers deployed in the northern portion of the state.)

Figure 3-6 Map of Alaska's Recorded Earthquakes in 2023

Figure 3-7 depicts historical earthquakes M4.0 and greater near Nome.



Source: Global Earthquake Archive- Updated December 11, 2023, Accessed March 7, 2024

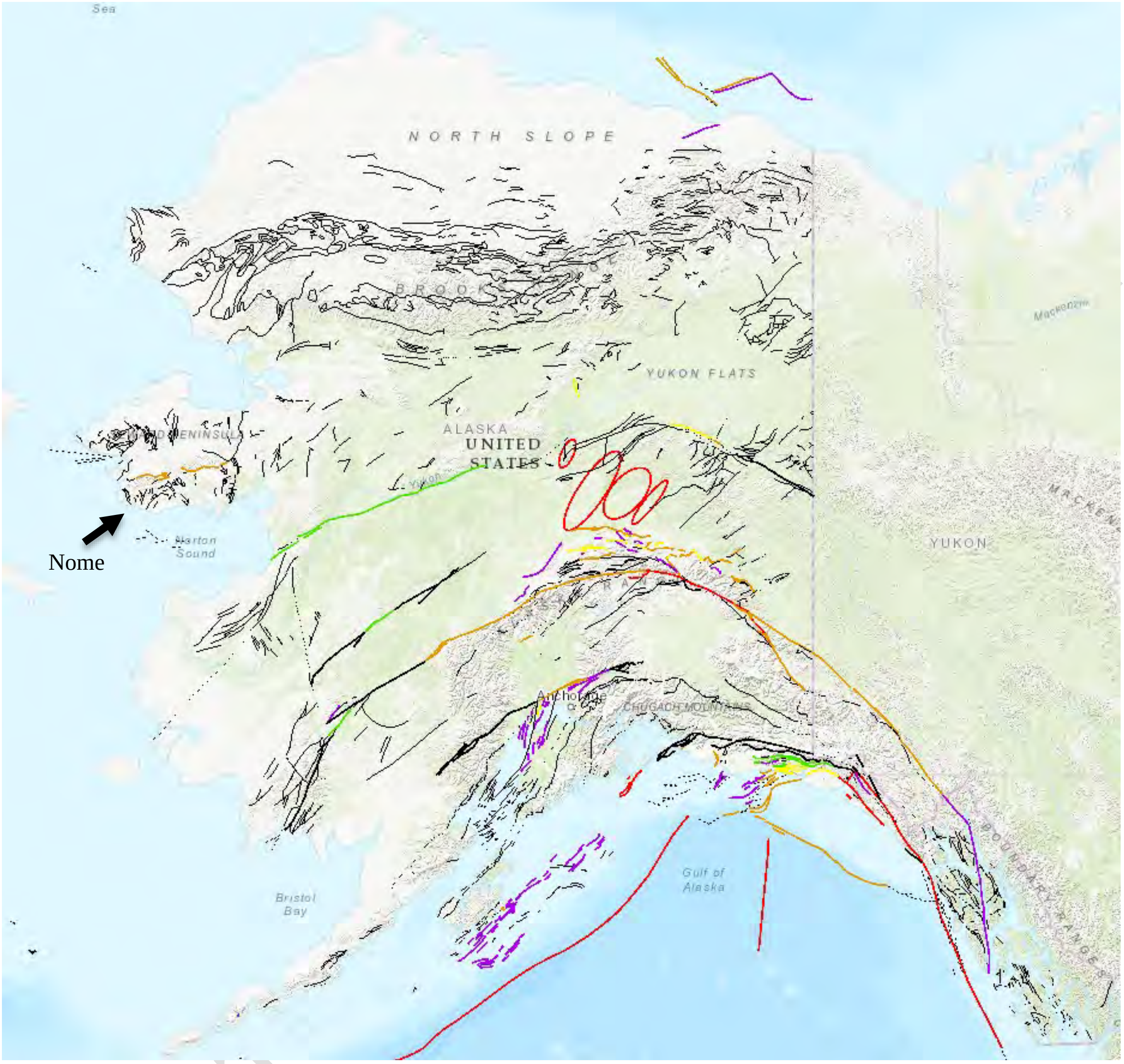
Figure 3-7 Historical Earthquakes M4.0 and Greater near Nome

Within ~100 miles of Nome, the largest earthquake occurred on April 7, 1958, and registered as a M7.1, but there were no recorded damages in Nome.

3.3.1.3 Location

Due to Alaska's location along the border between two tectonic plates, near the Aleutian Islands, the entire state is subject to the effects of earthquakes. Nome is not located near this subduction zone and historical earthquakes have been minor and fewer in number compared to areas along the subduction zone and the rest of the state.

Figure 3-8 shows Alaska's earthquake faults and folds. The accompanying legend is below.



Source: DGGS Quaternary Fault and Folds Database (2013)

Figure 3-8 Alaska's Faults and Folds

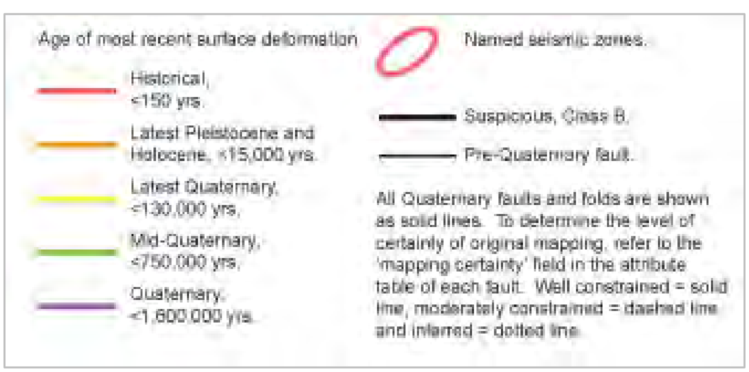


Figure 3-9 is a zoomed in image of the Quaternary Fault and Folds near Nome. The legend above is applicable to this figure as well.

The faults near Nome are Pre-Quaternary faults (black) which have not been active in over 1.6 million years and are not named. The orange fault north of Nome, Solomon, and Council is named the Kigluaik Fault and is less than 15,000 years in age. It has a slip rate of 0.2-1.0 mm/yr with a dip direction of North.

Source: DGGS Quaternary Fault and Folds Database (2013)

Figure 3-9 Faults and Folds Near Nome

3.3.1.4 Extent (Magnitude/Severity)

Intensity is a subjective measure of the strength of the shaking experienced in an earthquake. Intensity is based on the observed effects of ground shaking on people, buildings, and natural features. It varies from place to place within the disturbed region depending on the location of the observer with respect to the earthquake epicenter.

The "intensity" reported at different points generally decreases away from the earthquake epicenter. Local geologic conditions strongly influence the intensity of an earthquake; commonly, sites on soft ground or alluvium have intensities two to three units higher than sites on bedrock. The Richter scale expresses magnitude as a decimal number.

A M2.0 or less is called a microearthquake; they cannot even be felt by people and are recorded only on local seismographs. Events of about M4.5 or greater are strong enough to be recorded by seismographs all over the world. A M5.0 earthquake is a “moderate” event, a M6.0 characterizes a “strong” event, a M7.0 is a “major” earthquake, and a “great” earthquake exceeds M8.0. Great earthquakes occur once a year on average worldwide; some examples of Great earthquakes are British Columbia 1700, Chile 1960, and Alaska 1964. The Richter Scale has no upper limit, but for the study of massive earthquakes, the moment magnitude scale is used. The modified Mercalli Intensity Scale is used to describe earthquake effects on structures (Table 3-4).

Most earthquake injuries and fatalities occur within buildings from collapsing walls and roofs, flying glass, and falling objects. As a result, the extent of Nome’s risk depends not just upon its location relative to known faults, and its underlying geology and soils, but also on the design of its structures. Buildings that have not been constructed to meet seismic standards can pose major threats to life and the continued functioning of key public services during an earthquake.

Based on past event history and the criteria identified in Table 3-2, the extent of earthquakes in Nome, King Island, Council, and Solomon is considered Negligible with minor injuries, the potential for critical facilities to be shut down for less than 24 hours, less than 10 percent of property or critical infrastructure being severely damaged.

3.3.1.5 Impact

The Seward Peninsula is not a typically seismically-active area of Alaska, but damages to buildings from past earthquakes have been documented in the region. Impacts from earthquakes pose a larger threat to Nome if a large and damaging earthquake impacts a larger community hub such as Anchorage, and disrupts the supply chain. Rural Alaskan communities rely on food, supply, and freight deliveries from Anchorage and if air travel is disrupted due to an earthquake (or any other hazard event), rural villages would be without food and supplies for extended periods of time.

3.3.1.6 Probability of Future Events

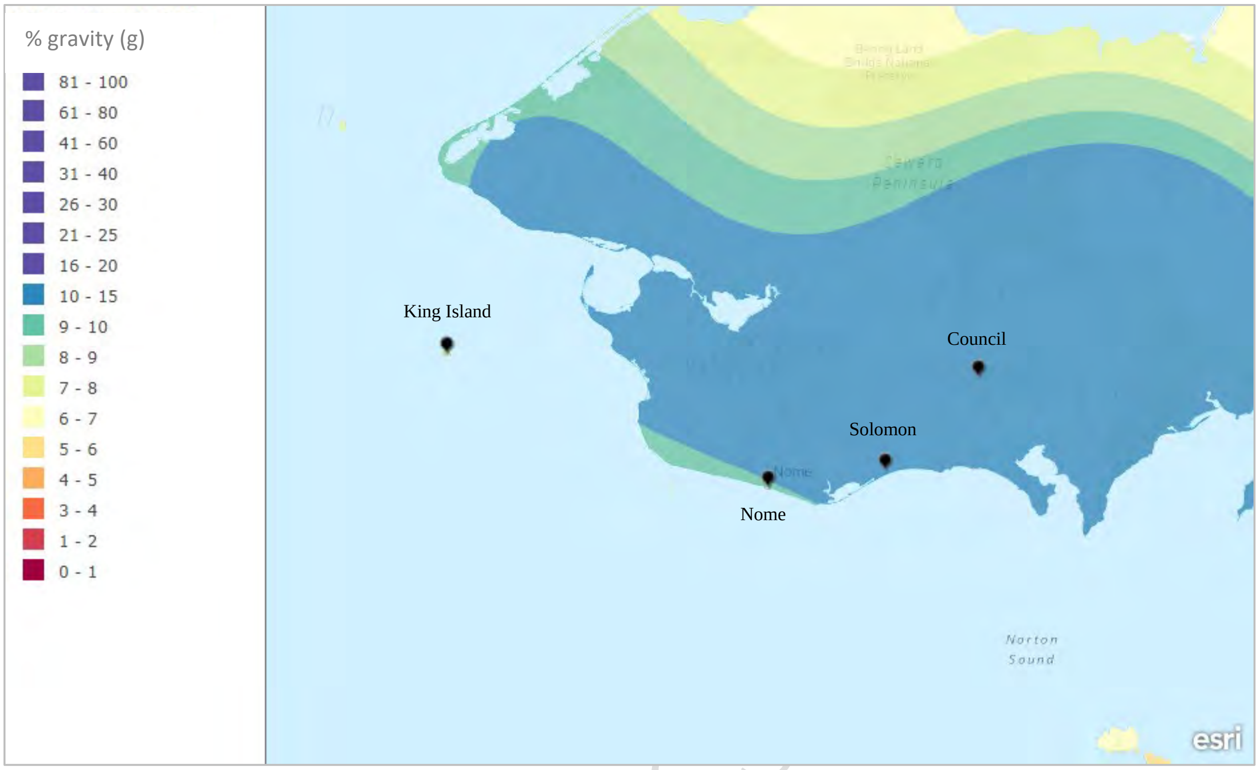
While it is not possible to predict an earthquake, the USGS has developed earthquake probability maps that use the most recent earthquake rate and probability models.

Figure 3-10 shows the earthquake probability/risk for Nome. This map layer shows the potential ground shaking intensity from earthquakes and the value that is shown is an estimate of the worst amount of shaking due to earthquakes experienced at a specific location in a 50-year time frame (Esri, USGS 2022).

In Nome, the associated earthquake risk category is 9% (0.09g). Based on the MMI scale (Table 3-4), Nome could experience moderate shaking and very light potential damage.

In King Island, the associated earthquake risk category is 8% (0.08g). Based on the MMI scale (Table 3-4), King Island could experience moderate shaking and very light potential damage.

In Council and Solomon, the associated earthquake risk category is 10% (0.10g). Based on the MMI scale (Table 3-4), Council and Solomon could experience moderate shaking and very light potential damage.



This layer shows the probability of a 10% chance of exceeding the displayed horizontal ground acceleration within 50 years. A 10% chance in 50 years means that statistically this earthquake happens on average every 500 years.
Source: Esri, USGS- USA Earthquake Risk. Accessed March 7, 2024.

Figure 3-10 Nome Area Earthquake Probability/Risk

Based on previous occurrences and the criteria identified in Table 3-3, it is Likely that there will be an earthquake M4.0 or greater within 100 miles of Nome (including King Island, Council, and Solomon) in the next three years; there is a 1 in 3 years chance of occurring (1/3=33%); and the history of events is greater than 20% but less than or equal to 33% likely per year.

3.3.1.7 Future Conditions Including Climate Change

Changing Factor	Description of Future Changes due to Climate Change
Nature	Climate change is not anticipated to influence the nature of future earthquakes in Alaska.
Location	Climate change is not anticipated to influence the location of future earthquakes in Alaska.
Extent	Climate change is not anticipated to influence the extent of future earthquakes in Alaska.
Impact	Climate change is not anticipated to influence the impact of future earthquakes in Alaska.
Probability of Future Events	Climate change is not anticipated to influence the recurrence probability of future earthquakes in Alaska.

3.3.2 SEVERE WEATHER

Hazard applicability: ☑Nome ☑King Island townsite ☑Council townsite ☑Solomon townsite

3.3.2.1 Nature

Severe weather is any dangerous meteorological development that has the power to cause damage or disruption, including the loss of human life. Severe weather instances that occur throughout Alaska with extremes experienced by Nome, King Island, Council, and Solomon's residents include extreme cold, freezing rain/ice storm, heavy and drifting snow, blizzard, winter storm, heavy rain, high winds, and drought. The nature of each event is described below.

Severe Weather Event	Nature of the Event
Extreme Cold	Extreme cold is generally defined as a prolonged period of excessively cold weather. Extreme cold conditions are often, but not always, part of winter storms. In Alaska, extreme cold usually involves temperatures between -20 to -50°F or more.
Freezing Rain and Ice Storms	Freezing rain and ice storms occur when the layer of freezing air is so thin that the raindrops do not have enough time to freeze before reaching the ground. Instead, the water freezes on contact with the surface, creating a coating of ice on whatever the raindrops contact. These events are noted by accumulation of at least 12 inches in less than 24 hours.
Heavy Snow	Heavy snow generally means snowfall accumulating to four inches or more in depth in 12 hours or less or six inches or more in depth in 24 hours or less.
Drifting Snow	Drifting snow is the uneven distribution of snowfall and snow depth caused by strong surface winds. Drifting snow may occur during or after a snowfall.
Blizzard	A blizzard as a specific type of snowstorm that consist of large amounts of snow or blowing snow, winds greater than 35 mph, and visibility of less than ¼ mile for at least three hours.
Winter Storm	A winter storm is a combination of heavy snow, blowing snow, and/or dangerous wind chills. A winter storm is life-threatening. A snowstorm is an example of a winter storm. A snowstorm occurs when a mass of very cold air moves away from the polar region and collides with a warm air mass. The warm air rises quickly and the cold air cuts underneath it, causing huge cloud bank to form. As the ice crystals within the cloud collide, snow is formed. However, snow will only fall from the cloud if the temperature of the air between the bottom of the cloud and the ground is below 40 degrees Fahrenheit. A higher temperature will cause the snowflakes to melt as they fall through the air, turning them into rain or sleet. Similar to ice storms, the effects from a snowstorm can disturb a community for a prolonged period of time. Buildings and trees can collapse under the weight of heavy snow.
Heavy Rain	Heavy rain occurs when the precipitation rate is between 0.39 - 2.0 inches per hour.
High Winds	High winds pose a moderate threat to a community when they reach sustained speeds of 26 to 39 mph, or frequent wind gusts of 35 to 57 mph. High winds pose a high threat to a community when they reach sustained speeds of 40 to 57 mph. High winds pose an extreme threat to a community when they reach sustained speeds greater than 58 mph, or frequent wind gusts greater than 58 mph. While Alaska does not experience hurricanes, it experiences hurricane-force winds. Various wind scales equate wind speed to expected damages. Two widely used wind scales are the

Severe Weather Event	Nature of the Event
	Beaufort Scale of Wind Strength and the Saffir-Simpson Hurricane Wind Scale, further explained below in Table 3-6 and Table 3-7.

Table 3-6 Beaufort Scale of Wind Strength

Force	Wind Speed (mph)	Damages
0	0-1	Calm: smoke rises vertically.
1	1-3	Direction of wind shown by smoke drift, but not by wind vanes.
2	4-7	Wind felt on face; leaves rustle; ordinary vanes moved by wind.
3	8-12	Leaves and small twigs in constant motion; wind extends light flag.
4	13-18	Raises dust and loose paper; small branches are moved.
5	19-24	Small trees in leaf begin to sway; crested wavelets form on inland waters.
6	25-31	Large branches in motion; whistling heard in telegraph wires; umbrellas used with difficulty.
7	32-38	Whole trees in motion; inconvenience felt when walking against the wind.
8	39-46	Breaks twigs off trees; generally impedes progress.
9	47-54	Chimneys blown down; slate & tiles torn from roofs.
10	55-63	Trees broken or uprooted.
11	64-75	Trees uprooted; cars overturned.
12	75+	Wide-spread devastation, buildings damaged or destroyed.

Table 3-7 Saffir-Simpson Hurricane Wind Scale

Category	Sustained Winds (mph)	Damages
1	74-95	Very dangerous winds will produce some damage: Well-constructed frame homes could have damage to roof, shingles, vinyl siding and gutters. Large branches of trees will snap, and shallowly rooted trees may be toppled. Extensive damage to power lines and poles likely will result in power outages that could last a few to several days.
2	96-110	Extremely dangerous winds will cause extensive damage: Well-constructed frame homes could sustain major roof and siding

Severe Weather Event	Nature of the Event		
			damage. Many shallowly rooted trees will be snapped or uprooted and block numerous roads. Near-total power loss is expected with outages that could last from several days to weeks.
	3 (major)	111-129	<u>Devastating damage will occur:</u> Well-built framed homes may incur major damage or removal of roof decking and gable ends. Many trees will be snapped or uprooted, blocking numerous roads. Electricity and water will be unavailable for several days to weeks after the storm passes.
	4 (major)	130-156	<u>Catastrophic damage will occur:</u> Well-built framed homes can sustain severe damage with loss of most of the roof structure and/or some exterior walls. Most trees will be snapped or uprooted, and power poles downed. Fallen trees and power poles will isolate residential areas. Power outages will last weeks to possibly months. Most of the area will be uninhabitable for weeks or months.
	5 (major)	157+	<u>Catastrophic damage will occur:</u> A high percentage of framed homes will be destroyed, with total roof failure and wall collapse. Fallen trees and power poles will isolate residential areas. Power outages will last for weeks to possibly months. Most of the area will be uninhabitable for weeks or months.
Drought	A drought is a period of time when an area or region experiences below-normal precipitation. Droughts may range in severity but have many effects on the surrounding land and weather conditions. Droughts threaten people's livelihoods and can result in a water shortage, poor quality drinking water, poor air quality, loss or destruction of aquatic habitat, loss of vegetation or crops, and an increase in infectious diseases. Droughts are a slow-onset hazard and can last weeks, months, or even years. Because of the possible long duration of droughts, the impacts last for years and can ripple through a community over time. Drought conditions are classified in categories, which are described below:		

Severe Weather Event	Nature of the Event
	Table 3-8 Classifications of Drought Conditions

Table 3-8 Classifications of Drought Conditions

Category	Description	Possible Impacts
D0	Abnormally Dry	Going into drought: • short-term dryness slowing planting, growth of crops or pastures Coming out of drought: • some lingering water deficits • pastures or crops not fully recovered
D1	Moderate Drought	• Some damage to crops, pastures • Streams, reservoirs, or wells low, some water shortages developing or imminent • Voluntary water-use restrictions requested
D2	Severe Drought	• Crop or pasture losses likely • Water shortages common • Water restrictions imposed
D3	Extreme Drought	• Major crop/pasture losses • Widespread water shortages or restrictions
D4	Exceptional Drought	• Exceptional and widespread crop/pasture losses • Shortages of water in reservoirs, streams, and wells creating water emergencies

Source: U.S. Drought Monitor (USDM) 2024

3.3.2.2 History

The history of severe weather events documented in Nome are described below. Detailed weather information is not available for King Island, Council, or Solomon.

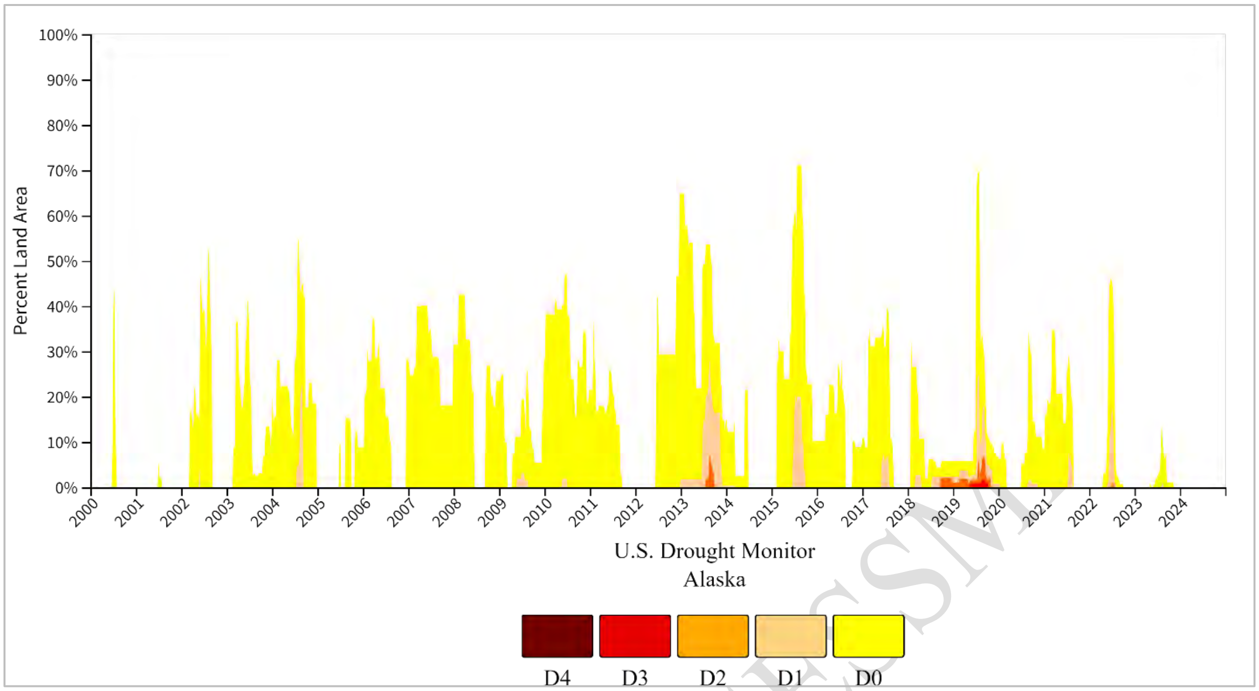
Severe Weather Event	History of the Event
Extreme Cold	Wind chills of -80ºF have been documented in Nome.
Freezing Rain and Ice Storms	Freezing rain and ice storms are not commonly reported in Nome, but they have historically occurred.
Heavy Snow	Nome averages 80 inches of snowfall per year. 10+ inches of snow have fallen with several hours in Nome.
Drifting Snow	Drifting snow has occurred in Nome during severe storm events with snowfall and accompanying high winds.
Blizzard	Blizzards are documented annually in Nome.

<table>
<tr><th>Severe Weather Event</th><th>History of the Event</th></tr>
<tr><td>Winter Storm</td><td>Numerous winter storms occur throughout Alaska every year. The most notable winter storms in Alaska’s history are:
February 1966 in Fairbanks. Over 35 feet of snow.
March 2002 in Anchorage. Over 29 inches of snow with a rate of over 2 inches of snow per hour.
January 2012 in Valdez. Over 320 inches (27 feet) of snow in the span of a couple months.
January 2012 in Cordova. Over 18 feet of snow.
December 2017 in Thompson Pass. Over 40 inches of snow in 12 hours.
Winter storms, particularly blizzards, are common in Nome.</td></tr>
<tr><td>Heavy Rain</td><td>In Alaska, the year of 2022 was the 17th wettest year to date over the last 98 years, and specifically, July 2022 was the 6th wettest July over the past 98 years (USDM 2023).

Nome averages 15 inches of rainfall per year. In Nome, fall precipitation is projected to increase by +33% by the end of the century. In King Island, winter precipitation is projected to increase by +53% by the end of the century. In Council, fall precipitation is projected to increase by +38% by the end of the century. In Solomon, fall precipitation is projected to increase by +34% by the end of the century. (UAF/SNAP 2024a- Northern Climate Reports).</td></tr>
<tr><td>High Winds</td><td>The windiest places in Alaska are generally along the coastlines. Wind gusts of 75+ mph have been recorded in Nome.</td></tr>
<tr><td>Drought</td><td>The U.S. Drought Monitor (USDM) started in 2000 and is a is an interactive tool/map that is updated each Thursday to show the location and intensity of drought conditions across the country.

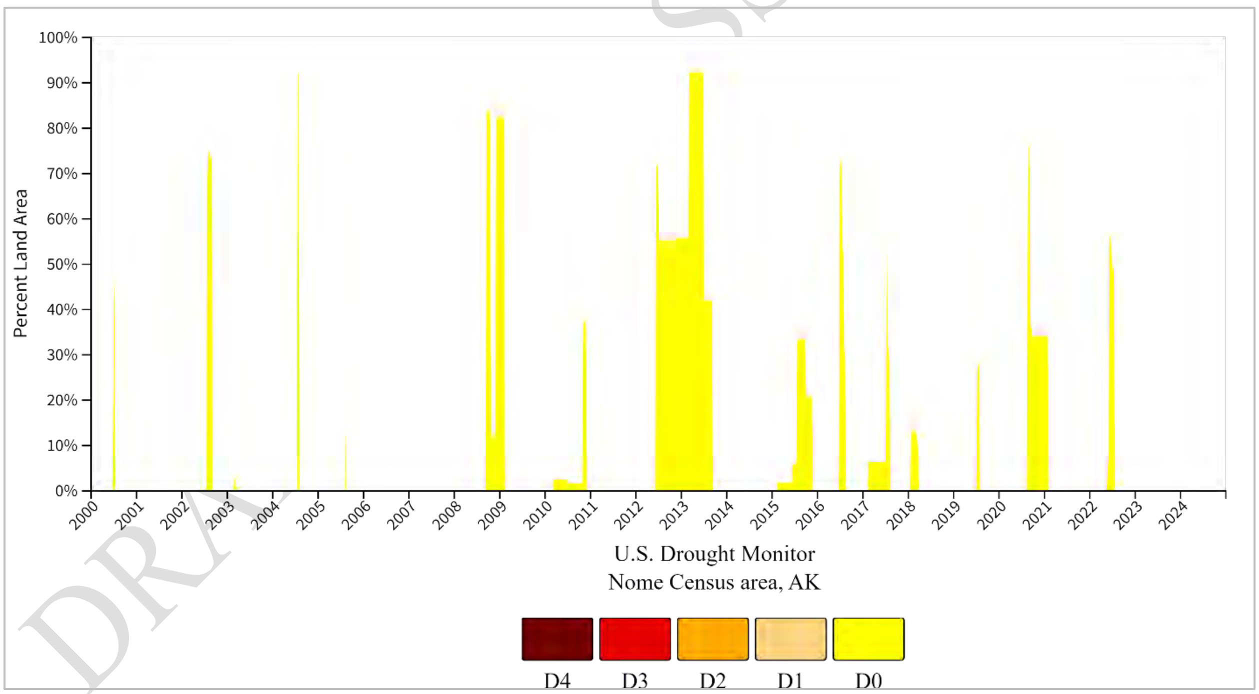
Since the creation of the USDM, the longest duration of drought conditions (D1–D4) recorded in Alaska lasted for 79 weeks. This drought began on July 17, 2018 and ended on January 14, 2020. This drought intensified to a D3 during the week of August 27, 2019 and affected 1.5% of Alaskan land (USDM 2023).

Figure 3-11 shows the historical drought conditions for the State of Alaska (2000-January 2024) and Figure 3-12 shows historical drought conditions for the Nome Census Area (2000-January 2024).</td></tr>
</table>



Source: NIDIS 2024

Figure 3-11 Historical Drought Monitor Conditions for Alaska (2000-January 2024)



Source: NIDIS 2024

Figure 3-12 Historical Drought Monitor Conditions for Nome Census Area (2000-January 2024)

Table 3-9 lists Nome's historical severe storm events from January 1996 - November 2023. Some event information includes details for King Island, Council, and Solomon. Any events resulting in a flood are addressed in the flood hazard section. See Table 3-12 for a list of these flooding events.

Table 3-9 Historical Severe Weather Events in the Nome Area

Date	Event Type	Magnitude
2/17/1996	High Wind	A deepening storm off Kamchatka moved northeast over the Bering Sea and Northern Alaska. Behind the storm strong winds occurred over Western Alaska. Peak Winds: Nome SW 38g47 kts.
2/23/1996	Winter Storm	A strong storm moved north over the Bering Sea producing blizzard conditions, heavy snow, and locally high winds across the west coast of Alaska. Snowfall: 10.5" reported at Nome.
7/31/1996	High Wind	A moderate 985mb low developed near the Komandorskiye Islands of Russia early Tuesday, July 30...moving northeastward throught the Bering Sea to just south of the Gulf of Anadyr late Wednesday as a 978mb center. The front associated with this low extended from the low into the extreme western Aleutians early Tuesday...making landfall near Nome, Bethel and Cold Bay late Wednesday, July 31.
11/8/1996	Winter Storm	A frontal wave off Kamchatka Peninsula tracked northeast offshore the coast of Far East Russia, then north over the Bering Strait and Chukchi Sea. Heavy snow occurred over Zone 6: Nome reported around 5 " in 24 hours, but due to the wind, was probably a low estimate. Forecasts indicated up to 12 inches over inland areas - but no verification available.
11/13/1996	High Wind	The remains of super-typhoon Dale moved from the western Aleutians, north over Far East Russia, and continued northwest over the Russian Arctic. Central pressure of the storm remained between 940 and 950 mbs during this time, filling little, while 1040 mb High over eastern Alaska drifted into Canada at 1048 mbs. Peak winds speeds include: Nome E 28g34 kts.
2/19/1997	Winter Storm	Strong High pressure over the Chukotsk Peninsula while a weather front over Interior Alaska intensified and moved slowly west. A BLM Remote Automated Weather Station north of Nome over the inland Seward Peninsula, reaching values of -70 to -80 F.
12/4/1997	Blizzard	A strong storm moved northeast over the Bering Sea bringing Blizzard conditions and High Winds to parts of Alaska's West Coast. Blizzard reported in Nome.
3/31/1998	Blizzard	A strong low-pressure center moved north in the Bering Sea, decelerating, but weakening only slowly. This storm produced blizzard and near-blizzard conditions across much of the West Coast of Alaska, including Nome.
4/2/1998	Blizzard	Blizzard conditions likely occurred over portions of the Yukon Delta, especially near the coast, as well as the western portion of the Seward Peninsula. Nome came close to blizzard conditions with visibilities as low as 1/2 mile and wind speeds near 30 mph.
4/9/1998	High Wind	A strong springtime Low pressure center moved from Kamchatka to Saint Matthew Island, spreading blizzard conditions and strong winds across the west coast of Alaska. At Nome the wind removed one-quarter of the roof of a hangar, and a ham radio tower was toppled. Highest winds(kt): Nome 41 gust 48.
12/17/1998	Blizzard	A storm south of the central Aleutian Islands moved north into the Bering Sea then northwest to Far East Russia and weakened. Blizzard condition occurred at Nome.
1/22/1999	Blizzard	With an already moderate pressure gradient over western Alaska, a strong low-pressure center moved from south of the Aleutian chain to Norton Sound the morning of the 23rd; to near Barrow on the Arctic Coast the evening of the 23rd. The associated occluded front moved northeast across Northern Alaska producing Blizzard Conditions over the West and North Coast, strong upslope precipitation over the Southern Slopes of the Brooks Range, and strong winds through passes of the Brooks Range and Alaska Range. Blizzard conditions occurred at Nome.
4/4/1999	Blizzard	The weather front from a strong low-pressure center in the southwest Bering Sea moved northeast over western Alaska, eventually dissipating over the Brooks Range Monday morning April 5th. Blizzard conditions occurred at Nome.
4/29/1999	Blizzard	A moderate weather front moved northeast over the west coast of Alaska producing blizzard conditions in Nome.
1/22/2000	Heavy Snow	A storm as deep as 951 millibars early on the 23rd, moved slowly northeast over the Bering Sea, eventually dissipating over Saint Matthew Island on the afternoon of the 25th. The associated weather front which moved northeast over interior Alaska on the 23rd and 24th, bringing a variety of winter weather to northern Alaska. Blizzard conditions occurred at Nome. Heavy Snow (24-hour amounts) occurred at Nome 6.0 "
12/19/2000	Winter Storm	High pressure over eastern Siberia and the Yukon Territory combined with several low-pressure systems moving north over the Bering Sea brought blizzard conditions and strong winds to northwest Alaska. Blizzard conditions were reported at Nome.
1/25/2001	High Wind	A 950 mb Low pressure center moved north over the eastern Bering Sea on the 25th and 26th weakening, and eventually dissipated on the evening of the 27th northwest of Saint Lawrence Island. This system produced blizzard conditions over parts

Date	Event Type	Magnitude
		of the West Coast of Alaska and the North Slope, as well as high winds briefly through the central Alaska Range. Blizzard conditions were reported at Nome.
2/8/2001	Blizzard	A storm as deep as 958 mb moved north over the Bering Sea and the associated occluded front moved over the west coast of Alaska on the 8th, eventually dissipating by the morning of the 9th. The storm weakened to 1002 mb by the time it reached the Chukchi Sea the night of the 9th. Blizzard conditions remoted in Nome.
2/10/2001	Winter Storm	A storm as low as 961 mb moved north over the Bering Sea on the 10th, filling to 983 mb by the time it reached the western Chukchi Sea on the evening of the 11th. The associated occluded front moved over the west coast of Alaska on the 10th, and offshore of the Arctic Coast the afternoon of the 11th. A small low-pressure center developed on the front in the Fairbanks area on the afternoon of the 11th, and caused the front to remain stationary over the Middle Tanana Valley, producing heavy snow. Blizzard conditions occurred across the west coast of Alaska, along with heavy snow, and over southwest Alaska, pockets of light freezing rain likely occurred where a shallow layer of cold air at the surface was overrun by warmer, moist air aloft. Areas of heavy snow also occurred over parts of the eastern Interior of Alaska. In addition, strong south winds occurred across the central Alaska Range in advance of the frontal system. Blizzard conditions occurred at Nome. In Nome: 6.4 inches ending midnight on the 11th.
4/2/2001	Blizzard	A strong low-pressure center of 964 Mb moved northeast over the Bering Sea weakening to 980 Mb the evening of the 3rd near Nunivak Island. The associated weather front moved from the southwest Alaska coast on the afternoon of the 2nd to the Alaska-Canada Border on the afternoon of the 3rd. This system brought Blizzard conditions to the west coast of Alaska, Heavy Snow to some parts of Western Alaska, and High Winds through the Alaska Range. Blizzard Conditions were reported at Nome.
4/6/2001	Blizzard	A 960 Mb Low moved northeast over the Bering Sea the night of the 5th and continued north on the 6th weakening to 984 Mb over the Chukchi Sea the morning of the 7th. Blizzard conditions occurred at Nome.
11/24/2001	Freezing Rain	A strong storm over the western Aleutians drifted north over the southern Bering Sea, with the associated weather front pushing strong winds and warm air north over the outer West Coast of Alaska. Light freezing rain was also reported at Nome.
2/21/2002	Blizzard	A strong, slow-moving low-pressure system over the southern Bering Sea helped to create blizzard conditions across portions of western Alaska. An occluded front associated with the strong low moved across this region bringing with it areas of snow. Strong winds also developed as the pressure gradient strengthened near the frontal boundary. This combination of snow and strong winds resulted in blizzard conditions being reported at Nome.
3/16/2002	Blizzard	Blizzard conditions were reported across western Alaska at a number of locations including Nome. These blizzard conditions resulted from a deepening low-pressure system and associated occluded frontal boundary over the southwest Bering Sea that moved northward across the region.
4/16/2002	Blizzard	A 982 mb low pressure system and associated frontal system moved from the Pribilof Islands northeast across Norton Sound on the morning of the 17th, across northwest Alaska the night of the 17th, and offshore of the eastern Arctic Coast on the morning of the 18th.The warm front portion of the frontal system produced heavy snow over western and northern Alaska, and strong winds through Windy Pass of the central Alaska Range. Blizzard conditions occurred at Nome.
11/23/2003	Blizzard	A 975 mb low pressure center moved northeast over the Bering sea from Kamchatka Peninsula to Saint Lawrence Island the evening of the 22nd and morning of the 23rd. The low then slowed and began weakening, moving east across the Seward Peninsula Sunday and across the western interior Monday; then reaching Fairbanks Monday night before dissipating. The associated strong frontal system moved northeast across western Alaska Sunday and interior Alaska Sunday night, producing blizzard conditions over western Alaska and areas of heavy snow over the Seward peninsula and near Kotzebue. The snow diminished as the system weakened but local heavy snow was reported at several interior Alaska sites. 4.8 inches of snow reported in Nome.
12/29/2003	Blizzard	Complex low pressure moved into the south Bering Sea early on the 27th and then moved slowly north, the main low center reaching a depth of 955 mb the afternoon of the 29th before slowly filling and moving north over the Chukotsk Peninsula through the 30th. The associated weather front moved over western Alaska on the night of the 28th but dissipated on the afternoon of the 29th over the Seward Peninsula. This frontal system spawned a new low south of the Alaska Peninsula on the 28th, and this low, while remaining over the Gulf of Alaska, sent a second weather front northeast over the state on the 29th and 30th...and this second front finally dissipated over the eastern Arctic Coast and eastern interior of Alaska on the morning of the 30th. Nome reported visibility restriction as low as 1/2 mile.
1/8/2004	Blizzard	Strong high pressure which developed early in the month over interior Alaska and Canada migrated to northwest Alaska and the Chukchi Sea on the 5th then continued north slowly to cover the Chukchi and Beaufort Seas on the 7th, maintaining it's

Date	Event Type	Magnitude
		strength of 1050 to 1055 millibars into the 8th. Low pressure centers moved along the Aleutian Islands or into the Gulf of Alaska through the 10th helping to slowly weaken the High further, but not before producing strong pressure gradient in areas across Northern Alaska. Near blizzard conditions in Nome.
7/28/2004	Funnel Cloud	Possible weak funnel cloud observed just north of Nome.
10/18/2004	Severe Storm	A low-pressure center of 978 mb moved north over the central Aleutians on the evening of the 17th and deepened to 941 mb as it reached the Gulf of Anadyr the evening of the 18th, about 400 miles west of Nome. The great deepening of the storm was due to in influx of moisture from an ex-typhoon east of Japan (though the ex-typhoon itself continued east across the north Pacific) and then the cold air around an upper-level circulation of Far East Russia moving southeast into the low. On the 19th the storm began to slowly fill and decelerate, to 980 mb on the evening of the 20th 400 miles west of Kotzebue. The circulation around this storm covered western Alaska with 50 to 80 mph winds and was comparable or stronger than the November 1974 storm, though this current storm moved quicker over the Bering Sea and was located farther west than the 1974 storm. Nonetheless, a significant and damaging storm surge accompanied this storm in addition to high winds. Nome ASOS reported peak gust 51 knots (59 mph). Surge height was 10.45 ft at Nome, the November 1974 storm produced a 10 ft rise in ocean level. The city of Nome sustained the bulk of the damage amount. In Nome: 45 Individuals temporarily evacuated in Nome during the height of the storm surge. 13 residences were affected by the storm. % residences were evacuated directly due to the coastal flooding. While the other residences, located near Front Street, were evacuated due to a combination of loss of electrical power and due to leakage of propane gas from three (3) businesses, as the valves broke on their 1000-pound propane tanks. The storm surge cut the Nome-Council Road at Mile 22 resulting in the isolation of approximately ten (10) occupied residences in the Council area. In Nome, five homes reported minor damage and eight homes reported major damage. Multiple businesses in Nome also report damage. The State building was damaged by ocean flooding. The historic Cape Nome Roadhouse, located at the site of Fort Davis on the Nome-Council Highway, sustained some storm-related damage. Power lines damaged at Nome. Water Treatment System had minor structural damage. Some roadways received major damage. Seawall protecting the harbor damaged, parts of a jetty east of Nome was washed away and most of the dock at the jetty was destroyed.
11/19/2004	Blizzard	A 964 mb low moved north to the Pribilofs on the morning of the 19th and continued north through the day reaching St. Lawrence Island early on the 20th. At the same time this system nudged northward a weather front over the southern Chukchi Sea, creating windy conditions on the Western Arctic. Blizzard conditions occurred at: Nome. Nome ASOS recorded gust to 36 knots (41 mph).
12/24/2004	High Wind	With strong high pressure of 1049 mb covering the interior of Alaska, an occluded weather front moved north over the Bering Sea and Chukchi Sea on the night of the 24th through the 25th.Blizzard conditions observed at Nome.
2/12/2005	Blizzard	The weather front from a low in the south-central Bering Sea moved north over western Alaska on the 12th. Blizzard conditions occurred at Nome.
3/20/2005	High Wind	Strong high pressure over eastern Siberia on the 18th moved to the eastern Arctic Ocean through the 20th and strengthened to 1055 mb. this created a strong pressure gradient over northern Alaska with cold air and strong gusty northeast winds spreading southwest over the state. Nome peak wind was 43 knots (49 mph).
2/13/2006	Blizzard	A 960 mb low pressure center moved north over the central Bering Sea on the evening of the 13th and the morning of the 14th, bringing strong winds and local blizzard conditions to western Alaska. Blizzard conditions reported at Nome.
2/25/2006	Blizzard	A complex frontal system moved over western Alaska from the southwest Bering Sea, creating blizzard conditions at Nome.
3/1/2006	Heavy Snow	A large storm became stationary over the southwest Bering Sea and the associated weather front moved northeast over western Alaska, bringing winter storm conditions to various locations over western Alaska, as well as extreme wind chills to the Arctic Coast. Heavy Snow reported in Nome: 13.2 inches which began 2353 AST on the 28th.
3/30/2006	Blizzard	A low-pressure center moved north over the eastern Bering Sea to Saint Lawrence Island and weakened. Blizzard conditions reported by the NWS office in Nome.
11/26/2006	Blizzard	On the night of the 25th, a 970 mb low moved north of Adak on the Aleutian chain, then curved northwest across Saint Matthew Island on the morning of the 26th reaching the southern Gulf of Anadyr on the afternoon of the 26th, then moving inland over Russia Far East and weakening. With persistent strong high pressure of 1052 mb over interior Alaska, the combination of these features produced a variety of winter weather over Western Alaska. Blizzard conditions were reported at Nome.

Date	Event Type	Magnitude
1/10/2007	Blizzard/ High Wind	A large low-pressure center over the southwest Bering Sea sent several strong occlusions north over western Alaska on the 10th through the morning of the 11th, producing blizzard conditions occurred at Nome where wind gusts reached 42 knots (48 mph).
1/23/2008	Blizzard	A 980 mb low moved north over the southeastern Bering Sea on the 21st, to Nome at 9am on the 22nd and to Barrow 9pm on the 22nd, then moved northeast approaching Banks Island 3pm on the 23rd. This system produced blizzard conditions over portions of western Alaska and the North Slope, and Heavy snow in the Brooks Range. Blizzard conditions occurred at Nome, and likely at Golovin; each had highest gust of 49 knots (56 mph). At Nome, power was lost to various sections north of town as power lines iced up rapidly in the wet snowfall, falling temperatures, and strong winds. Extensive damage resulted to 13 homes due to frozen/burst water pipes. The City of Nome set up an Incident Command System to organize emergency resources. Volunteer Fire Fighters and EMTs went door-to-door to the neighborhoods north of town to deliver emergency messages and conduct welfare checks. A shelter was set up at the Recreation Center in town, but was not utilized.
1/27/2008	Blizzard	A stationary 965 mb low in the western Bering Sea sent an occlusion north over western Alaska on the night of the 26th and during the day on the 27th, creating blizzard conditions at several locations. Blizzard conditions were reported at Nome
3/31/2008	Winter Storm	A 983 mb low pressure center moved north to the central Bering Sea on the 31st, and an associated occlusion moved over southwest Alaska with the low eventually weakening north of the Seward Peninsula on the afternoon of the 1st. This system brought heavy snow and freezing rain to the eastern and northern shores of Norton Sound the night of the 31st and morning of the 1st. On the 31st, 3.8 inches of snow fell at Nome. Rain started on the evening of the 31st and ended early on the morning on the 1st with 0.21 inches while air temperatures were at or above freezing, traveling surfaces were still below freezing resulting in ice-covered roads and streets.
1/16/2009	Blizzard	A 949 mb low across the Alaska Peninsula on the morning of the 16th tracked into the Norton Sound early on the morning of the 17th, and weakened to 978 mb by Noon on the 17th. The low re-developed across the Arctic Ocean during the afternoon of the 17th, and tracked to north of Banks Island as a 985 mb low on the morning of the 18th. The storm brought high winds, heavy snow, blizzard conditions and freezing rain to much of the west coast as well as the arctic coast. Blizzard conditions and heavy snow were observed at Nome during the afternoon and evening hours of the 16th. A total of 8.3 inches of snow was observed at the Nome Weather Service Office. The visibility was also frequently reduced to one quarter mile or less in snow and blowing snow, and occasionally to zero. Temperatures briefly climbed above freezing during the evening hours of the 16th into the early morning hours of the 17th with freezing rain. The wind gusted to 44 kt/51 mph at the Nome ASOS.
2/12/2009	Winter Storm	On the morning of the 12th a 963 mb low in the western Bering Sea tracked slowly northeast and weakened to 996 mb east of Saint Lawrence Island through the evening of the 13th. The storm moved inland and filled on the 14th. The storm brought high winds, heavy snow, and blizzard conditions to much of the west coast. Heavy snow was observed at Nome during the evening hours of the 12th through noon on Friday of the 13th. A total of 8.9 inches of snow was observed at the Nome Weather Service Office. The visibility was also frequently reduced to one half mile or less in snow and blowing snow. The wind gusted to 31 kt/36 mph at the Nome ASOS. Two men suffered injuries in the Tesoro Iron Dog Race, each in separate instances, when the snowmobile they were driving and hit a snowdrift.
2/18/2009	Blizzard	A 970 mb low in the central Bering Sea on the afternoon of the 17th tracked to the southern Chukchi Sea on the afternoon of the 18th, and then along the arctic coast on the 19th. This storm system brought heavy snow and blizzard conditions to much of northern Alaska. High winds were also observed in the passes of the Alaska Range. Blizzard conditions were observed at times at the Nome WSO during the morning and early afternoon hours on the 18th. The visibility was frequently reduced to one quarter mile in snow and blowing snow. An east wind of 25 to 35 mph with gusts to 40 mph was observed at the Nome ASOS.
2/27/2009	Blizzard	A 976 mb low near the northern Kamchatka Peninsula on the afternoon of the 26th tracked across the Chukotsk Peninsula during the afternoon of the 27th, and into the southern Chukchi Sea on the evening the 27th as a 983 mb low. The low then tracked northeast across the Arctic Ocean on the 28th. The storm brought blizzard conditions to much of the west coast as well as the arctic coasts of Alaska. Blizzard conditions were observed at Nome during the morning and afternoon hours on the 27th. The visibility was reduced to near zero at times in heavy snow and blowing snow. The Nome ASOS reported wind gusts to 45 mph/39kt.
3/4/2009	Blizzard	A 978 mb low across the southern Aleutians at 3 am AKST on the 4th lifted northeast and deepened to 973 mb in the vicinity of Saint Lawrence Island by 3 am AKST on the 5th. The low tracked northeast to the Norton Sound by 9 pm AKST on the 5th, and weakened to 994 mb along the northwest coast of Alaska by 3 am AKST on the 6th. The storm brought blizzard conditions and heavy snowfall to portions of northern Alaska.

Date	Event Type	Magnitude
		Blizzard conditions were observed at Nome during the evening hours of the 4th. The visibility was frequently reduced to one quarter mile in heavy snow and blowing snow. A peak wind gust of 40 mph/35kt was observed at the Nome ASOS.
3/8/2009	Heavy/ Drifting Snow	A 988 mb low south of the Aleutians at 3 pm on the 6th lifted north and deepened to 980 mb in the northern Bering Sea by 10 am on the 8th. A 1052 mb high across northern Alaska drifted slowly into western Canada during this time. The strong differences in pressure between the high and low produced strong winds and blizzard conditions along much of the west coast of Alaska. Blizzard conditions were observed at Nome from the early morning hours on the 8th until the early morning hours on the 9th. The visibility was frequently less than one quarter mile in heavy snow and blowing snow. The storm produced 15.5 inches of snow, which was an all-time daily record. The drifting snow as significant during this event, with drifts to roof tops. The airport at Nome was shut down for nearly a day. A peak wind gust of 49 mph/43kt was observed at the Nome ASOS during this event.
11/11/2009	Blizzard	A strong 967 mb low pressure system developed over the Bering Strait on the night of the 10th, and moved near the Seward Peninsula and intensified to 956 mb on the morning of the 11th. The storm brought strong west winds, heavy snow, and blizzard conditions to zones 209, 211, 212 and 217. The low then moved inland and weakened during the evening of the 11th. Blizzard conditions and heavy snow were observed at Nome during the afternoon and evening hours of the 11th. A total of 7.5 inches of snow was observed at the Nome National Weather Service Office. The visibility was frequently reduced to one quarter mile or less in snow and blowing snow. The wind gusted to 45 kt/52 mph at the Nome ASOS.
4/10/2010	Blizzard	A 956 mb low in the western Bering Sea at 1000AKST on the 9th tracked to the northeast and gradually weakened to 976 mb near the Gulf of Anadyr by 0400AKST on the morning of the 11th. A strong occluded front associated with the low produced blizzard conditions on Saint Lawrence Island and along parts of the west coast of Alaska. Blizzard conditions were observed at Nome on the 10th from approximately 0630 am AKST until 1200AKST. The visibility was frequently reduced to one quarter mile or less in snow and blowing snow. A peak wind gust of 44 kt/51 mph was observed at the Nome ASOS.
12/18/2010	Heavy Snow	A frontal boundary associated with a 984 mb low near Wrangel Island produced heavy snowfall and blizzard conditions along portions of the west coast of Alaska on December 18-19, 2010. Heavy snow was observed at Nome from late on the morning of the 18th through the late morning on the 19th. A storm total of 10 inches was observed at the Nome National Weather Service office.
1/1/2011	Blizzard	A 960 mb low approximately 200 miles southwest of Saint Lawrence Island combined with a 1026 mb high across the northern Beaufort Sea to produce strong winds and snow along with heavy snowfall and areas of blizzard conditions along the west coast of Alaska. A short period of blizzard conditions were observed at Nome at the start of the event from 1130AKST through 1500AKST on the 1st. The visibility was reduced to one quarter mile in snow and blowing snow. There was a peak wind gust of 39 kt (45 mph) was observed at the Nome ASOS. After the short period of blizzard conditions, snow and blowing snow continued until around 3 am on the 2nd, but the visibilities were at least one-half mile. A storm total of 6.5 inches of snow was observed at Nome during this event.
2/19/2011	Heavy Snow	A 966 mb low along the northern coast of Kamchatka at 0900AKST on the 19th moved into the Gulf of Anadyr as a 980 mb low at 0300AKST on the 20th. The low continued to gradually weaken to 988 mb in the southern Chukchi Sea by 1500AKST on the 20th. The low produced blizzard conditions along parts of the west coast of Alaska on the 19th into the 20th. Heavy snowfall was observed at Nome with a storm total of 10.9 inches. The snow began at 1940AKST on the 19th and ended at 1834AKST on the 20th. The snow was accompanied by an east wind that gusted as high as 37 kt (43 mph) and produced areas of blowing snow with the visibility reduced to one quarter mile or less at times.
2/22/2011	Heavy Snow	A 968 mb low in the central Bering Sea at 2100AKST on the 23rd moved to the Gulf of Anadyr as a 976 mb low at 0900AKST on the 24th. The low tracked to the northeast as a 978 mb low in the southern Chukchi Sea at 2100AKST on the 24th. The low then tracked to the east and passed just south of Banks Island as a 980 mb low by 0900AKST on the 25th. The storm produced widespread blizzard conditions along the west coast as well as the arctic coast and heavy snowfall and high winds in parts of the interior. There were also areas of flooding and high water observed along parts of the west coast. At Nome, a storm total of 3.4 inches of snow was observed during this event. According to the city office, rising water reached the old airstrip and water was reported to be rising during the event in bays and along the coast according to state emergency personnel.
4/7/2011	Blizzard	A north Pacific low rapidly deepened south of the Aleutians during the evening of the 5th and was a 940 mb low as it passed over the Bering Sea buoy 46035 (350 miles north of Adak) around 1900AKST on the 6th. The low then weakened to 954 mb

Date	Event Type	Magnitude
		150 miles west of Nunivak Island by 1500 AKST on the 7th, and to 981 mb along the Kuskokwim Delta at 1500AKST on the 8th. The low produced strong winds and heavy snowfall along much of the west coast. Blizzard conditions were observed at Nome from 2351AKST on the 6th through 0851AKST on the 7th. The visibility was reduced to one quarter mile in snow and blowing snow. There was a peak wind gust of 48 kt/55 mph at the Nome ASOS. A total of 6.7 inches of snow fell at the Nome National Weather Service office. The 6.7 inches of snow that fell in Nome was the largest calendar day snowfall ever observed at Nome during the month of April. This event forced on the 7th the pre-emptive closure of all schools, as well as closure of many businesses and public offices.
11/8/2011	Blizzard	A 960 mb low over the southern Aleutians at 0300AKST on the 8th intensified to 945 mb near the Gulf of Anadyr by 2100AKST on the 8th. The low crossed the Chukotsk Peninsula as a 956 mb low at 0900AKST on the 9th, and moved into the southern Chukchi Sea as a 958 mb low by 2100AKST on the 9th. The low then tracked to the northwest and weakened to 975 mb about 150 miles north of Wrangel Island by 1500AKST on the 10th. The storm was one of the strongest storms to impact the west coast of Alaska since November 1974. Blizzard conditions were observed at Nome from approximately 2008AKST on the 8th through 0300AKST on the 9th. The visibility was frequently one quarter mile or less in snow and blowing snow. A peak wind gust to 53 kt (61 mph) was observed at the Nome ASOS. A total of 4.8 inches of snow was observed at the NWS office in Nome on the 8th, with an additional 1.6 inches on the 9th for a storm total of 6.4 inches for the event. A major impact of the storm was that the last regular autumn delivery of fuel to Nome was delayed; the barge carrying diesel fuel and gasoline was delayed by the storm, and then unable to make it to Nome as the winter sea ice rapidly developed in the week following the storm. In January 2012, the Russian tanker Renda was escorted by the U.S. Coast Guard icebreaker Healy through approximately 350 miles of ice up to four feet thick and successfully delivered 1.3 million gallons of fuel to Nome. This prevented the fuel from having to be flown into Nome at a much higher cost. This was the first-ever winter marine delivery of fuel to northwestern Alaska.
12/3/2011	Blizzard	A 960 mb low approximately 200 miles west of Nunivak Island at 1500AKST on the 3rd moved north to Saint Lawrence Island by 0300AKST on the 4th as a 968 mb low. The low drifted slowly north to the Bering Strait as a 970 mb low by 1500AKST on the 4th. The low then weakened to 997 mb near Barrow by 0900AKST on the 5th and dissipated as a new 968 mb low developed bear Banks Island by 1500AKST on the 5th. The low produced heavy snow and blizzard conditions along much of the west coast and arctic coast. A strong Chinook produced high winds, freezing rain and snow in parts of the interior. Blizzard conditions were also observed at Nome on the 3rd from 1053AKST through 1553AKST. The visibility was reduced to one quarter mile in snow and blowing snow with a peak wind gusts of 36 kt (41 mph).
12/7/2011	Blizzard	A 968 mb low near Shemya at 0600AKST on the 6th moved to near Saint Matthew Island as a 977 mb low by 0300AKST on the 8th. The low then moved to the Seward Peninsula and weakened to 993 mb by 0300AKST on the 9th. Snow began at Nome at 1246AKST on the 6th and continued through the day on the 7th. A total of 4.1 inches of snow was observed on the 6th with an additional 5.6 inches on the 7th. The wind gusted as high as 39 kt (45 mph) and produced considerable blowing and drifting snow. The visibility was frequently reduced to one half mile or less in snow and blowing snow, with periods of near blizzard to blizzard conditions on the morning of the 7th. When the strong wind diminished during the afternoon hours on the 7th the snow briefly changed over to freezing rain. Lighter snow continued into the day on the 8th, with a storm total of 11.3 inches.
12/10/2011	Blizzard	A 955 mb low in the central Bering Sea at 0300AKST on the 10th moved into the Gulf of Anadyr as a 969 mb low by 2100AKST on the 11th. The low then drifted to the west along the Russian Coast and slowly weakened on the 12th. Blizzard conditions were observed at Nome from 0940AKST through 1930AKST on the 10th. The visibility was reduced to one quarter mile in snow and blowing snow. There was a peak wind gust to 46 kt (53 mph) at the Nome ASOS. There was a total of 4.5 inches of snow observed by the Nome Weather Service Office.
1/1/2012	Cold/ Wind Chill	All of northern Alaska was under the influence of a very cold air mass for nearly all of January 2012. The greatest temperature departures from normal occurred across the western interior where the sky was more persistently clear, which allowed strong inversions to form and temperatures remained very low for a prolonged period of time. Many communities along the west coast and across the western interior had the coldest or one of the top few coldest months on record. The duration of the cold weather was more notable than the absolute minimums, as relatively few daily record low temperatures were set at locations with more than 50 years of weather observations. At Nome, January 2012 was the coldest on record. The average temperature of -16.6 degrees easily exceeded the old record of -15.2 degrees that occurred in 1989. This was not quite the coldest month on record as February 1990 had an average Temperature of -17.2 degrees. The lowest temperature observed during the month was 40 below on the 5th. This was the first 40 below reading at Nome since 1999. Temperature records at Nome date back to 1907.

Date	Event Type	Magnitude
2/4/2012	Blizzard	A 958 mb low across the central Aleutians at 0300AKST on the 4th weakened to 971 mb near St Paul Island by 1500AKST on the 5th. The low produced blizzard conditions along much of the west coast of Alaska. Blizzard conditions were observed at Nome from approximately 1030AKST through 1815AKST on the 4th. The visibility was reduced to one quarter mile or less in snow and blowing snow. There was a peak wind gusts to 42kt (48 mph) at the Nome ASOS. A total of 9.9 inches of snow was observed at the National Weather Service office at Nome.
11/14/2013	Blizzard	A complex low-pressure center of 993 mb over Kamchatka on the morning of the 12th moved to the southeast Beaufort Sea near Barter Island on the morning of the 14th deepening to 979 mb. This storm brought a variety of hazardous weather to northern Alaska: another surge of sea water across Norton Sound, rising 4 to 8 feet to prolong the inundation which had occurred just a few days earlier though the peak surge did occur during the falling tide so the overall rise in sea level was not as high as the previous event. A strong warm front with this system spread precipitation across the west coast and interior starting out as freezing rain, then rain, though remaining as snow near the Brooks Range. Some locations in the interior received nearly 1 inch of ice, with many locations receiving one-quarter to one-half inch overall. Very strong westerly winds gusting from 50 to 75 mph developed just behind the warm front as it moved across the west coast and interior of northern Alaska on the afternoon of the 13th through the morning of the 14th. In addition to the wintry mix of precipitation and strong winds, temperatures soared into the lower 40s when the wind arrived. As the low-pressure center continued east of Barter island on the 14th, a short period of blizzard conditions occurred there. Coastal flooding was reported at Nome and the Road to Council. Minor flooding as water levels rose about 4 feet above tidal values, though no further damage from the previous surge on the 11th Heavy rain fell at Nome (0.52 inches accumulation). Though mostly rain, ground surfaces remained frozen, so the effect was the same as freezing rain on ground surfaces. Although rain ended at about 1300AKST on the 23th, high winds occurred later that afternoon, as winds at the Nome ASOS and White Mountain AWOS each gusted to 53 kt (61 mph).
12/6/2013	Ice Storm	A 988 mb low pressure center moved into the western Bering Sea on the 5th of December. An associated warm front and warm air moved across the Bering strait on the 5th and over the west coast of Alaska on the 6th...then continued north over interior Alaska on the 6th and 7th before weakening. This warm front spread rain or freezing rain to the west coast and many locations across the northern interior. Nome received 0.27 inch of rain and precipitation likely froze to the ground.
12/20/2013	Heavy Snow	A 984 mb low pressure center moved north from Bristol Bay to the Yukon Delta while weakening to 992 mb on the 20th. The associated weather front moved north over Norton Sound on the afternoon and evening producing snow at Nome totaling 7 inches before ending during the early morning of the 21st.
1/17/2014	Blizzard	A strong 952 mb low entered the eastern Bering Sea during the morning hours of the 17th. The associated occluded front pushed north during the day. A strong pressure gradient along with snow and strong winds produced blizzard conditions at a variety of locations along the West Coast of Alaska on January 17th. Blizzard conditions occurred at Nome, where the visibility was one quarter mile or less along with a peak gust of 55 kt (63 mph) on the 17th.
3/13/2014	High Wind	A weather system moving north from the Gulf of Alaska to the central western interior of Alaska on the 14th brought high winds briefly to the Alaska Range, and snow and local blizzard conditions to the Seward Peninsula. Nome reported 6 inches of new snow by mid-morning of the 14th.
11/23/2015	Blizzard	A 968 mb low pressure center in the western Bering Sea along with the associated occluded front pushed northeast towards Saint Lawrence Island during the morning hours of the 23rd of November 2015. This low produced strong easterly winds along with snow and blowing snow creating blizzard conditions for Saint Lawrence Island during the daytime hours. Blizzard conditions spread north and east across the Seward Peninsula and the Yukon Delta and along the northwest coast of Alaska during the daytime hours of the 23rd. The associated occluded front moved into the interior of Alaska on the 24th through 26th bringing areas of heavy snowfall in and near the Alaska Range, along with a period of high wind to the eastern Alaska Range. Blizzard conditions were observed at the Nome ASOS. The visibility was reduced to one quarter mile or less in snow and blowing snow. There was a peak wind gust of 47 kt (54 mph) at the Nome ASOS.
2/17/2016	Blizzard	A strong low-pressure system west of Saint Lawrence Island and its associated occluded front brought heavy snow and strong winds to Nome and the Bering Strait during the morning hours of the February 17th 2016. Blizzard conditions were observed at the Nome ASOS. The visibility was reduced to one quarter mile or less in snow and blowing snow. A peak wind of 49 kt (56 mph) was reported.
12/28/2016	Blizzard	Back-to-back strong low-pressure systems affected much of the state over several days from December 28th 2016 until January 2nd 2017. Heavy snow and blizzard conditions for the west coast and interior as well as minor coastal flooding with higher

Date	Event Type	Magnitude
		than normal storm surges (4 to 9 feet) occurred along the southern Seward Peninsula over the course of several days. Strong southerly winds of 50 to 65 mph pushed sea ice on shore and water levels rose in several villages. Villages along Norton sound reported high surge values of 5 to 9 feet breaking up the ice near shore and pushing it up onto the land. High water on roads and near homes were reported in Nome. Minor coastal flooding in Norton sound due to the water level rise and sea ice pushed into villages. Nome minor flooding of homes along Belmont Point. Blizzard conditions were observed at the Nome ASOS. The visibility was reduced to one quarter mile or less in snow and blowing snow. A peak wind of 46 kt (53 mph) was reported.
1/30/2017	Blizzard/ Blowing Snow	Low pressure system brought strong southerly winds and snow creating blizzard conditions for the upslope areas of Kobuk and Noatak valleys and the Bering Strait. Low visibility and blowing snow reported at the Nome ASOS.
2/22/2017	Blizzard	A series of low-pressure systems brought an abundant amount of moisture to Northwest Alaska with accumulations of 1 to 2 feet reported. Strong winds and local blizzard conditions along the coastal areas. Blizzard and quarter mile visibility reported at the Nome ASOS.
11/17/2017	Blizzard	A weather front produced strong winds and low visibility to parts of the west coast and northwest Alaska on the 17th of November. Blizzard conditions reported at the Nome ASOS. A peak wind of 35 kt (40 mph) also reported.
12/17/2017	Blizzard	Low pressure brought snow and blowing snow and strong winds to the west coast on December 17th, 2017. Heavy snow fell in the mountains of the Seward Peninsula and the Nulato Hills. Blizzard conditions were observed at the Nome ASOS. The visibility was reduced to one quarter mile or less in snow and blowing snow. There was a peak wind gust of 43 kt (50 mph) at the Nome ASOS.
12/30/2017	Blizzard	Low-pressure and associated frontal boundary produced local blizzard conditions along the Bering strait from December 30 to 31st 2017. Blizzard conditions were observed at the Nome ASOS. The visibility was reduced to one quarter mile or less in snow and blowing snow. There was a peak wind gust of 44 kt (50 mph) at the Nome ASOS.
12/15/2021	Blizzard	A strong pressure gradient set up over the western north slope between a 984 mb low in the Bering Sea and a 1040 high over the Arctic. Falling snow and strong winds led to blizzard conditions on December 15th, 2021, for northwest Alaska and portions of the west coast of Alaska. Blizzard conditions were reported at the Nome ASOS.
12/24/2021	Ice Storm	A series of unusually warm and moist weather fronts moving into the Bering Sea and across Interior Alaska resulted in unprecedented precipitation across portions of Interior Alaska. Record precipitation values were broken at several locations across region. The Nome ASOS (PAOM) also reported freezing rain and ice accumulation. Reports from residents in Nome also indicated ice accumulation around the community. There were no reported impacts.
09/17/2022	Coastal Flood	The extratropical remnants of Typhoon Merbok moved north through the Bering Sea from Thursday September 15th to Saturday September 17th. Strong south to southwest winds resulted in a significant storm surge that caused water levels to rise from 8 to 13 feet above the normal high tide line, with the highest water levels observed at Golovin. This resulted in major coastal flooding and the worst flooding in nearly 50 years. Fish camps and other structures along the coast used for hunting and gathering activities were damaged or destroyed across the region. A state disaster declaration was declared for this event.

Source: NWS 2024- Storm Events Database and Storm Prediction Center Product

Additionally, the DHS&EM October 2022 DCI lists the following severe weather disaster events which may have affected the area:

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°F. 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, and DOT/PF support in maintaining access to isolated communities.

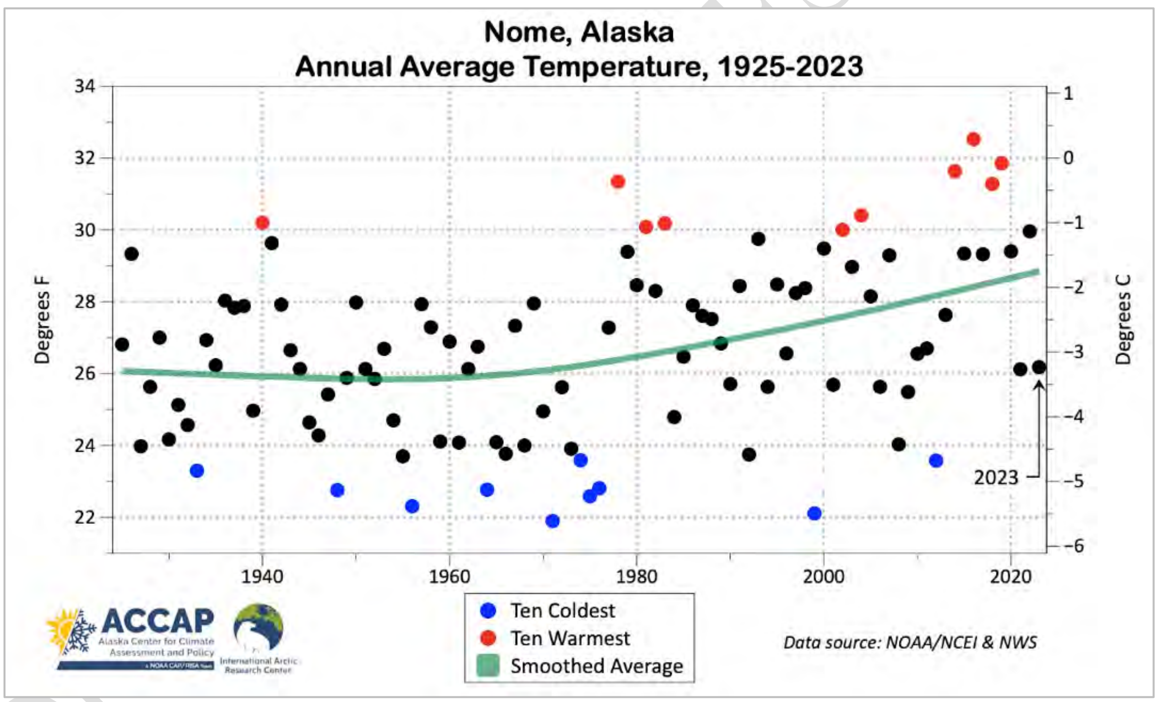
159. Norton Sound Herring Fishery Disaster, July 13, 1992: The Governor requested the Small Business Administration to declare an Economic Injury Disaster for Businesses and fishermen impacted by the failure of the Norton Sound herring fishery. Due to a very late spring, sea ice in the area did not breakup at the time the herring arrived in the Sound making them inaccessible to the fishermen. The Governor did not declare under AS 26.23.

<u>01-194 Identified as YKN</u>: 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 led 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).

3.3.2.3 Location

The entire planning area of Nome, King Island townsite, Council townsite, and Solomon townsite experiences periodic severe weather impacts.

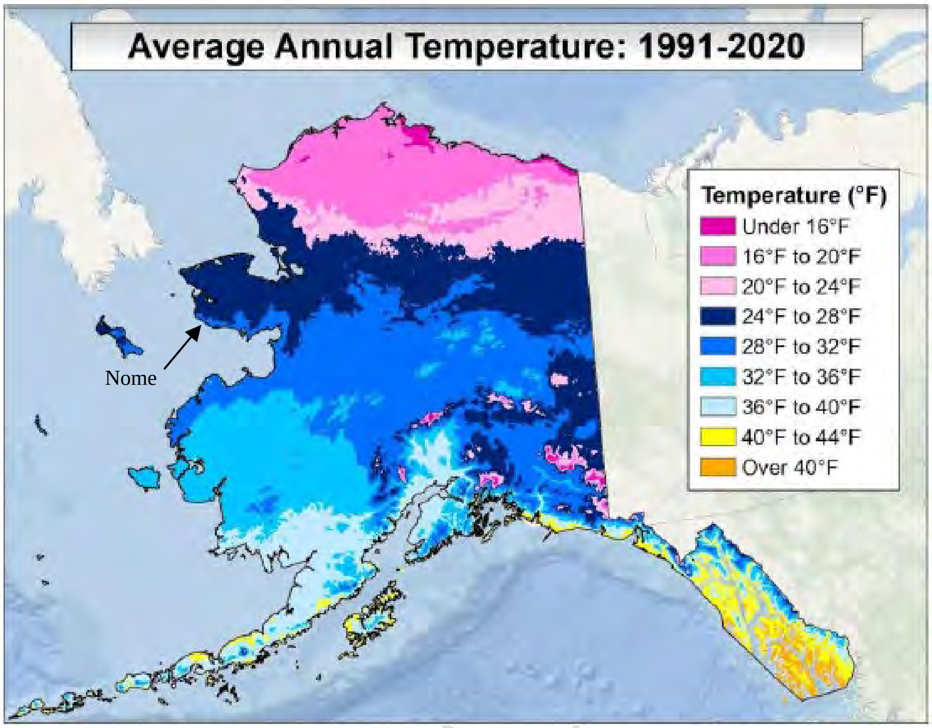
Figure 3-13 shows the annual average temperature in Nome from 1925-2023. The 10 hottest and 10 coldest days are also noted.



Source: ACCAP 2024

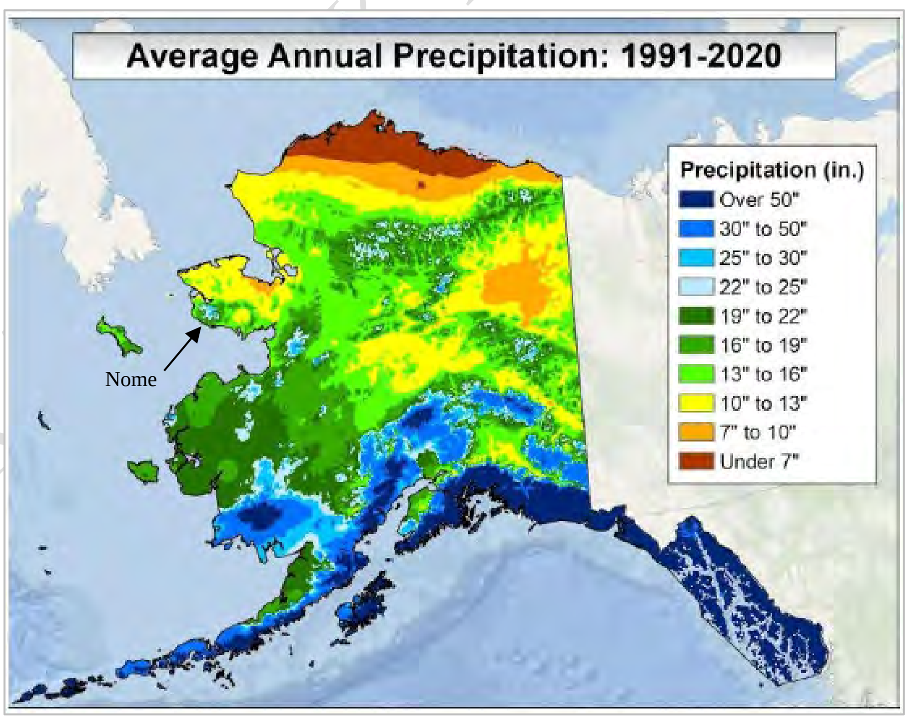
Figure 3-13 Nome Annual Average Annual Temperature 1925-2023

Figure 3-14 shows Alaska's average annual temperature from 1991-2020 and Figure 3-15 shows Alaska's average annual precipitation from 1991-2020.



Source: NOAA NCEI Gridded Normals

Figure 3-14 Alaska Average Annual Temperature 1991-2020



Source: NOAA NCEI Gridded Normals

Figure 3-15 Alaska Average Annual Precipitation 1991-2020

3.3.2.4 Extent (Magnitude/Severity)

The planning area is vulnerable to the impacts from severe weather. The extent (Magnitude/Severity) of each severe weather event is listed below.

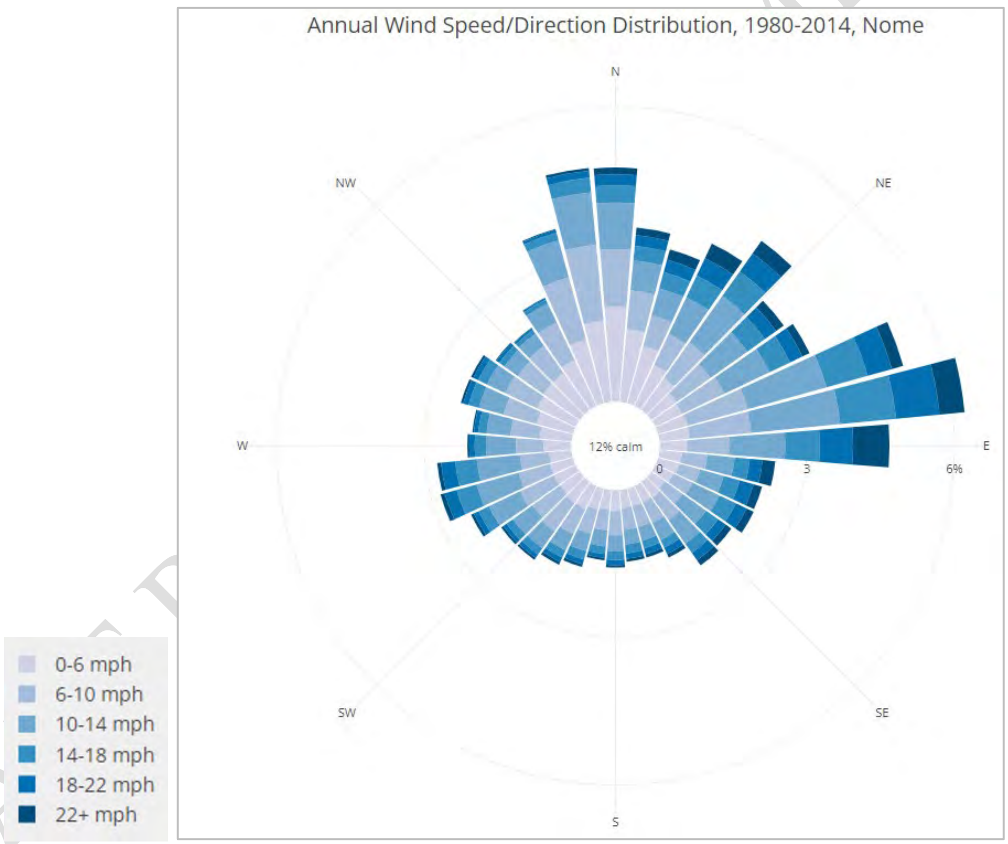
Severe Weather Event	Extent (Magnitude/Severity) of the Event
Extreme Cold	Wind chills of -80ºF have been recorded in Nome.
Freezing Rain and Ice Storms	Nome experiences periodic freezing rain and ice storms that have damaged utility lines and cause dangerous road conditions.
Heavy Snow	Nome experiences severe storm conditions accumulating over 10-20 inches of snowfall within several hours.  Source: Nome Nugget 2024 **Figure 3-16 Heavy Snow in Nome (January 2024)**
Drifting Snow	Nome experiences periodic drifting snow events that have caused blockages on roads and snow buildup on the sides of larger buildings.

Severe Weather Event	Extent (Magnitude/Severity) of the Event
	 Source: User Thudinak via Reddit (2021) **Figure 3-17 Snow Drift in Nome (2021)**
Blizzard	Blizzards are common in Nome. Blizzards frequently decrease visibility to less than ¼ mile and cause dangerous road conditions. Blizzards have caused school, airport, and business closures, freight delays, snow drifts, and loss of utilities.  Source: User 10235171411 via Reddit (2021) **Figure 3-18 Snow from Blizzard Blocking Doorway in Nome (2021)**
Winter Storm	Nome experiences periodic winter storms that have caused blizzard conditions, heavy snowfall, high winds, and dangerous travel conditions.

<table>
<tr><th>Severe Weather Event</th><th>Extent (Magnitude/Severity) of the Event</th></tr>
<tr><td>Heavy Rain</td><td>Nome experiences periodic severe weather storms that include heavy rain, which have led to flooding and road washouts.</td></tr>
<tr><td>High Winds</td><td>Nome experiences severe storm conditions with wind speeds and gusts exceeding 75 mph.

Figure 3-19 shows annual wind speed and direction distribution for Nome from 1980-2014. This information is not available for King Island, Council, or Solomon.

• Spokes in the rose point in the compass direction from which the wind was blowing (i.e., a spoke pointing to the right denotes a wind from the east).
• Colors within each spoke denote frequencies of wind speed occurrence.
• Size of the center hole indicates the % of calm winds.

The accompanying legend is below.


Source: UAF/SNAP 2024b- Community Wind

Figure 3-19 Annual Wind Speed/Direction Distribution in Nome, 1980-2014</td></tr>
<tr><td>Drought</td><td>Nome has not been severely impacted by droughts. Droughts have increased the magnitude and severity of wildfire events as a result of drier fuel (vegetation) surrounding the community.</td></tr>
</table>

Based on past severe weather events and the criteria identified in Table 3-2, the extent of overall severe weather in Nome, King Island, Council, and Solomon is considered Limited to Critical, where injuries and/or illnesses could result in temporary to permanent disability; with potential for critical facilities to be shut down for more than a week, and 10-25% of property would be severely damaged.

3.3.2.5 Impact

The location, land topography, and intensity influence the severity of a severe weather event impact within a community. Below are the impacts of various historical severe weather events in Nome (detailed severe weather data is not available for King Island, Council, or Solomon but due to their proximity to Nome are expected to be similar to Nome).

Severe Weather Event	Impact of the Event
Extreme Cold	Extreme cold may also impact a community by disrupting the flow of transportation within the community. With extreme cold temperatures, comes ice fog, which may ground an aircraft carrying supplies until conditions improve. Prolonged periods of cold can cause large bodies of water to freeze, disrupting shipping and increasing the likelihood of ice jams and associated flooding. While Alaskans have engineered ways to stay warm during extreme cold, infrastructure can only withstand and function within a certain temperature range. Extreme cold can cause electric generation to malfunction or cause fuel to congeal in supply lines and storage tanks. Without electricity, heaters and furnaces do not work, and water/sewage pipes can freeze or rupture. A combination of extreme cold and little to no snow cover, increases the ground's frost depth, which can disturb pipes beneath the ground. While extreme cold can impact a community's infrastructure, the greatest danger from extreme cold is its impact on humans. Prolonged exposure to extreme cold can cause frostbite or hypothermia and become life-threatening very quickly. Infants and elderly people are most susceptible to these conditions. Carbon monoxide poisoning is another threat as people use supplemental heating devices without proper ventilation. Extreme cold accompanied by wind intensifies life-threatening exposure injuries such as hypothermia and frostbite. Impacts from extreme cold in Nome have included loss of utilities.
Freezing Rain and Ice Storms	Ice accumulations can damage trees, utility poles, and communication towers. Ice on communication towers can disrupt transportation, power, and communications within the community. Ice storms are often the cause of automobile accidents, power outages, and personal injury. Impacts from freezing rain and ice storms in Nome have included loss of utilities.
Heavy Snow	Heavy snow can impact a community by halting transportation in and out of a community. Until the snow can be removed, roadways and airports are impacted, even closed completely. With these services out of commission, supplies are not able to be brought into the community, and emergency and medical services are halted. Excess weight from accumulated snow on roofs, trees, and powerlines can cause them to collapse. Heavy snow can also damage light aircraft and cause small boats to sink. Once temperatures reach above freezing, the heavy snow will begin to thaw, and can cause substantial flooding. The cost of snow removal, repairing damages, and the loss of business can have severe economic impacts on the community. Heavy snow can lead to injury or death as a result of vehicle and or snow machine accidents. Other causalities can occur due to hypothermia caused by prolonged exposure to cold weather or overexertion while shoveling snow. Impacts from heavy snow in Nome have included snow drifts, decreased visibility, damage to roofs, school closures, and loss of utilities.
Drifting Snow	The most common hazard caused by blowing and drifting snow is quickly reduced visibility while driving. The combination of near-zero visibility and drifting snow can cause unexpected travel difficulties and accidents in remote areas during dangerously cold winter weather situations. Impacts from drifting snow in Nome have included loss of visibility and dangerous road conditions.

Severe Weather Event	Impact of the Event
Blizzard	Conditions during a blizzard can be extreme, resulting in severe impacts to community. During a blizzard, heavy or blowing snow can cause whiteout conditions, making travel difficult and unsafe. Roads can become partially or fully blocked by snowdrift. Cold temperatures associated with blizzards can last for days after the storm has ended, increasing the potential for hypothermia or frostbit. High winds during a blizzard may disrupt utilities, potentially leaving homes without heat and power until after the storm has ended and utilities are restored. Impacts from blizzards in Nome have included reduction or loss of visibility, loss of utilities, and damage to homes.
Winter Storm	A winter storm can last a few hours or several days, cut off utilities, and put older adults, children, sick individuals, and pets are at greater risk. Winter storms create a higher risk of car accidents, hypothermia, frostbite, carbon monoxide poisoning, and heart attacks from overexertion. Winter storms can also cause property damage. Some impacts to homes and other infrastructure may include roof damage or collapse, water damage from frozen or busted pipes, cracks in caulking due to extreme cold, damage to building foundations. Winter storms and cold temperatures can also impact vehicles (cars, snowmachines) that the community relies upon for transportation. These impacts may include slowing the battery, hurting the cooling system, thickening fluids, damaging the engine, and increasing the potential for vehicular accidents. Impacts from winter storms in Nome have included loss of visibility, loss of utilities, snow load considerations, school closures, damage to critical facilities and infrastructure, and hindered snow removal efforts.
Heavy Rain	The potential impacts of heavy rain include crop damage, erosion, and an increased flood risk. Floods onset from heavy rain can result in road washouts, injuries/loss of life, or drowning. Impacts from heavy rain in Nome have included localized flooding of local rivers and streams.
High Winds	High winds can cause downed power lines, flying debris, building collapses, transportation disruptions, damage to buildings, damage to vehicles, and injury or death. High winds can lead to power outages, resulting in lack of heating, running water, refrigeration loss, and damage to electronics and/or medical equipment. Impacts from high winds in Nome have included loss of utilities, downed trees, damage to buildings and residences, and damage to the Nome airport.
Drought	Droughts can severely impact a community by causing shortages in safe drinking water, reducing air quality by increasing the risk of wildfires and dust storms, increasing the potential of illness and disease, and increasing economic burdens. Droughts can also impact the environment by reducing soil quality for vegetation, reduction or degradation of fish and wildlife habitat, and lowering the water level of lakes, ponds, or reservoirs which can hinder salmon spawning abilities. For 64 weeks, starting on October 2, 2019, Alaskan salmon were unable to enter many streams due to low flow conditions and drought conditions throughout Alaska caused many pre-spawn mortality events of salmon. All species of salmon were affected by the drought conditions statewide, leading to widespread mortality (USDM 2023). On June 27, 2019, there was a statewide ban of purchasing fireworks due to the high to very high fire danger as a result of hot, dry weather. At the time, there were 130 active wildfires burning 273,521 acres across the state (USDM 2023). Nome has not been severely impacted by droughts.

3.3.2.6 Probability of Future Events

The probability of future events for each severe weather event is outlined below.

Severe Weather Event	Probability of the Event
Extreme Cold	Based on previous occurrences and the criteria identified in Table 3-3, it is Likely that Nome, King Island townsite, Council townsite, and Solomon townsite will experience an extreme cold event in the next three years; there is a 1 in 3 years chance of occurring (1/3=33%); and the history of events is greater than 20% but less than or equal to 33% likely per year.
Freezing Rain and Ice Storms	Based on previous occurrences and the criteria identified in Table 3-3, it is Possible that Nome, King Island townsite, Council townsite, and Solomon townsite will experience a freezing rain/ice storm event in the next five years; there is a 1 in 5 years chance of occurring (1/5=20%); and the history of events is greater than 10% but less than or equal to 20% likely per year.
Heavy Snow	Based on previous occurrences and the criteria identified in Table 3-3, it is Likely that Nome, King Island townsite, Council townsite, and Solomon townsite will experience a heavy snow event in the next three years; there is a 1 in 3 years chance of occurring (1/3=33%); and the history of events is greater than 20% but less than or equal to 33% likely per year.
Drifting Snow	Based on previous occurrences and the criteria identified in Table 3-3, it is Likely that Nome, King Island townsite, Council townsite, and Solomon townsite will experience a drifting snow event i in the next three years; there is a 1 in 3 years chance of occurring (1/3=33%); and the history of events is greater than 20% but less than or equal to 33% likely per year.
Blizzard	Based on previous occurrences and the criteria identified in Table 3-3, it is Highly Likely that Nome, King Island townsite, Council townsite, and Solomon townsite will experience a blizzard event within the calendar year; there is a 1 in 1 year chance of occurring (1/1=100%); and the history of events is greater than 33% likely per year.
Winter Storm	Based on previous occurrences and the criteria identified in Table 3-3, it is Highly Likely that Nome, King Island townsite, Council townsite, and Solomon townsite will experience a winter storm event within the calendar year; there is a 1 in 1 year chance of occurring (1/1=100%); and the history of events is greater than 33% likely per year.
Heavy Rain	Based on previous occurrences and the criteria identified in Table 3-3, it is Highly Likely that Nome, King Island townsite, Council townsite, and Solomon townsite will experience a heavy rain event within the calendar year; there is a 1 in 1 year chance of occurring (1/1=100%); and the history of events is greater than 33% likely per year.
High Winds	Based on previous occurrences and the criteria identified in Table 3-3, it is Highly Likely that Nome, King Island townsite, Council townsite, and Solomon townsite will experience a heavy wind event within the calendar year; there is a 1 in 1 year chance of occurring (1/1=100%); and the history of events is greater than 33% likely per year.
Drought	Based on previous occurrences and the criteria identified in Table 3-3, it is Possible that Nome, King Island townsite, Council townsite, and Solomon townsite will experience drought conditions in the next five years; there is a 1 in 5 years chance of occurring (1/5=20%); and the history of events is greater than 10% but less than or equal to 20% likely per year.

3.3.2.7 Future Conditions Including Climate Change

The nature or location of severe weather events in Nome, King Island, Council, or Solomon are not anticipated to change due to climate change. However, the extent of severe weather events is expected to change due to climate change. The anticipated changes for each event are described below.

<table>
<tr><th>Severe Weather Event</th><th>Projected Changes in Extent (Magnitude/Severity) due to Climate Change</th></tr>
<tr><td>Extreme Cold</td><td>

Average annual temperatures in Alaska are projected to rise by an additional 2°F to 4°F by 2050 (USGCRP 2018). If global emissions continue to increase during this century, temperatures can be expected to rise 10°F to 12°F in the north, 8°F to 10°F in the interior, and 6°F to 8°F in the rest of the state (USGCRP 2018).

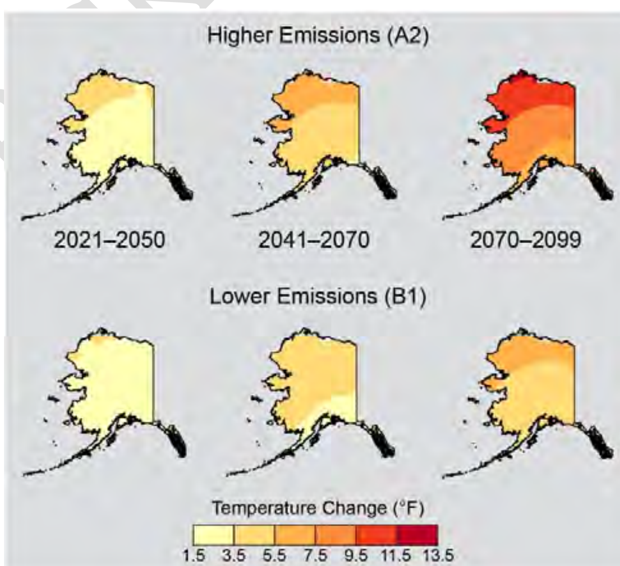
In Nome, average annual temperatures may increase by about 14°F by the end of the century (UAF/SNAP 2024a- Northern Climate Reports). Winter temperatures are increasing the most (+23°F) and spring and fall may transition from below freezing to above freezing temperatures in the future (UAF/SNAP 2024a- Northern Climate Reports).

In King Island, average annual temperatures may increase by about 14°F by the end of the century (UAF/SNAP 2024a- Northern Climate Reports). Winter temperatures are increasing the most (+25°F) and fall may transition from below freezing to above freezing temperatures in the future (UAF/SNAP 2024a- Northern Climate Reports).

In Council, average annual temperatures may increase by about 14°F by the end of the century (UAF/SNAP 2024a- Northern Climate Reports). Winter temperatures are increasing the most (+23°F) and spring and fall may transition from below freezing to above freezing temperatures in the future (UAF/SNAP 2024a- Northern Climate Reports).

In Solomon, average annual temperatures may increase by about 14°F by the end of the century (UAF/SNAP 2024a- Northern Climate Reports). Winter temperatures are increasing the most (+22°F) and spring and fall may transition from below freezing to above freezing temperatures in the future (UAF/SNAP 2024a- Northern Climate Reports).

Figure 3-20 shows Alaska's predicted temperature changes under a higher emissions scenario and a lower emissions scenario through 2099. See Figure 3-22 for historical and projected temperatures in Nome. See Figure 3-24 for historical and projected temperatures in King Island. See Figure 3-26for historical and projected temperatures in Council. See Figure 3-28 Figure 3-22for historical and projected temperatures in Solomon.

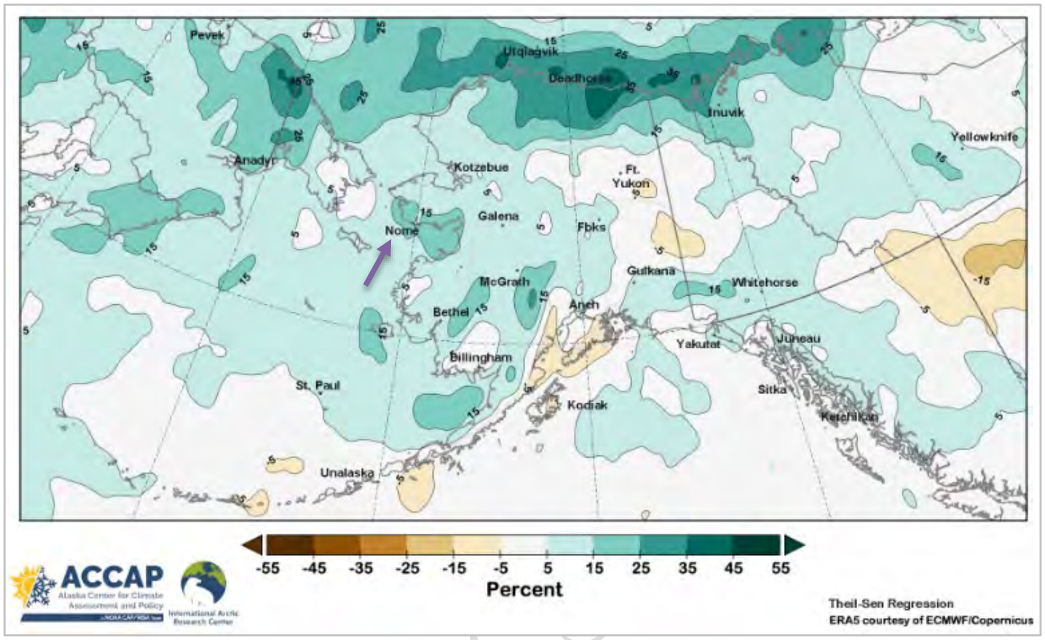


Source: USGCRP 2018

Figure 3-20 Alaska's Predicted Temperature Changes Through 2099

</td></tr>
</table>

Severe Weather Event	Projected Changes in Extent (Magnitude/Severity) due to Climate Change
Freezing Rain and Ice Storms	Alaska has experienced an 11% increase in the amount of precipitation falling in very heavy events from 1958 to 2012 (EPA 2016). As global temperatures continue to rise, freezing rain and ice storm events may be less severe as historical storms.
Heavy Snow	In southern and coastal parts of Alaska, large decreases in spring snowpack are expected by the mid-21st century, even with more winter precipitation because temperatures warm to above freezing, causing a shift from snow to rain or more melt during the winter (NPS 2020). Nome experiences severe storm conditions accumulating over 10-15 inches of snowfall within several hours.
Drifting Snow	Nome experiences periodic drifting snow events that have caused snow buildup and blockages on roads. Blowing and drifting snow in Nome have caused school delays and closures.
Blizzard	There are many studies on the effect of climate change on the extent of blizzards in the contiguous United States, particularly the Northeast region of US. However, there is little published information on the effect of climate change and blizzards in Alaska. Studies show that climate change could exacerbate the severity of blizzards (Dixon et al. 2018). A warmer atmosphere holds more moisture. This moisture eventually falls as precipitation—either as rain or snow, which results in more frequent and intense storms.
Winter Storm	Climate scientists have suggested that warming temperatures, caused by the increase of greenhouse gases in the atmosphere, may be enabling longer and more intense cycles of droughts, floods, and winter storms (Dixon et al. 2018).
Heavy Rain	Alaska has experienced an 11% increase in the amount of precipitation falling in very heavy events from 1958 to 2012 (EPA 2016). Extreme precipitation events have occurred throughout Alaska with increasing frequency. In Nome, fall precipitation is projected to increase by +33% by the end of the century. In King Island, winter precipitation is projected to increase by +53% by the end of the century. In Council, fall precipitation is projected to increase by +38% by the end of the century. In Solomon, fall precipitation is projected to increase by +34% by the end of the century. (UAF/SNAP 2024a-Northern Climate Reports). Figure 3-21 shows the percent change in annual average precipitation from 1973–2022 in Alaska. Based off this figure, average precipitation in Nome has increased by 15-25%.

<table>
<tr><th>Severe Weather Event</th><th>Projected Changes in Extent (Magnitude/Severity) due to Climate Change</th></tr>
<tr><td></td><td>


Source: USDA 2023

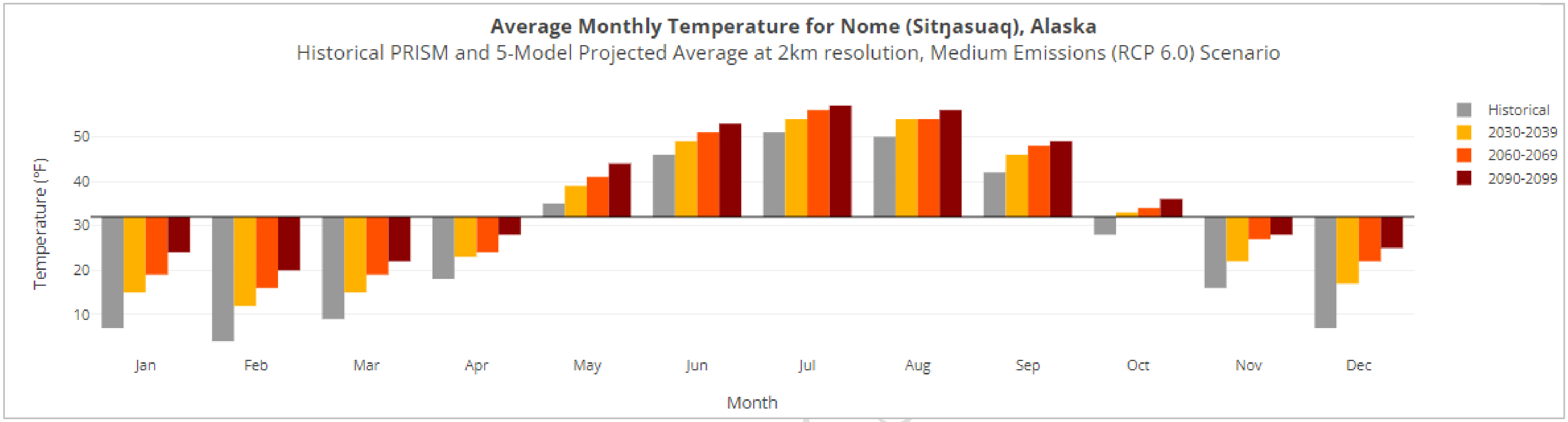
Figure 3-21 Percent Change in Annual Average Precipitation Statewide (1973-2022)

See Figure 3-23 for historical and projected precipitation amounts for Nome, Figure 3-25 for King Island, Figure 3-27 for Council, and Figure 3-29 for Solomon.
</td></tr>
<tr><td>High Winds</td><td>High-wind events are projected by models to become more frequent in Alaska, with changes most noticeable in the northern and western coastal regions of Alaska (Redilla et al. 2019).</td></tr>
<tr><td>Drought</td><td>Climate change is increasing the intensity and length of severe weather events including droughts. Increased exposure to extremes will surpass the resilience of ecological and human systems. Already vulnerable communities may be unable to adapt, laying bare systemic inequalities and requiring emergency assistance (IPCC 2019).

The U.S. Drought Monitor started in 2000. Since 2000, the longest duration of drought (D1–D4) in Alaska lasted 79 weeks beginning on July 17, 2018 and ending on January 14, 2020. The most intense period of drought occurred the week of August 27, 2019, where D3 affected 1.5% of Alaska land (USDM 2023).

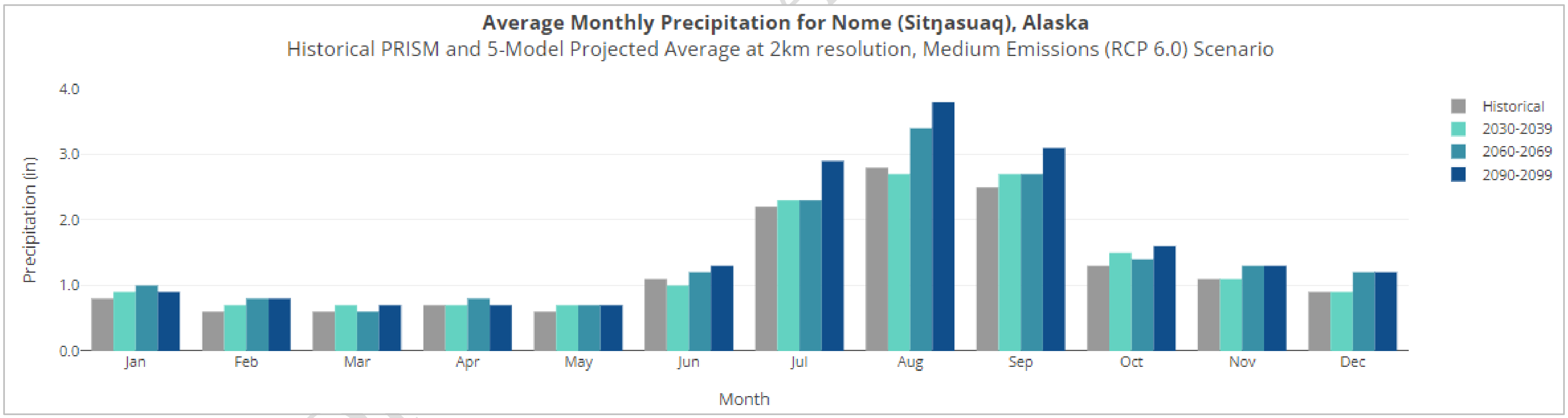
Historically, Nome has not been severely impacted by droughts.</td></tr>
</table>

The following figures depict Nome, King Island, Council, and Solomon’s historical and future projected temperatures and precipitation amounts under a medium emissions (RCP 6.0) scenario.



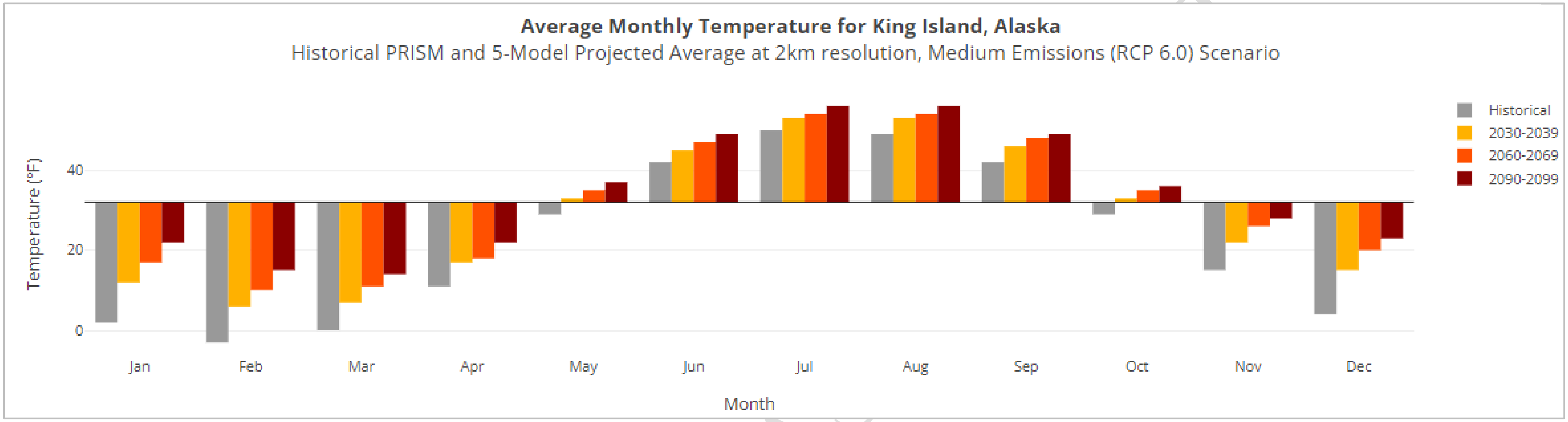
Source: UAF/SNAP 2024c- Community Climate Charts

Figure 3-22 Historical and Projected Temperatures in Nome



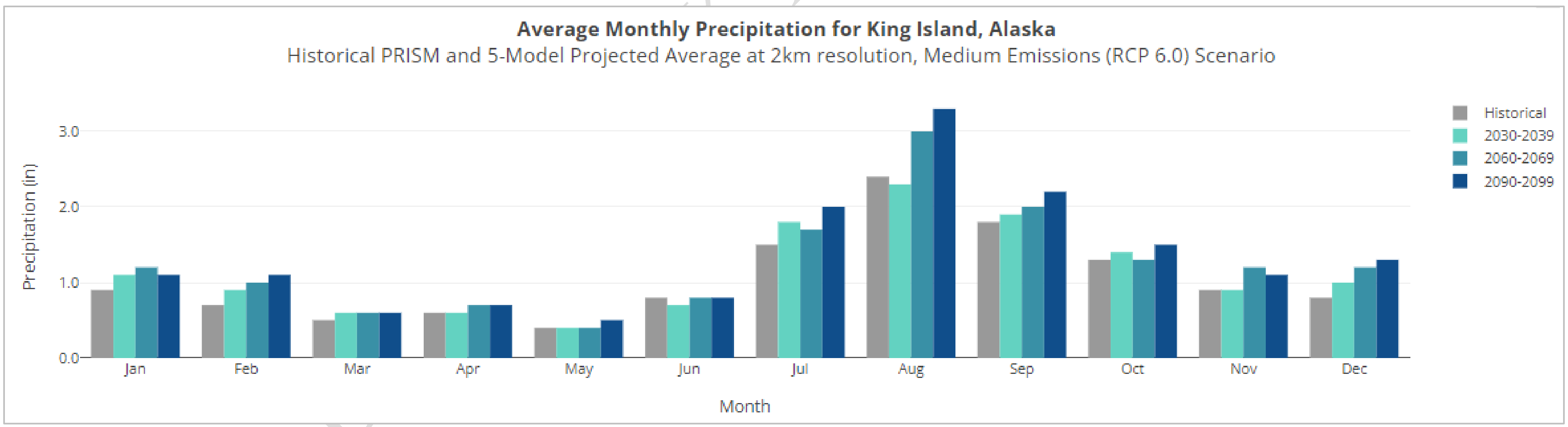
Source: UAF/SNAP 2024c- Community Climate Charts

Figure 3-23 Historical and Projected Precipitation Amounts in Nome



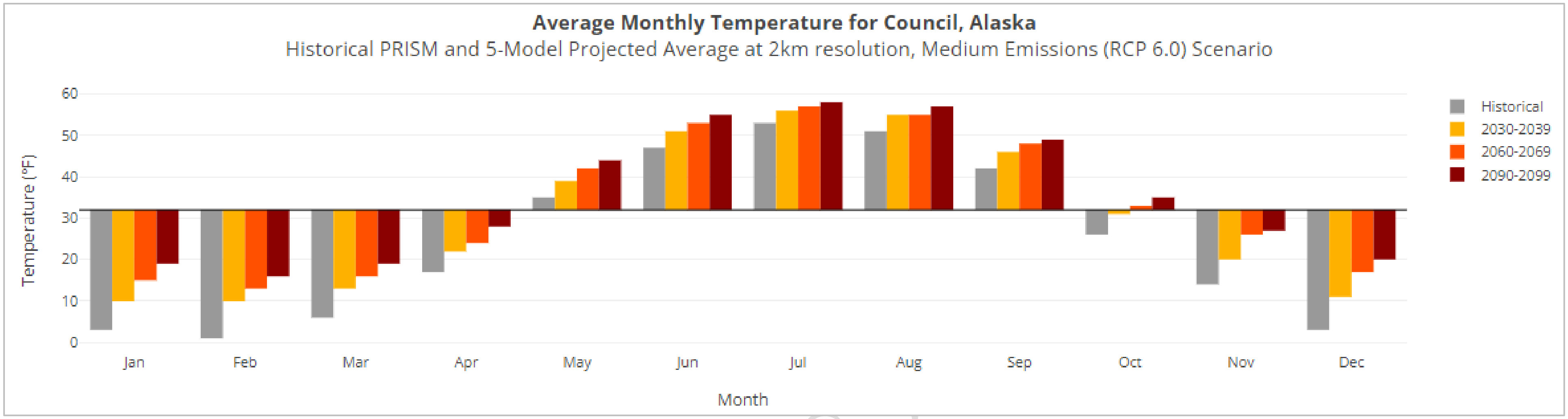
Source: UAF/SNAP 2024c- Community Climate Charts

Figure 3-24 Historical and Projected Temperatures in King Island



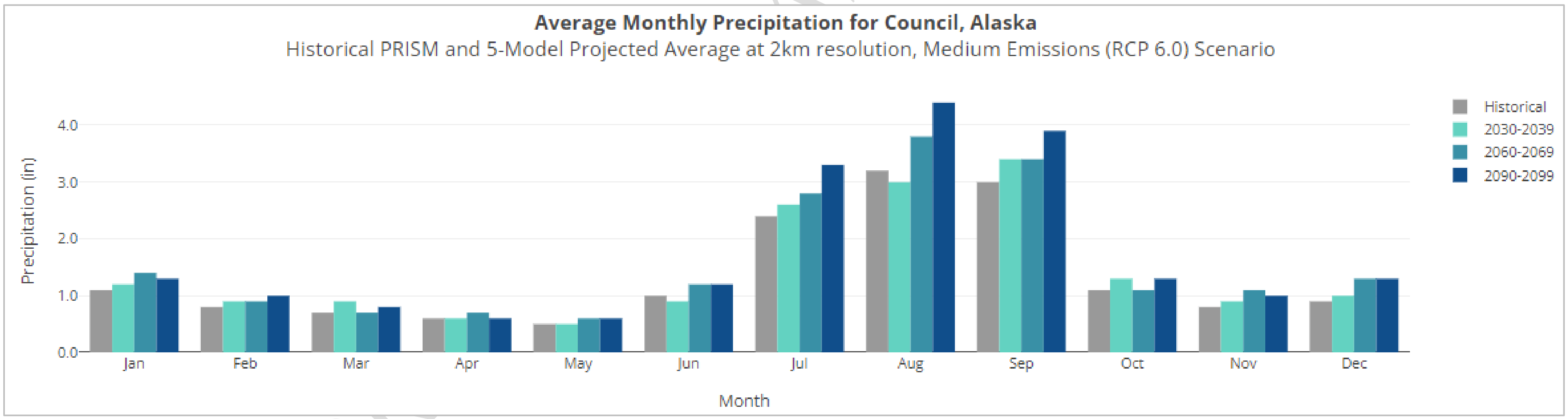
Source: UAF/SNAP 2024c- Community Climate Charts

Figure 3-25 Historical and Projected Precipitation Amounts in King Island



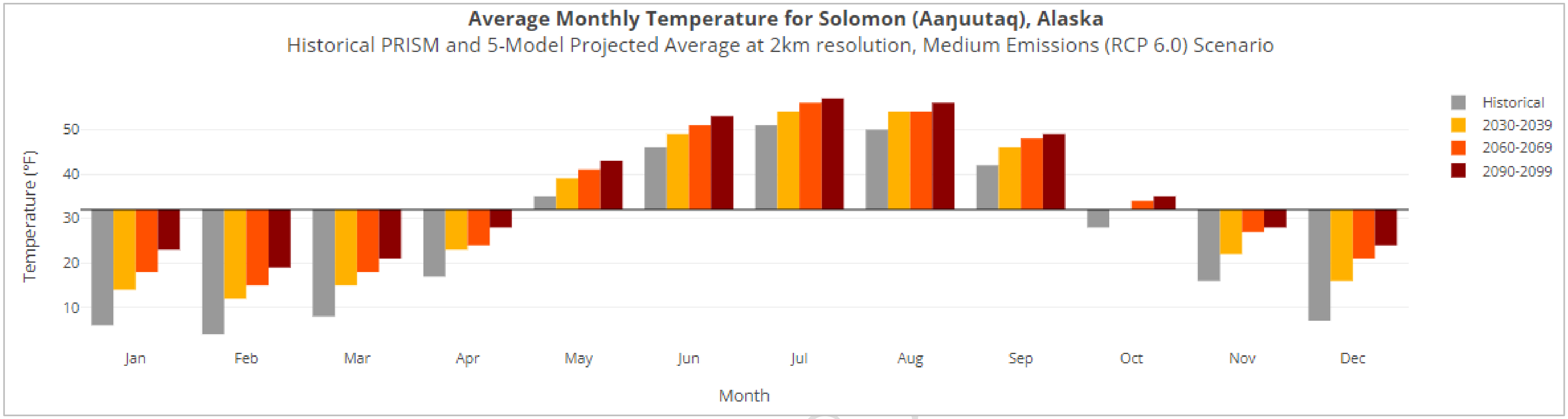
Source: UAF/SNAP 2024c- Community Climate Charts

Figure 3-26 Historical and Projected Temperatures in Council



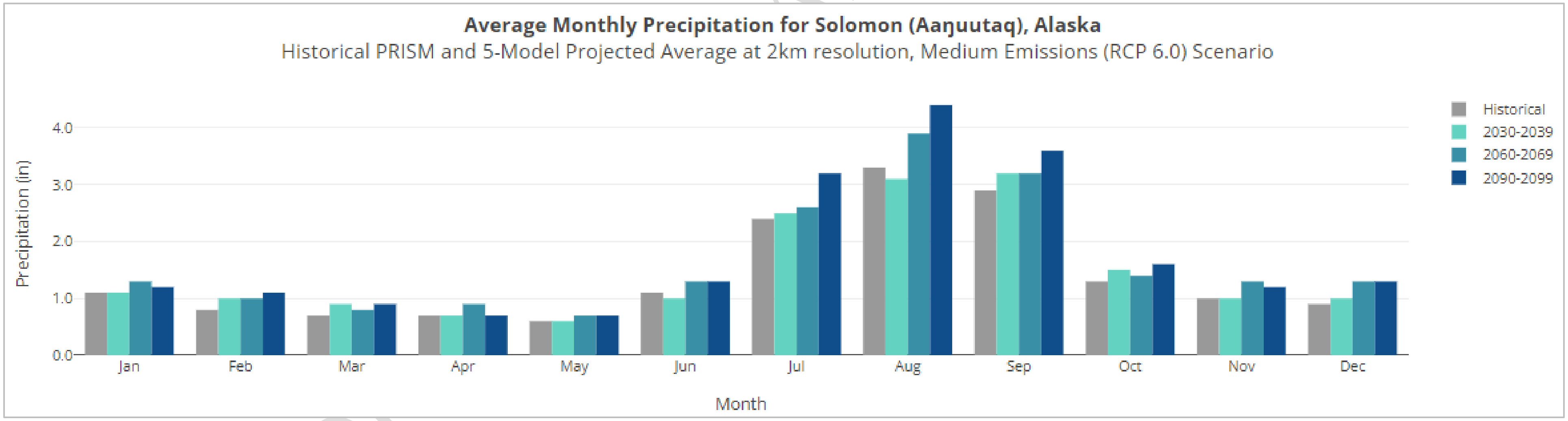
Source: UAF/SNAP 2024c- Community Climate Charts

Figure 3-27 Historical and Projected Precipitation Amounts in Council



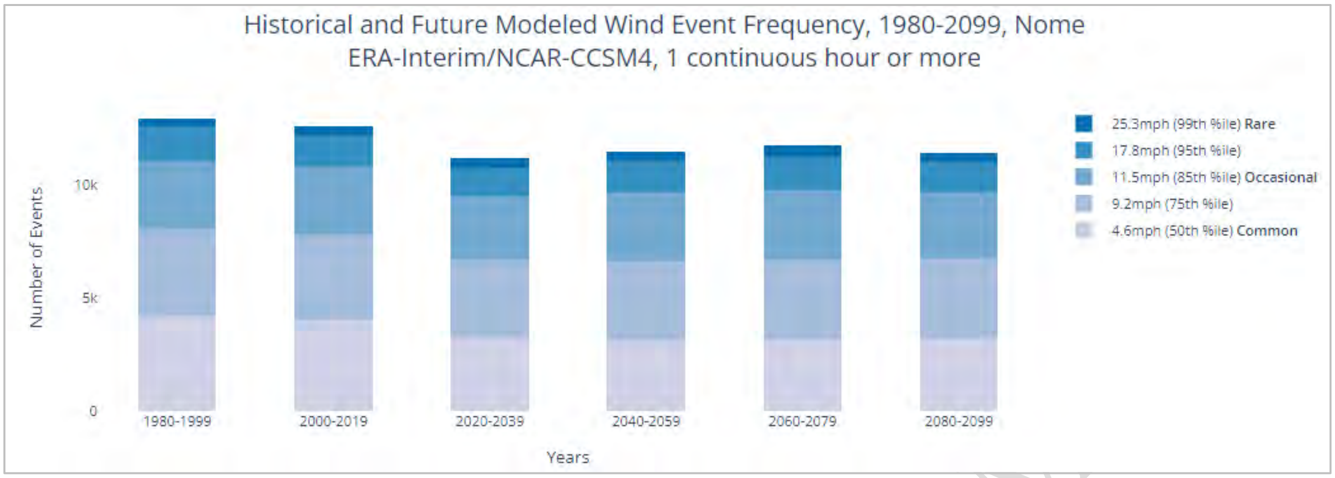
Source: UAF/SNAP 2024c- Community Climate Charts

Figure 3-28 Historical and Projected Temperatures in Solomon



Source: UAF/SNAP 2024c- Community Climate Charts

Figure 3-29 Historical and Projected Precipitation Amounts in Solomon



Source: UAF/SNAP 2024b- Community Wind
Note: This information is not available for King Island, Council, or Solomon

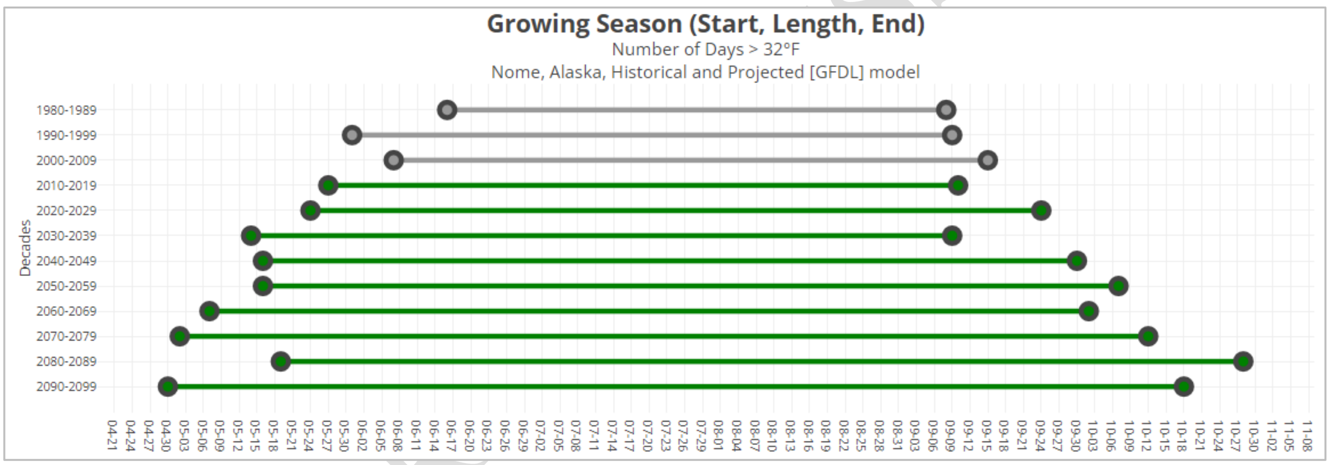
Figure 3-30 Historical and Future Modeled Wind Event Frequency, Nome (1980-2099)

Due to climate change, the impacts of severe weather events in Nome, Solomon, King Island and Council are expected to change. Projected impacts of each event are outlined below.

Severe Weather Event	Projected Changes in Impact due to Climate Change
Extreme Cold	In addition to direct impacts such as hypothermia, extreme cold may also impact a community by disrupting the flow of transportation within the community. With extreme cold temperatures, comes ice fog, which may ground an aircraft carrying supplies until conditions improve. Prolonged periods of cold can cause large bodies of water to freeze, disrupting shipping and increasing the likelihood of ice jams and associated flooding. While Alaskans have engineered ways to stay warm during extreme cold, infrastructure can only withstand and function within a certain temperature range. Extreme cold can cause electric generation to malfunction or cause fuel to congeal in supply lines and storage tanks. Without electricity, heaters and furnaces do not work, and water/sewage pipes can freeze or rupture. A combination of extreme cold and little to no snow cover, increases the ground's frost depth, which can disturb pipes beneath the ground. While extreme cold can impact a community's infrastructure, the greatest danger from extreme cold is its impact on humans. Prolonged exposure to extreme cold can cause frostbite or hypothermia and become life-threatening very quickly. Infants and elderly people are most susceptible to these conditions. Carbon monoxide poisoning is another threat as people use supplemental heating devices without proper ventilation. Extreme cold accompanied by wind intensifies life-threatening exposure injuries such as hypothermia and frostbite. Reduced snow cover and winter precipitation in the form of snow, along with increased air temperature, are expected to increase stream water temperature (NPS 2020). During winter and spring, warmer waters could hasten development and growth of salmon eggs and fry, possibly leading to earlier life stage transitions (NPS 2020). Additionally, ecological impacts to spawning salmon from rising temperatures may be seen. During summer, warmer waters could increase physiological stress on adult salmon migrating to spawning grounds, potentially reducing spawning rates (NPS 2020). Higher temperatures in spring and fall could also result in longer a growing season (UAF/SNAP 2024d- Alaska Garden Helper). See Figure 3-31 to Figure 3-34 below for the historical and projected length of the growing season in each community.

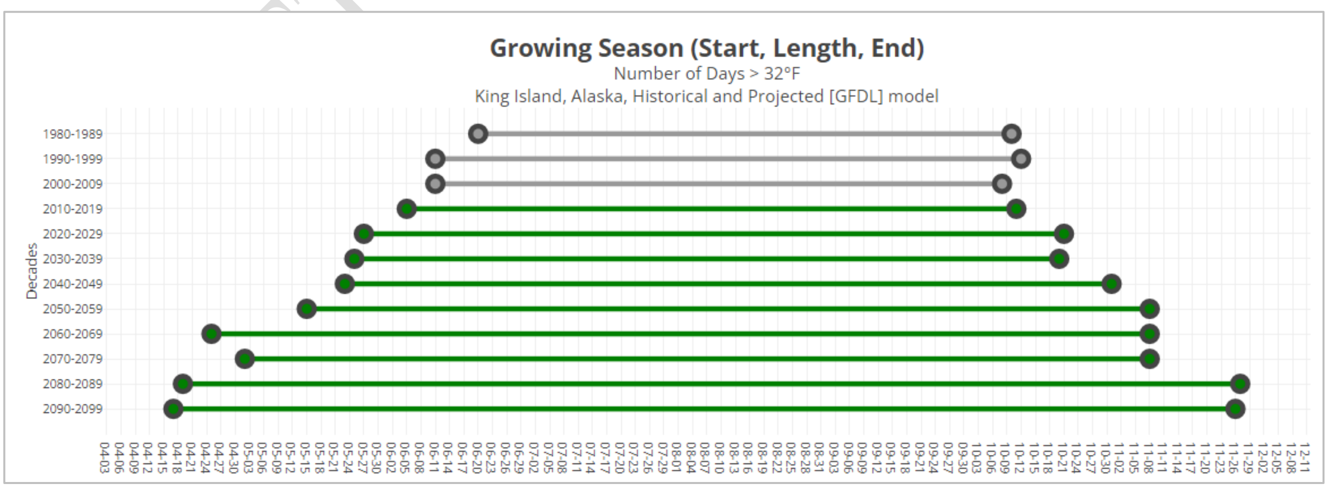
Severe Weather Event	Projected Changes in Impact due to Climate Change
Freezing Rain and Ice Storms	Due to climate change, average annual temperatures in Alaska are projected to rise by an additional 2°F to 4°F by 2050 (USGCRP 2018), while the intensity and frequency of winter storms and other storm events is projected to increase (Dixon et al. 2018). How these factors will affect the impact of freezing rain and ice storm events in Nome, King Island, Solomon, and Council is unknown.
Heavy Snow	Within the next century, climatically-driven changes in snow characteristics (decreasing snowfall, snowpack, and snowmelt) will affect hydrologic and ecological systems in Alaska (Littell et al. 2018). Impacts from reduced snowpack and less frequent snowfall will directly affect the spawning habitats for salmon. Reduced snow cover and winter precipitation in the form of snow, along with increased air temperature, are expected to increase stream water temperature (NPS 2020). During winter and spring, warmer waters could hasten development and growth of salmon eggs and fry, possibly leading to earlier life stage transitions (NPS 2020). Additionally, ecological impacts to spawning salmon from rising temperatures may be seen. During summer, warmer waters could increase physiological stress on adult salmon migrating to spawning grounds, potentially reducing spawning rates (NPS 2020). A shift from snow to rain impacts water storage capacity and surface water availability (UAF/SNAP).
Drifting Snow	Projected climate change impacts are expected to reduce snowpack (NPS 2020), while high-wind events are projected to become more frequent, with the highest increases in the northern and western Alaska coastal regions (Redilla et al. 2019). How these competing factors will affect the impact of drifting snow events in Nome, King Island, Solomon, and Council is unknown.
Blizzard	Studies show that climate change could exacerbate the severity of blizzards (Dixon et al. 2018), potentially resulting in worsening impacts to the community. Conditions during a blizzard can be extreme, resulting in severe impacts to community. During a blizzard, heavy or blowing snow can cause whiteout conditions, making travel difficult and unsafe. Roads can become partially or fully blocked by snowdrift. Cold temperatures associated with blizzards can last for days after the storm has ended, increasing the potential for hypothermia or frostbit. High winds during a blizzard may disrupt utilities, potentially leaving homes without heat and power until after the storm has ended and utilities are restored.
Winter Storm	Climate scientists have suggested that warming global temperatures may be enabling longer and more intense cycles of winter storms (Dixon et al. 2018) resulting in worsening impacts to the community. A winter storm can last a few hours or several days, cut off utilities, and put older adults, children, sick individuals, and pets are at greater risk. Winter storms create a higher risk of car accidents, hypothermia, frostbite, carbon monoxide poisoning, and heart attacks from overexertion. Winter storms can also cause property damage. Some impacts to homes and other infrastructure may include roof damage or collapse, water damage from frozen or broken pipes, cracks in caulking due to extreme cold, damage to building foundations. Winter storms and cold temperatures can also impact vehicles by draining the battery, damaging the cooling system, thickening fluids, damaging the engine, and increasing the potential for vehicular accidents.
Heavy Rain	In Nome, fall precipitation is projected to increase by +33% by the end of the century. In King Island, winter precipitation is projected to increase by +53% by the end of the century. In Council, fall precipitation is projected to increase by +38% by the end of the century. In Solomon, fall

Severe Weather Event	Projected Changes in Impact due to Climate Change
	precipitation is projected to increase by +34% by the end of the century. (UAF/SNAP 2024a-Northern Climate Reports). With increased precipitation, the impact of heavy rain in every community may increase. These impacts may include increased flooding and road washouts in the communities.
High Winds	As high wind events are projected to increase (Redilla et al. 2019), impacts from high wind events may increase.
Drought	Climate change-driven effects upon hydrology, seasonal snowpack, and days above freezing temperatures will alter the water supply in snowmelt/glacier runoff fed streams and rivers in turn affecting the water supply for Alaskan communities, wildlife, and landscapes. In conjunction with lower ground-water levels, droughts can drive salinization in soil, estuaries, and wetlands along coastlines as sea-water fills voids formerly occupied by fresh water. Indirect effects of climate change-induced droughts include threats to the tourism industry, food insecurity, and threats to the Alaskan subsistence lifestyle (IPCC 2019).



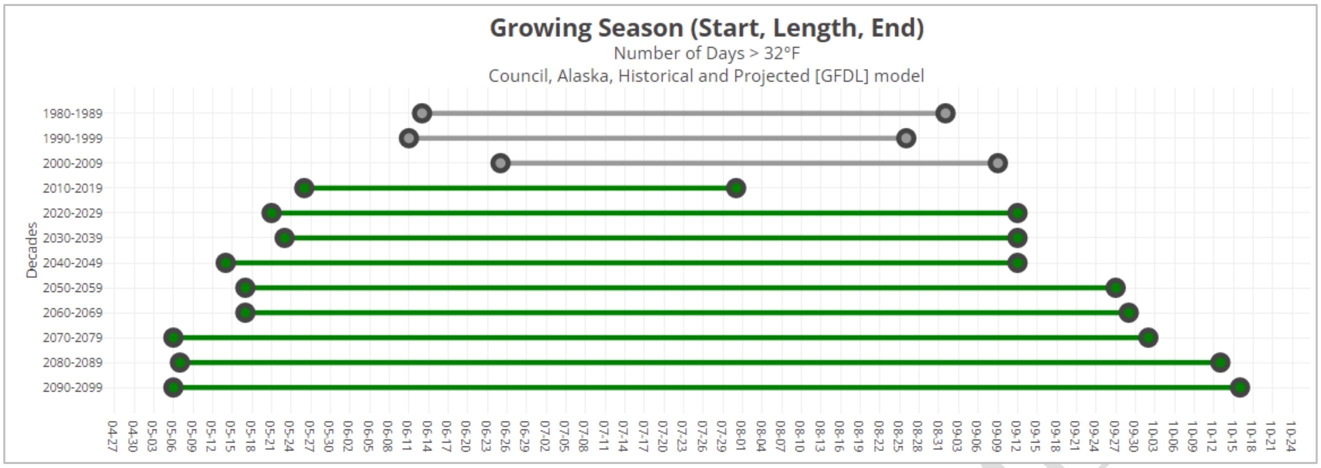
Source: UAF/SNAP 2024d- Alaska Garden Helper

Figure 3-31 Historical and Projected Length of Growing Season in Nome



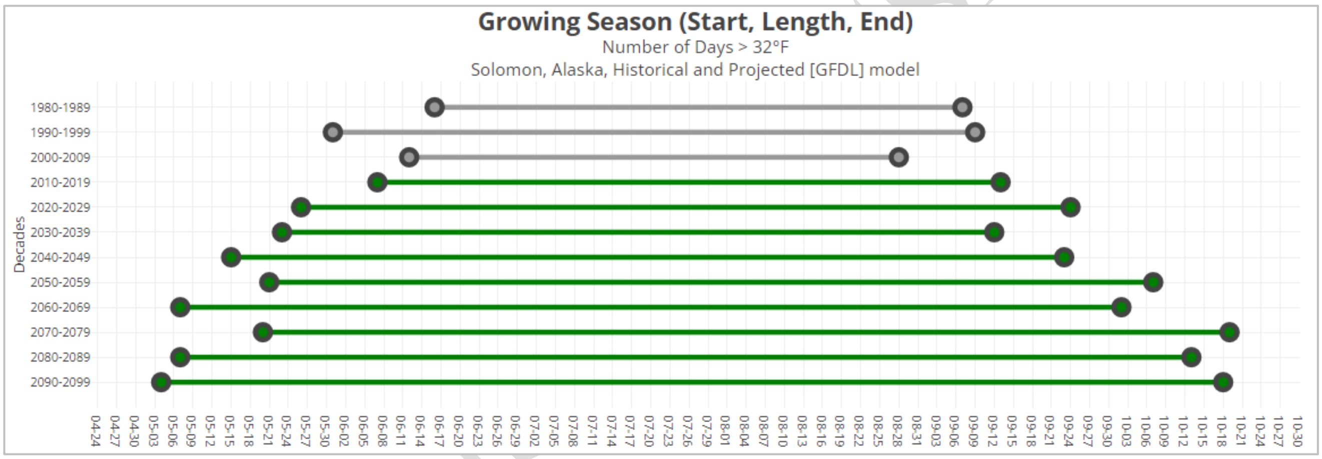
Source: UAF/SNAP 2024d- Alaska Garden Helper

Figure 3-32 Historical and Projected Length of Growing Season in King Island



Source: UAF/SNAP 2024d- Alaska Garden Helper

Figure 3-33 Historical and Projected Length of Growing Season in Council



Source: UAF/SNAP 2024d- Alaska Garden Helper

Figure 3-34 Historical and Projected Length of Growing Season in Solomon

The changes in frequency of severe weather events are dependent on the event and the influence of climate change will impact each differently. The projected changes in event frequency are outlined below.

Severe Weather Event	Projected Changes in Probability of Future Events due to Climate Change
Extreme Cold	Due to climate change, average annual temperatures in Alaska are projected to rise by an additional 2°F to 4°F by 2050 (USGCRP 2018; UAF/SNAP). Statewide, by 2046, the number of nights with below freezing temperatures is expected to decrease by at least 20 nights per year (USGRCP 2018). In Nome, average annual temperatures may increase by about 14°F by the end of the century (UAF/SNAP 2024a- Northern Climate Reports). Winter temperatures are increasing the most (+23°F), and spring and fall may transition from below freezing to above freezing temperatures in the future (UAF/SNAP 2024a- Northern Climate Reports). In King Island, average annual temperatures may increase by about 14°F by the end of the century (UAF/SNAP 2024a- Northern Climate Reports). Winter temperatures are increasing the most (+25°F), and fall may transition from below freezing to above freezing temperatures in the future (UAF/SNAP 2024a- Northern Climate Reports).

Severe Weather Event	Projected Changes in Probability of Future Events due to Climate Change
	In Council, average annual temperatures may increase by about 14°F by the end of the century (UAF/SNAP 2024a- Northern Climate Reports). Winter temperatures are increasing the most (+23°F), and spring and fall may transition from below freezing to above freezing temperatures in the future (UAF/SNAP 2024a- Northern Climate Reports). In Solomon, average annual temperatures may increase by about 14°F by the end of the century (UAF/SNAP 2024a- Northern Climate Reports). Winter temperatures are increasing the most (+22°F), and spring and fall may transition from below freezing to above freezing temperatures in the future (UAF/SNAP 2024a- Northern Climate Reports).
Freezing Rain and Ice Storms	Freezing rain and ice storm events are dependent on the ambient air mass temperature. Average annual temperatures in Alaska are projected to rise by an additional 2°F to 4°F by 2050 (USGCRP 2018; UAF/SNAP). As global temperatures continue to rise, freezing rain and ice storm events may become less frequent as in previous decades.
Heavy Snow	The amount of precipitation that falls as snow and the length of the snow-cover season both decrease as temperatures exceed 32°F more frequently (NPS 2020). Projected climate change impacts are expected to reduce snowpack and promote glacial melt, reducing salmon habitat quality and diversity (NPS 2020). Models indicate a broad switch from snow-dominated to transitional annual hydrology across most of Southern and Coastal Alaska (Littell et al. 2018). Therefore, as winter temperatures continue to increase, the amount of snowfall will decrease and precipitation in the form of rain will be more common in winter months.
Drifting Snow	Projected climate change impacts are expected to reduce snowpack (NPS 2020), while high-wind events are projected to become more frequent, especially in northern and western Alaska coastal regions (Redilla et al. 2019). How these competing factors will affect the probability of drifting snow events in Nome, King Island, Solomon, and Council is unknown. While unknown, the probability of drifting snow events will depend on the geography of the area and predisposition for snowfall.
Blizzard Winter Storm	Climate scientists have suggested that warming global temperatures may be enabling longer, more frequent, and more intense cycles of winter storms and blizzards (Dixon et al. 2018).
Heavy Rain	In Nome, fall precipitation is projected to increase by +33% by the end of the century. In King Island, winter precipitation is projected to increase by +53% by the end of the century. In Council, fall precipitation is projected to increase by +38% by the end of the century. In Solomon, fall precipitation is projected to increase by +34% by the end of the century. (UAF/SNAP 2024a- Northern Climate Reports).
High Winds	High-wind events are projected to become more frequent (Redilla et al. 2019).
Drought	Climate change within Alaska is likely to result in increased frequency of drought conditions (IPCC 2019). Drought risks will increase globally throughout the end of the 21st century, scaling upwards with emissions projections/additional degrees of heating. In the high latitudes of North America, droughts will be 150-200% more likely at 2°C warming and over 200% more likely at 4°C warming (IPCC 2019).

3.3.3 WILDLAND/TUNDRA FIRE

Hazard applicability: ☑Nome ☑Council townsite ☑Solomon townsite

Wildland/tundra fires do not pose a threat to King Island townsite due to the lack of vegetation (fuel).

3.3.3.1 Nature

Wildland fires are types of fires which spread via the consumption of vegetation, and they often spread very quickly due to amount of vegetation available. Tundra fires are more specific, as they occur on the Bering tundra, where Nome, King Island, Council, and Solomon are located.

Fires can be divided into the following categories:

- **Prescribed fires**: ignited under predetermined conditions to meet specific objectives, to mitigate risks to people and their communities, and/or to restore and maintain healthy, diverse ecological systems.
- **Wildland fire**: any non-structure fire, other than prescribed fire, that occurs in the wildland.
- **Wildland Fire Use**: a wildland fire functioning in its natural ecological role and fulfilling land management objectives.
- **Wildland-Urban Interface Fires (Community Fire)**: fires that burn within the line, area, or zone where structures and other human development meet or intermingle with undeveloped wildland or vegetative fuels. The potential exists in areas of wildland-urban interface for extremely dangerous and complex fire burning conditions which pose a tremendous threat to public and firefighter safety.

They begin sometimes unnoticed and cause dense smoke that is usually visible from several miles or tens of miles around. Two principal causes for them are natural (e.g., lightning) and human activity (campfires, cigarettes, unattended burns). They more usually happen in forests or other areas with sufficient vegetation (e.g., prairies). Wildland fires are usually classified as to a specific type or locale such as: urban, tundra, interface or intermix fires, as well as prescribed fires.

There are four significant variables which contribute to the behavior and extent of wildland fires, and these can be used to identify potential areas that are more susceptible to wildland fires. These are:

- **<u>Topography</u>**: the amount and aspect of slopes influence how wildland fires spread and how quickly. Slopes that face south are subject to more solar radiation which makes them generally drier and more prone for wildfires. Sometimes ridge lines or ridge tops become a natural barrier to wildfires as fires spread more slowly downhill.

- **<u>Fuel</u>**: Wildland fires are heavily dependent on the type and extent of fuel, i.e., vegetation, present for their spread and occurrence. Certain species of plants are much more ignitable and will burn with greater intensity. The amount of combustible material available is referred to as the fuel load, and the denser the vegetation the more intense the wildland fire can become. The amount of dead matter, e.g., leaf litter, compared to living matter also considerably effects the nature of these fires. Periods of prolonged droughts cause a decrease in the moisture of both living and dead matter and significantly increase the odds of wildland fire occurrence and extent. Climate change is now a factor as well. Lastly, the continuity of the fuel load is a main factor in both horizontal and vertical planes. The more continuous the fuel, the easier a fire will spread.

- **<u>Weather</u>**: Of all the factors which affect wildfires, weather is the most variable. The ignition and spread of a wildfire are dependent on humidity, temperature, winds, and lightning. Extreme bouts of weather, such as heat waves or droughts, can lead to extensive wildfire activity. Dry seasons are generally becoming longer due to climate change, and this has led to an increase in wildfires. Conversely, periods of increased rain and cooling decrease the odds of wildland fires and ease their containment as well.

- **Season**: The seasons with more vulnerability for wildfires are late summer and early autumn. This is generally the time when the fuel (vegetation) dries out. The moisture content drops sharply and the ratio to dead to living material increases. Though there are many factors which contribute to the extent and intensity if wildfires such as: wind speed and direction, fuel load and type, humidity, and topography. The most common causes of wildfires in Alaska, historically, have been lightning or human negligence.

Other hazards do have an effect on the extent and frequency of wildland fires. These are, for example: infestations, lightning, and drought. If a wildland fire is not quickly and properly controlled, it can grow rapidly into a disaster or emergency. The smallest of wildfires can even threaten lives, resources, and destroy properties. Livestock and pets are also susceptible to wildfires. Some wildfires can precipitate the need for emergency food and water, evacuation, and temporary shelters.

Sometimes the effects of wildland fires can be catastrophic. They can destroy large swathes of forest and other vegetation, damage the soil, waterways, and the land itself. Some soils may lose their capacity to keep moisture and support life for years after an intense wildfire.

3.3.3.2 History

Wildland fires occur in every state in the country, including all regions of Alaska. Each year, between 600 and 800 wildland fires, mostly between March and October, burned across Alaska, causing extensive damage.

Table 3-10 lists historical wildfire with 100 miles of Nome that burned 20 acres or more. None of these fires occurred in the community or impacted the residents. The Planning Team states that smoke from distant fires has impacted the air quality in the Village.

Table 3-10 Historical Wildfires within 100 miles of Nome (including Council & Solomon) (1939-2022)

Discovery Date	Fire Name	Latitude	Longitude	Total Acres Burned	Cause
6/4/1954	Imuruk Basin	65.0000	-165.0000	224,000	Lightning
7/11/1956	Rainbow Camp	65.5287	-164.2406	8,000	Heavy Equipment
6/3/1961	Koyuk	65.2000	-166.9333	400	Lightning
8/8/1964	Kougarok	65.4167	-164.6667	25	Lightning
8/10/1966	Imruk	65.4167	-163.4167	20	Lightning
8/11/1966	Kougarok	65.3500	-164.6667	500	Lightning
7/1/1969	Death Valley	65.1667	-162.5000	50	Lightning
6/9/1970	Cape Nome	64.4833	-165.0833	36	Cook/Warming Fire
6/24/1971	Cairn IV	65.0500	-164.8333	100,000	Lightning
6/24/1971	Seabert	65.4000	-165.5333	1,000	Lightning
6/24/1971	Little Ptarmigan I	65.2667	-165.8333	800	Lightning
6/24/1971	Cairn II	65.0532	-164.8404	300	Lightning
6/24/1971	Cairn III	65.0667	-164.8333	200	Lightning
6/24/1971	Little Ptarmigan II	65.2500	-165.8333	100	Lightning
6/25/1971	Cairn I	65.0500	-164.8333	350	Lightning
6/26/1971	Delome River	65.4167	-164.5833	61,440	Lightning
6/26/1971	165-30	65.3000	-165.5000	58,520	Lightning

Table 3-10 Historical Wildfires within 100 miles of Nome (including Council & Solomon) (1939-2022)

Discovery Date	Fire Name	Latitude	Longitude	Total Acres Burned	Cause
6/26/1971	Tuksuk Channel	65.2559	-165.6751	20,480	Lightning
6/26/1971	Niukluk River	65.0333	-164.2500	9,600	Lightning
6/26/1971	New Igloo	65.1667	-165.1167	3,600	Lightning
6/26/1971	West Fork	65.0647	-164.4498	2,560	Lightning
6/26/1971	Officid Creek	65.2500	-166.0000	399	Lightning
6/29/1971	Anc Nw 500	65.3333	-164.8333	100,000	Lightning
6/29/1971	Ella	65.3667	-164.1667	25,000	Lightning
6/29/1971	Kuz River	65.3333	-164.3333	23,000	Lightning
6/29/1971	Coffee Dome	65.2500	-164.7500	500	Lightning
6/29/1971	Whelan Creek	65.2667	-164.6667	200	Lightning
7/9/1972	Mccarthy Marsh	65.0586	-163.1803	387	Unknown
7/13/1972	Henry Creek	65.4700	-164.9742	800	Unknown
7/27/1972	Bunker Hill	65.2582	-164.1717	500	Lightning
7/27/1972	Paragon River	65.0500	-163.3667	20	Unknown
6/30/1973	Taylor	65.6697	-164.8700	320	Lightning
9/8/1974	Taylor	65.8000	-164.7667	766	Unknown
7/9/1977	Dry Canyon	65.0556	-162.7059	46,000	Lightning
7/24/1977	Shh Se 38	65.9000	-165.0000	20,000	Lightning
7/24/1977	Wmo E 9	64.6667	-163.1000	400	Lightning
8/31/1978	Shelton	65.2406	-164.8753	75	Lightning
6/4/1979	Sol Ne 5	64.5955	-164.2910	25	Lightning
6/5/1979	Gmt Sw 50	65.0566	-163.0640	35	Lightning
6/26/1982	Gmt W 37	65.4061	-162.7804	80	Natural
6/24/1984	Ome Nw 65	65.3337	-163.9802	60	Lightning
6/25/1984	Ome Ne 40	65.1000	-165.9699	20	Lightning
7/2/1984	414057	64.9500	-162.6833	1,000	Lightning
7/2/1984	Gmt Sw 50	64.9333	-162.9667	120	Lightning
7/2/1984	Glv N 25	64.9309	-162.7357	33	Lightning
7/14/1985	Otz Sw 95	65.6333	-164.8500	40	Lightning
8/5/1985	531055	65.8509	-165.0232	500	Unknown
8/5/1985	531038	65.0010	-164.5230	300	Unknown
8/5/1985	25	65.7903	-164.0092	21	Lightning
7/1/1990	Gal W 190	65.2833	-164.2333	8,800	Lightning
7/1/1990	031034	64.6000	-164.6500	32	Lightning
7/2/1990	032061	65.1333	-164.8000	200	Lightning
8/19/1990	031057	65.4667	-164.5333	350	Lightning
9/2/1991	Ome N 85	65.7167	-164.8333	55	Other

Table 3-10 Historical Wildfires within 100 miles of Nome (including Council & Solomon) (1939-2022)

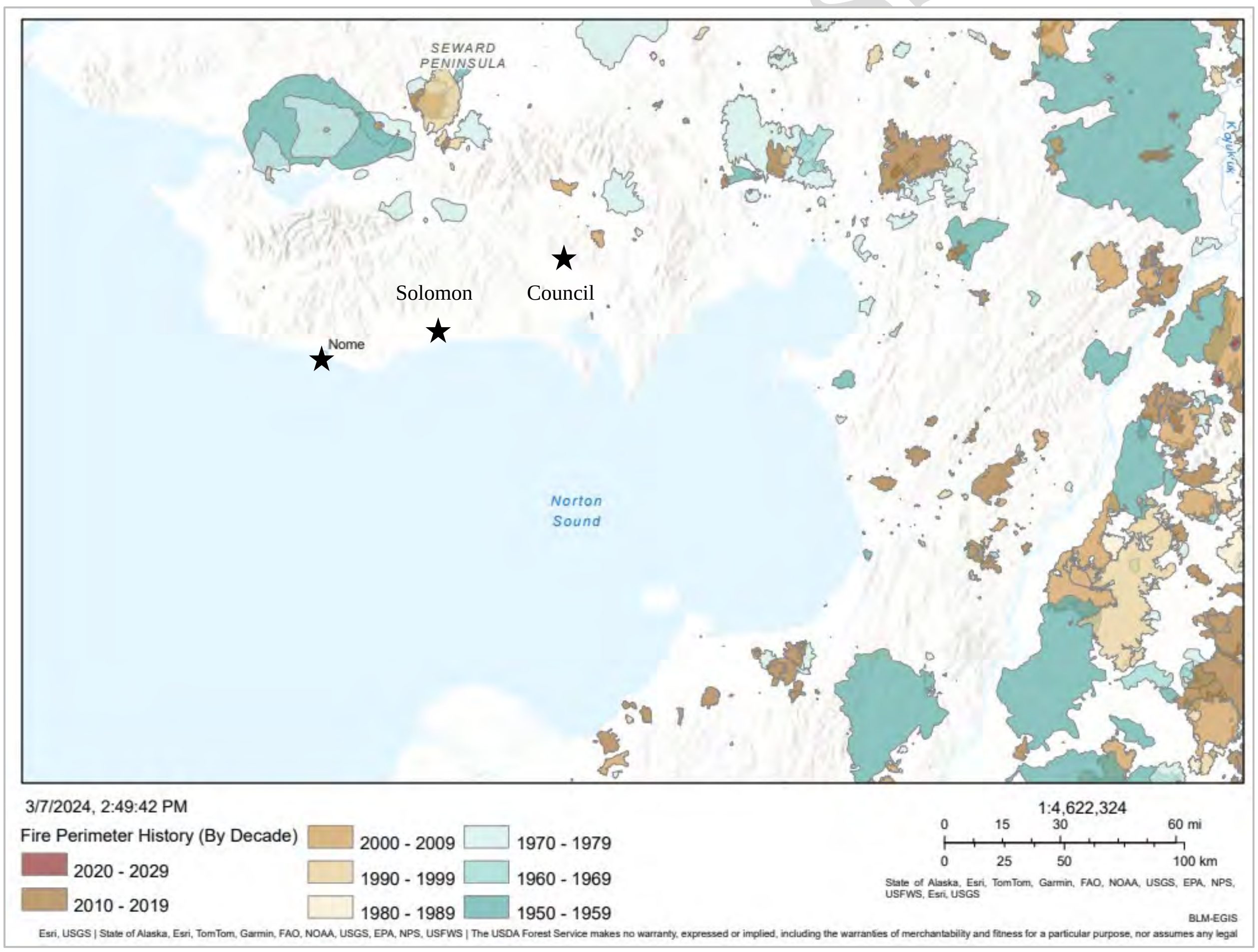
Discovery Date	Fire Name	Latitude	Longitude	Total Acres Burned	Cause
6/21/1992	231280	64.7500	-165.9333	80	Other
7/5/1992	Qrz Ne 2	65.3500	-164.5333	50	Lightning
7/5/1992	Kka W 36	64.9167	-162.7167	40	Lightning
7/5/1992	Qrz Ne 17	65.5667	-164.3333	35	Lightning
6/11/1994	Ome Nw 60	65.1667	-165.8500	3,200	Lightning
7/22/1997	Garfield Creek	65.4167	-164.3667	76,300	Lightning
7/22/1997	Delome Creek	65.4167	-164.3667	20	Lightning
7/23/1998	American	64.9667	-164.1833	60	Lightning
7/12/1999	Belt Creek	65.2000	-164.3000	818	Lightning
6/19/2000	Fish River	64.9667	-163.1333	20	Lightning
7/13/2000	Lucky Strike	65.1833	-166.1500	35	Lightning
8/4/2002	Milepost 85	65.4569	-164.5667	21,575	Vehicle
8/12/2002	Imuruk Basin	65.1486	-165.8967	381	Human
6/25/2003	Hunter Creek	65.3244	-165.3905	519	Lightning
6/13/2004	Quartz Creek #2	65.3333	-164.8333	1,648	Lightning
6/13/2004	Quartz Creek #3	65.3000	-164.8000	80	Lightning
6/13/2004	Quartz Creek	65.4000	-164.7000	37	Lightning
6/13/2004	Quartz Creek # 4	65.4667	-164.6167	25	Lightning
6/13/2004	Pargon River	65.0333	-163.3333	25	Lightning
7/15/2004	Oregon Creek	65.1258	-163.3450	7,750	Lightning
7/15/2004	Cliff Creek	64.9236	-163.0383	6,352	Lightning
7/15/2004	American Creek	64.9772	-164.3656	80	Lightning
7/26/2005	South Agiapuk	65.4189	-165.6447	67	Lightning
8/21/2005	Kuzitrin River	65.4175	-163.6328	50	Lightning
7/13/2007	Snow Shoe Creek	65.8761	-165.3906	39	Lightning
6/21/2010	Birch Creek	65.2853	-164.3444	1,644	Unknown
7/9/2010	Eagle Creek	64.6783	-162.9481	195	Lightning
8/8/2014	Teller Creek	65.7667	-165.1167	200	Lightning
8/8/2014	Artic River	65.8333	-166.1667	70	Lightning
7/16/2015	Anita Gulch	64.5803	-165.0547	42	Lightning
7/19/2015	Mingvk Lake	65.4167	-164.5333	21,698	Lightning
7/23/2015	Coco Creek	65.3881	-165.1305	180	Lightning
6/8/2018	Fishing Village	64.6395	-163.0977	318	Lightning
6/13/2018	Camp Creek	65.3143	-164.7777	68	Lightning
6/13/2018	Wander Gulch	65.3268	-164.7625	59	Lightning
7/5/2018	Gillette Creek	65.5017	-164.4330	50	Other Human Cause
6/19/2019	Kuzitrin River 5	65.3749	-164.4069	24	Lightning

Table 3-10 Historical Wildfires within 100 miles of Nome (including Council & Solomon) (1939-2022)

Discovery Date	Fire Name	Latitude	Longitude	Total Acres Burned	Cause
6/19/2019	Kuzitrin River 7	65.4534	-163.9059	21	Lightning
6/20/2019	Sango Creek	65.9305	-165.8432	128	Lightning
7/8/2019	Hooligan Creek	65.2895	-164.9011	30	Lightning
7/13/2019	Garfield Creek	65.4521	-164.6200	422	Lightning
6/3/2020	Macklin	65.7419	-164.8744	268	Lightning
6/3/2020	White Mountain	65.0996	-163.0803	179	Lightning
6/3/2020	White Mountain 2	65.0138	-163.2142	34	Lightning
6/3/2020	Coffee Dome	65.2969	-164.7310	21	Lightning

Source: AICC 2024

Figure 3-35 depicts the perimeters of historic wildfire fires near Nome (1940-2022).



Source: AICC 2024

Figure 3-35 Historical Wildfire Perimeters near Nome (1940-2022)

3.3.3.3 Location

Figure 3-36 depicts the Level II Ecoregion classifications and the vegetation/landcover classes found throughout the State.

Nome, King Island, Council, and Solomon are all located in the EC5 Level II Ecoregion which is classified as Bering Tundra. The Seward Peninsula is a predominantly treeless region and the vegetation/landcover class of this region is primarily made up of sparse vegetation containing trees, shrubs, and herbaceous cover.

Ecoregion EC5 has a low fire load, but fires do happen under favorable conditions. Mainly short lived as moisture frequently impacts the west coast. However, with certain combinations of fuel availability, weather, topography, and sources of ignition, wildland fires may occur near the Villages.

The Nome Volunteer Fire Department (NVFD) is responsible for fire protection, search and rescue, hazardous material (hazmat) response, and related emergencies around the City of Nome and the Nome Airport. The NVFD is also responsible for non-emergency functions including fire investigating, fire safety, fire prevention, and fire education.

The NVFD excels in the area of search and rescue. A majority of searches and rescues occur in the winter months with teams of fire department volunteers using snowmobiles.

The City of Nome currently has a split ISO rating of 5/9 from the 1984 Survey. Which means that dwellings or buildings within 1000 feet of a hydrant AND within 5 road miles of a fire station get the higher Class 5 rating. Other buildings not meeting these criteria get the lower Class 9 rating.

There are currently 42 members in the department. They protect over 14 square miles and over 3,500 people. The fire department also has a seat on the Local Emergency Planning Commission (City of Nome 2024).

3.3.3.1 Extent (Magnitude/Severity)

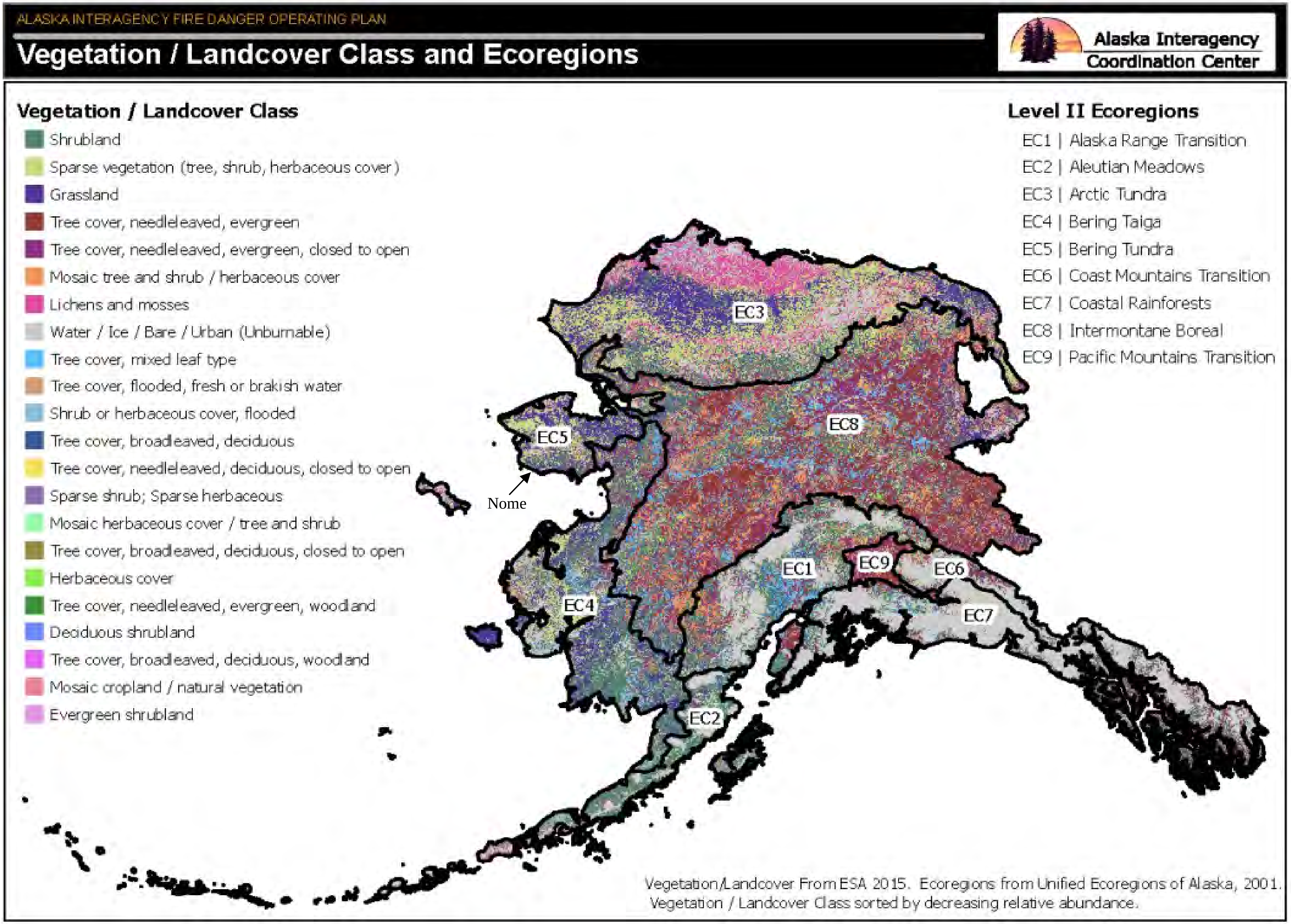
Due to the few recorded historical wildland fire events as well as the criteria listed in Table 3-2, the extent of wildland fire events in Nome and Solomon have been Negligible with minor injuries, the potential for critical facilities to be shut down for less than 24 hours, less than 10% of property or critical infrastructure being severely damaged, and little to no permanent damage to transportation or infrastructure or the economy. The extent of wildfires in Council is considered Critical as past wildfires have come close to the Village.

3.3.3.2 Impact

If wildfires are not adequately controlled, the impacts from them could become an emergency or considerable disaster. Even smaller wildfires can threaten lives, resources, and destroy properties. Livestock and pets are susceptible to wildfires as well. Wildfires can precipitate the need for emergency food and water, evacuation, and temporary shelters.

The effects of wildland fires can become catastrophic. They can destroy large swathes of forest and other vegetation, damage the soil, waterways, and the land itself. Some soils may lose their capacity to keep moisture and support life for years after an intense wildfire. Exposure of the land also leads to increased erosion and add to the siltation of rivers and streams. This increases the chances of flooding, degrades water quality, and can significantly harm aquatic life.

For many ecosystems, wildfires are actually critical features of the natural history. They can serve to help maintain renewal, biodiversity, and the ecological health of the land in general. This essential role which they serve for the local ecology has been incorporated into the planning process for fire management. Hence, the full range of fire management activities has been implemented in Alaska. This helps achieve the sustainability and health of the ecosystem. This includes the social consequences on firefighters in addition to ecological and economic factors. The natural and cultural resources that are potentially threatened, and other important values, all dictate the level and nature of the management response during a wildfire.

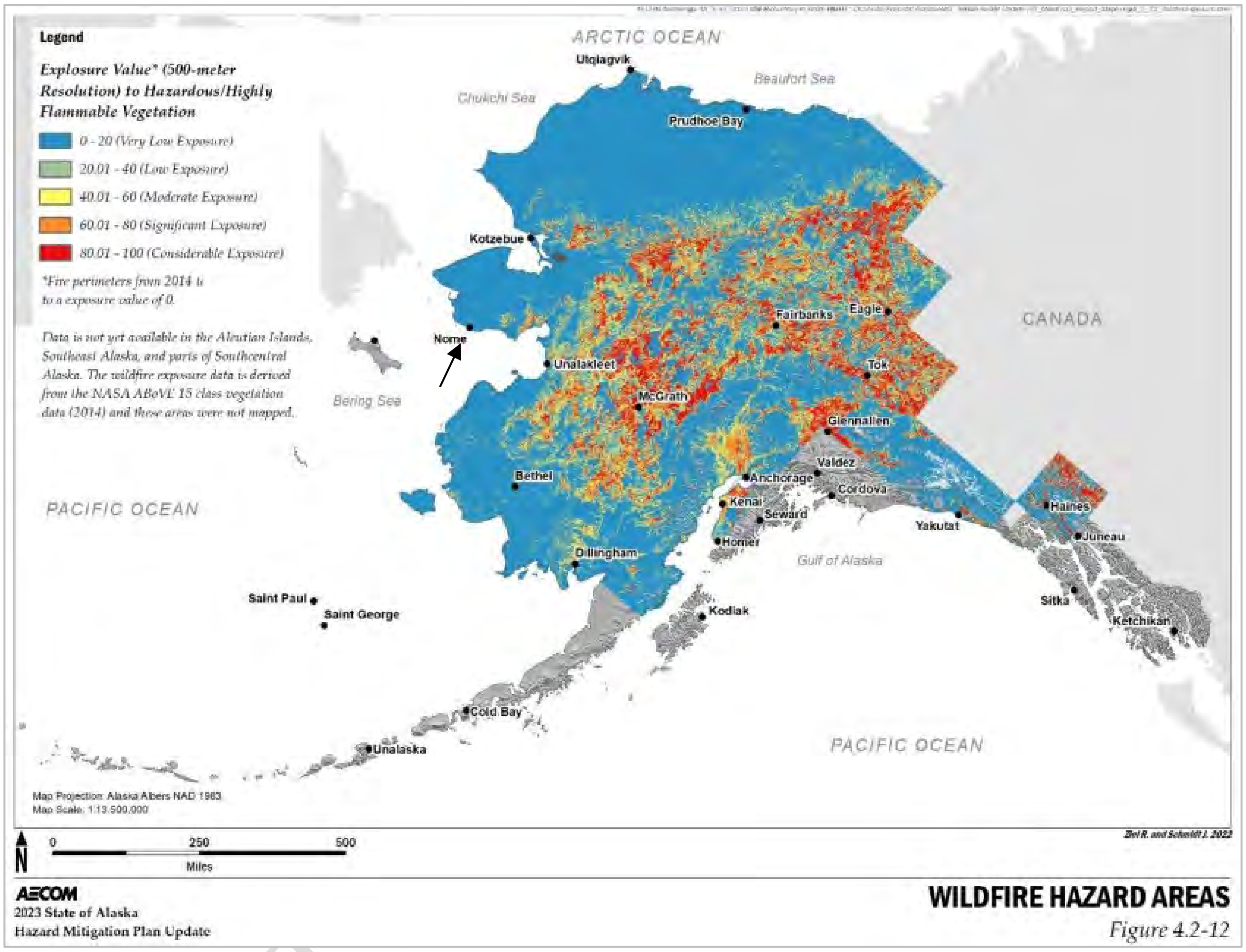


Source: BLM 2020

Figure 3-36 Vegetation/Landcover Class and Ecoregions of Alaska

3.3.3.3 Probability of Future Events

The 2023 State of Alaska SHMP identifies wildfire hazard areas across the State (Figure 3-37). Nome, Council, and Solomon are located in an area with very low exposure value. Exposure is not available for King Island.



Source: DHS&EM 2023

Figure 3-37 Statewide Wildfire Hazard Areas

Based on previous occurrences and the criteria identified in Table 3-3, it is Possible, but Unlikely that Nome or Solomon will experience a wildland fire in the community in the next ten years; there is a 1 in 10 years chance of occurring (1/10=10%); and the history of events is less than or equal to 10% likely per year.

Based on previous occurrences and the criteria identified in Table 3-3, it is Possible that Council will experience a wildland fire in the community in the next five years; there is a 1 in 5 years chance of occurring (1/5=20%); and the history of events is greater than 10% but less than or equal to 20% likely per year.

3.3.3.4 Future Conditions Including Climate Change

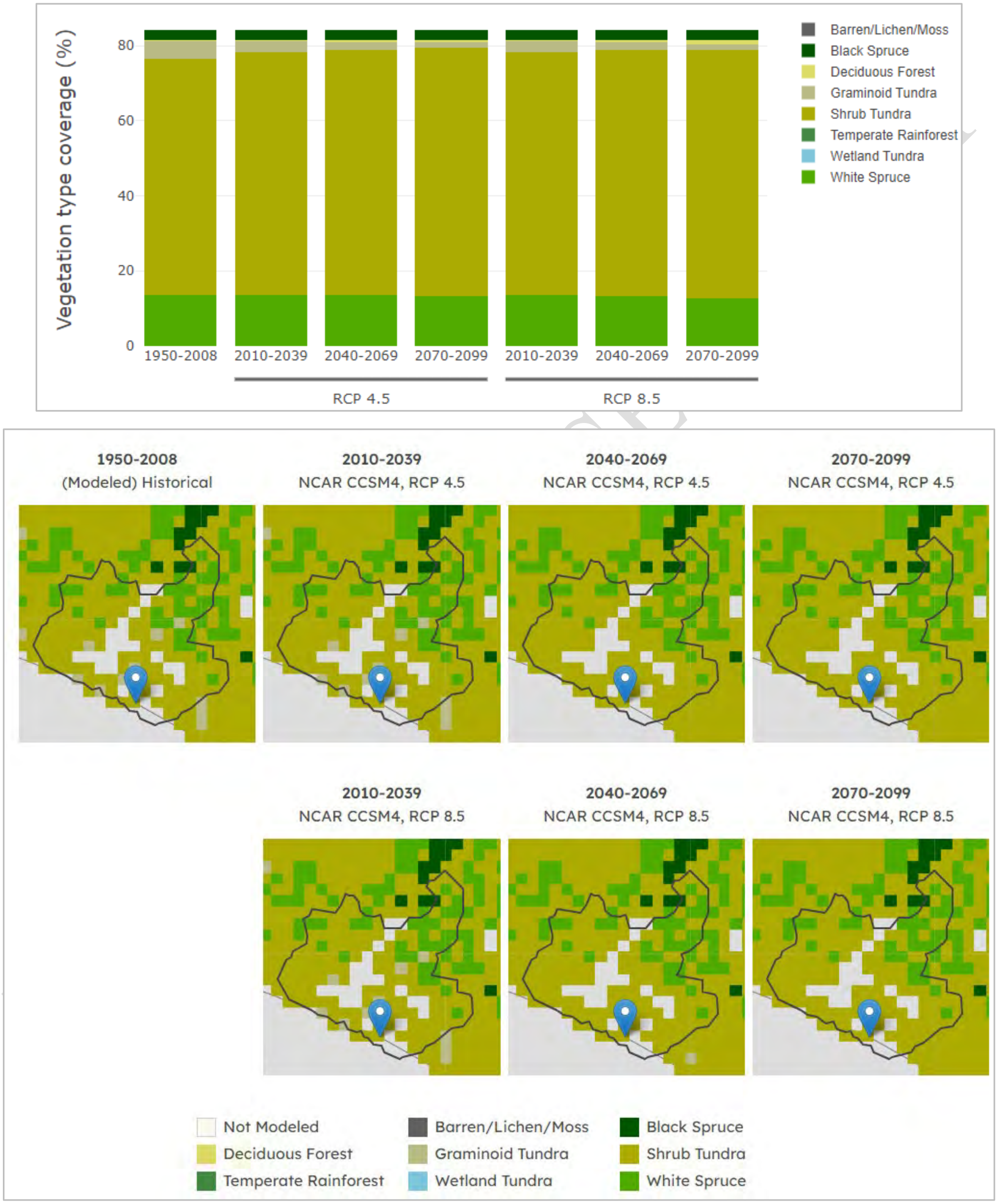
Due to climate change, the nature or location of future wildland fires in Nome, King Island, Council, and Solomon are not anticipated to change.

Changing Factor due to Climate Change	Description of Future Changes due to Climate Change
Extent (Magnitude/Severity)	Due to climate change, the extent (Magnitude/Severity) of wildland fires is expected to increase. As climate change alters the Arctic tundra landscape, more frequent and larger fires are predicted, with increased magnitude and severity.
Impact	Due to climate change, the impact of wildland fires to Nome, Solomon and Council is expected to increase. Anthropogenic climate change in the Arctic will increase tundra fires, with far-reaching ecological and socioeconomic implications (Hu et al. 2015). Additionally, a warmer, drier spring weather may increase fire risk and resulting impacts (UAF/SNAP).
Probability of Future Events	Historical observations and charcoal records from lake sediments reveal a wide range of fire regimes in Arctic tundra, with fire-return intervals varying from decades to millennia (Hu et al. 2015). Anthropogenic climate change in the Arctic will increase tundra fires, with far-reaching ecological and socioeconomic implications (Hu et al. 2015). Climate change within Alaska is likely to result in increased drought and longer fire seasons and shifts in vegetation will influence the intensity and frequency of fires (IPCC 2019). A warming climate is also projected to increase the frequency and size of wildfires, potentially changing the type and extent of wildlife habitat favorable for some important subsistence species (USGCRP 2018).

Figure 3-38, Figure 3-39, and Figure 3-40 shows historical and projected changes in vegetation in Nome, Council, and Solomon, respectively, from 1950 through year 2099 using the NCAR CCSM4 model, with the same data represented in the form of a map. This information was not available for King Island but based on the rocky terrain and lack of vegetation (fuel), it is anticipated that King Island has very low probability of future events.

Future projections (2010-2099) are shown under two different scenarios of differing Representative Concentration Pathways (RCP), which is the trajectory of greenhouse gas concentrations in the atmosphere. Compared to current emissions, RCP 4.5 is a scenario representing a reduction in global emissions, while RCP 8.5 represents a scenario similar to, or possibly higher than, current global emissions trajectories.

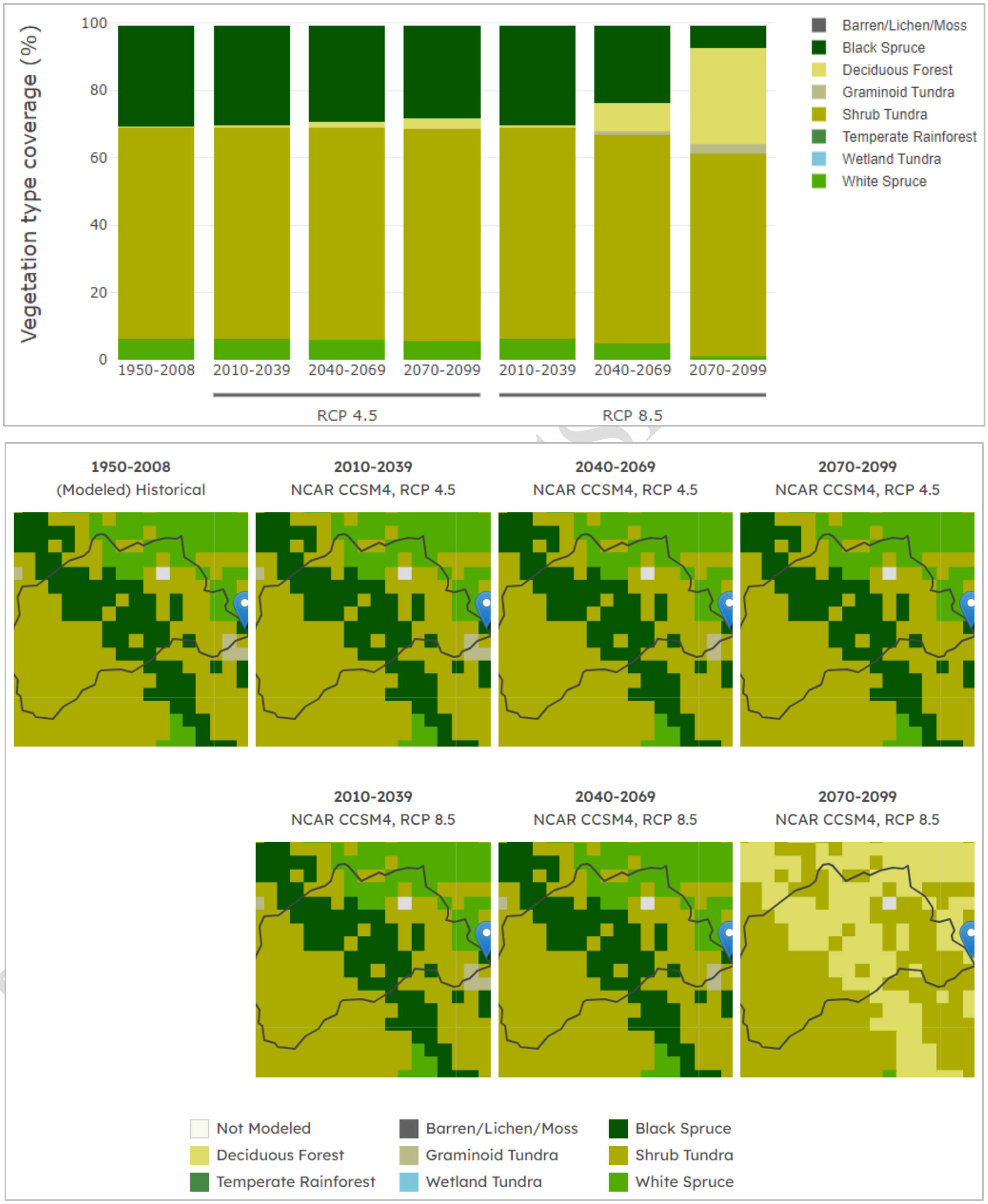
In Nome, the predominant vegetation type historically has been Shrub Tundra, followed by White Spruce, and lower concentrations of Graminoid Tundra, Deciduous Forest, and Black Spruce (UAF/SNAP 2024a-Northern Climate Reports). Under both emission scenarios, this model does not predict a significant change in coverage of Shrub Tundra or White Spruce in the future, but predicts slight changes in coverage of Graminoid Tundra, Deciduous Forest, and Black Spruce.



Source: UAF/SNAP 2024a- Northern Climate Reports

Figure 3-38 Projected Changes in Vegetation in Nome (1950-2099)

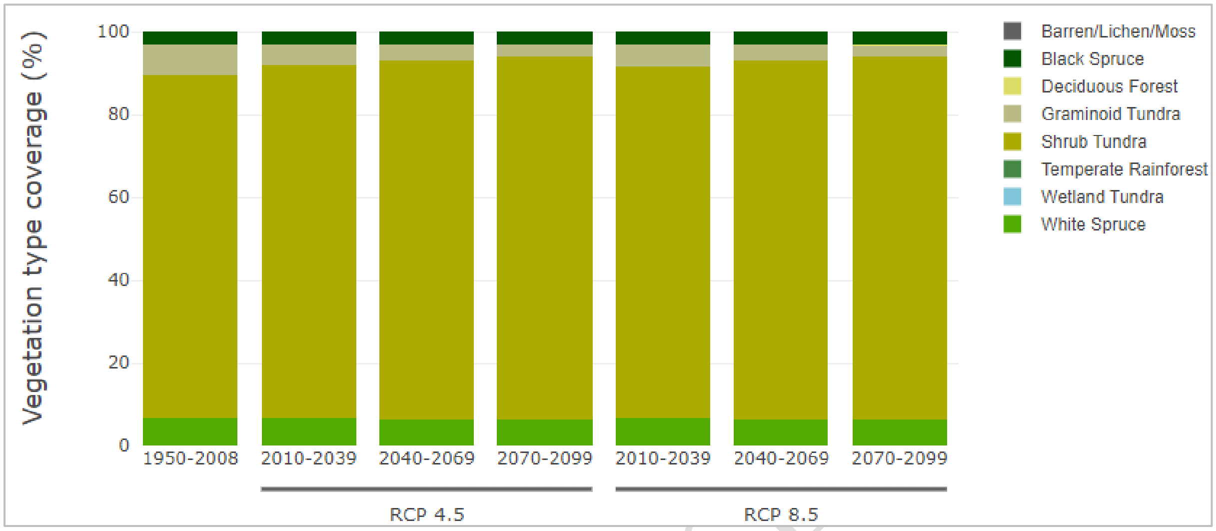
In Council, the predominant vegetation type historically has been Shrub Tundra, followed by Black Spruce, White Spruce, and a low concentration of Deciduous Forest (UAF/SNAP 2024a- Northern Climate Reports). Under the RCP 4.5 scenario, the model predicts a slight increase in Deciduous Forest by as early as 2040. Under the RCP 8.5 scenario, the model predicts a large increase in Deciduous Forest and decreases in Black Spruce by as early as 2040, with even higher concentration of Deciduous Forest and decreases in Black Spruce and Shrub Tundra by 2070.

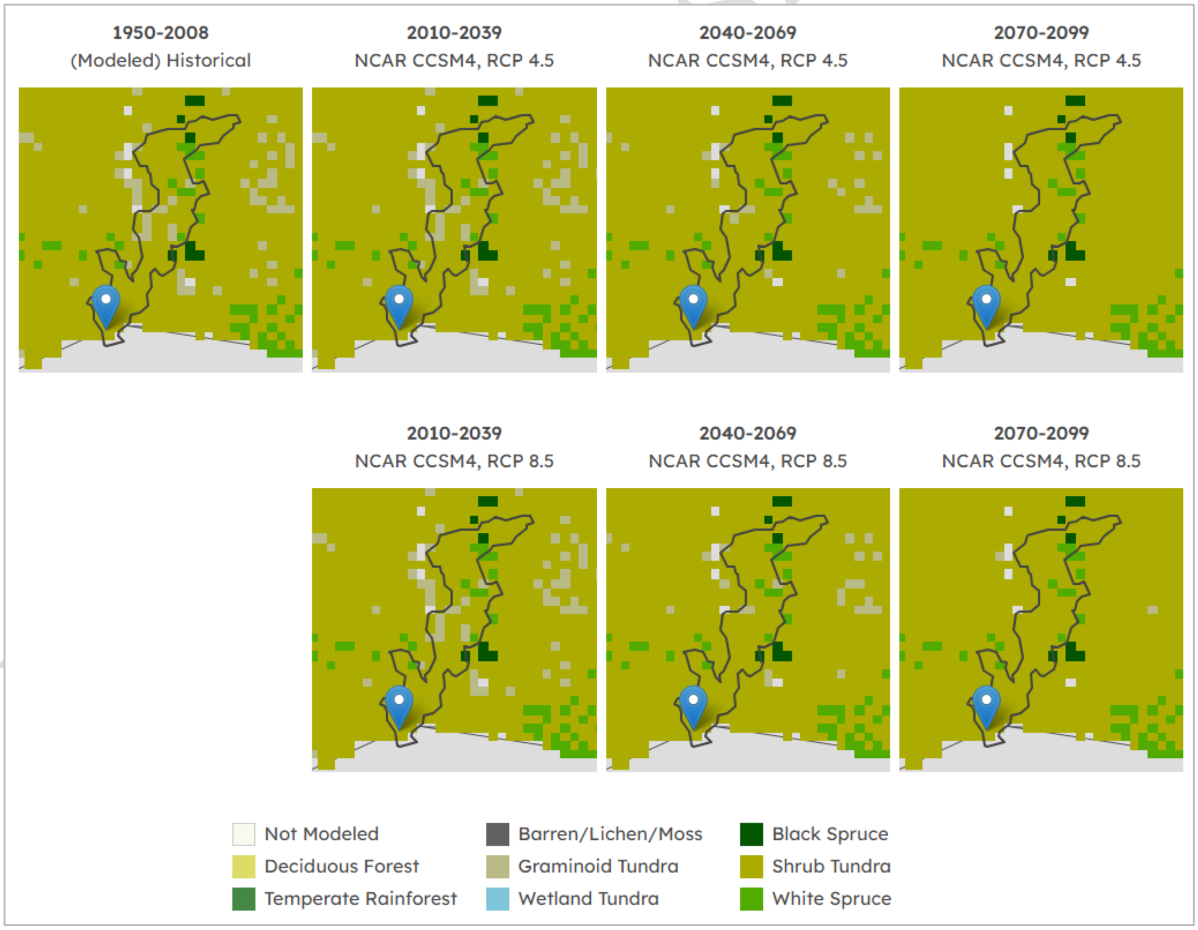


Source: UAF/SNAP 2024a- Northern Climate Reports

Figure 3-39 Projected Changes in Vegetation in Council (1950-2099)

In Solomon, the predominant vegetation type has historically been Shrub Tundra, followed by Graminoid Tundra, White Spruce, and lower concentrations of Black Spruce, and Deciduous Forest (UAF/SNAP 2024a- Northern Climate Reports). Under both emission scenarios, this model does not predict a significant change in coverage of Shrub Tundra, White Spruce, or Deciduous Forest in the future, but predicts slight changes in coverage of Graminoid Tundra and Black Spruce.





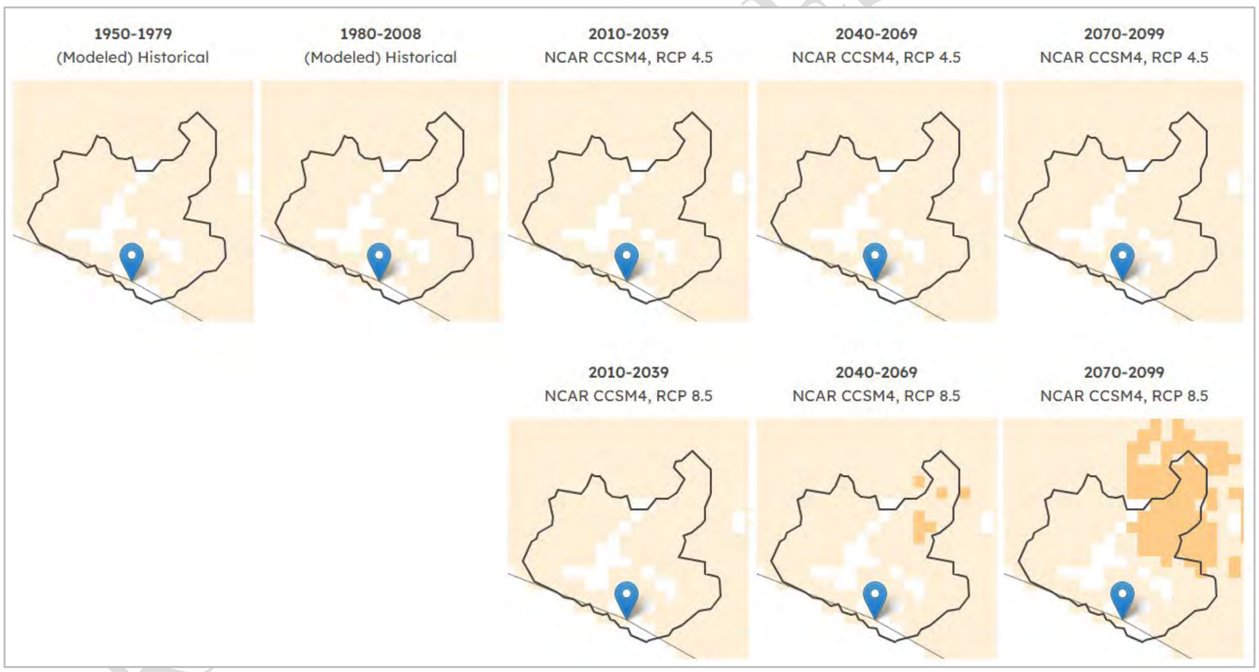
Source: UAF/SNAP 2024a- Northern Climate Reports

Figure 3-40 Projected Changes in Vegetation in Solomon (1950-2099)

Figure 3-41 depicts historical and future projections of the flammability in Nome, Council, and Solomon using the NCAR CCSM4 model. This model was not available for King Island.

Category	Flammability	Interpretation
Not modeled or no data	-	This pixel was not modeled or is not included in the dataset
Very Low	<0.2%	Fire is absent or very rare
Low	≥0.2%, <0.5%	Fire is rare, and unlikely to be the primary driver of vegetation patterns on this landscape
Moderate	≥0.5%, <1%	Fire is frequent enough to partially define the vegetation patterns on this landscape
High	≥1%, <2%	Fire is more frequent and more dominant in determining vegetation patterns on this landscape
Very High	≥2%	Fire is highly frequent and dominates the vegetation patterns on this landscape

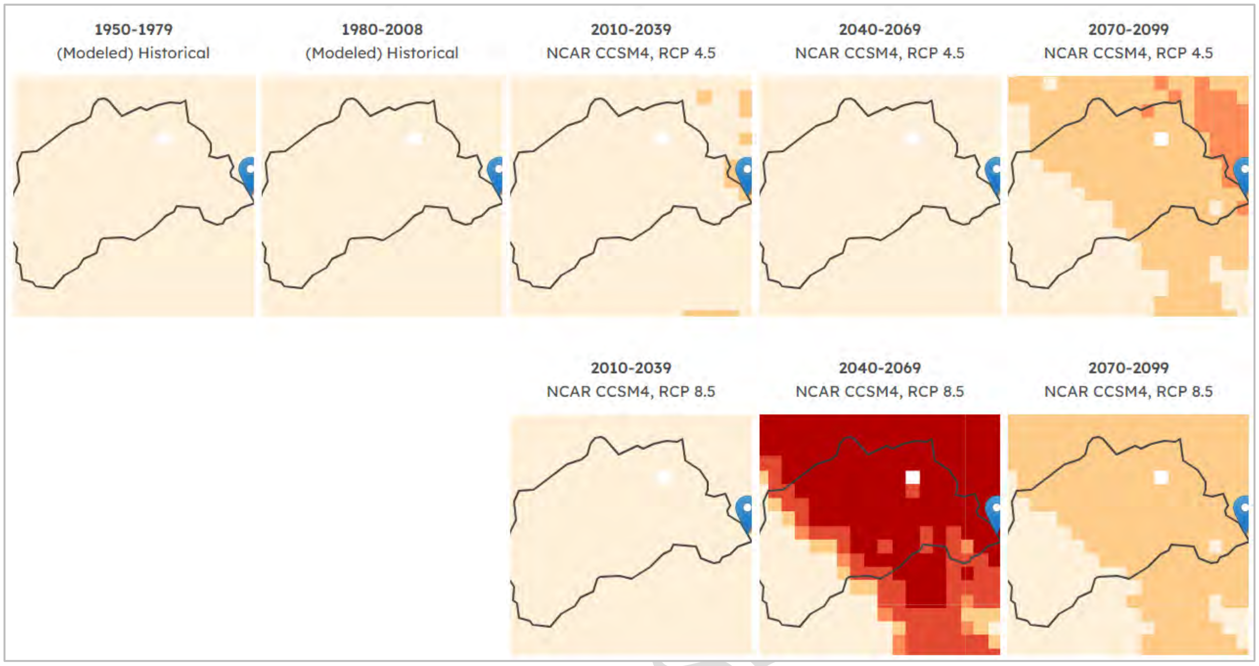
Nome has historically had Very Low flammability and future flammability is projected to stay about the (UAF/SNAP 2024a- Northern Climate Reports).



Source: UAF/SNAP 2024a- Northern Climate Reports

Figure 3-41 Historical and Projected Flammability Conditions in Nome (1950-2099)

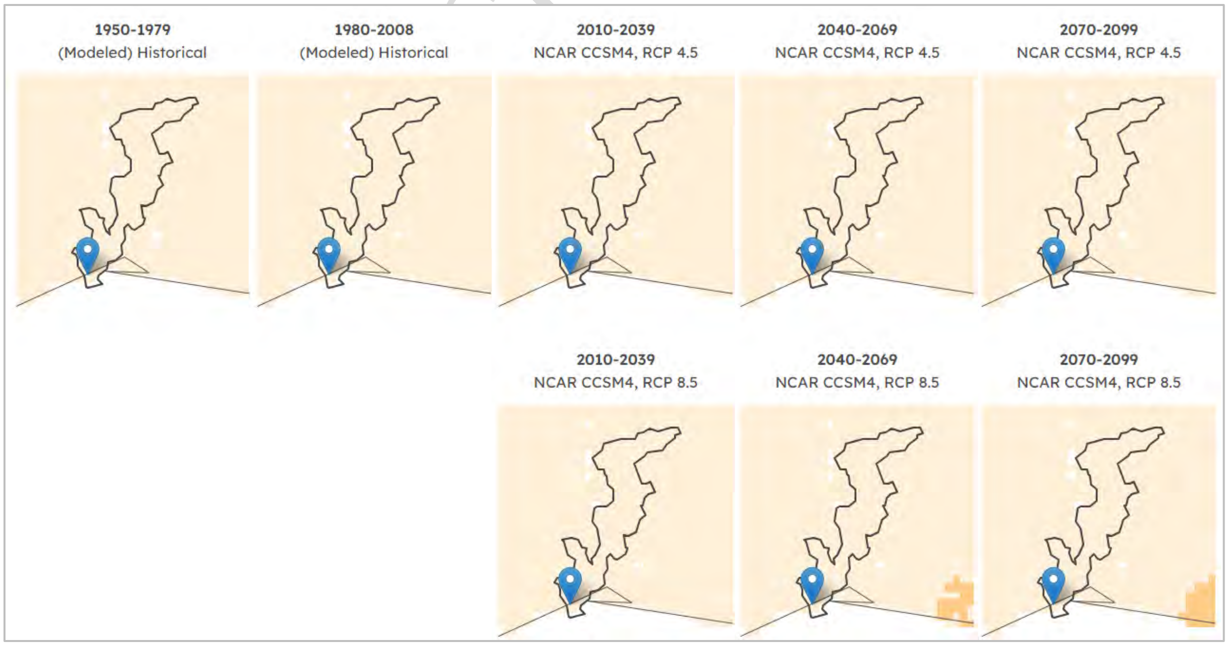
Council has historically had Very Low flammability. By mid-century, flammability may increase to High. By late century, flammability may increase to moderate compared to historical flammability (UAF/SNAP 2024a- Northern Climate Reports).



Source: UAF/SNAP 2024a- Northern Climate Reports

Figure 3-42 Historical and Projected Flammability Conditions in Council (1950-2099)

Solomon has historically had Very Low flammability and future flammability is projected to stay about the (UAF/SNAP 2024a- Northern Climate Reports).



Source: UAF/SNAP 2024a- Northern Climate Reports

Figure 3-43 Historical and Projected Flammability Conditions in Solomon (1950-2099)

3.3.4 CHANGES IN THE CRYOSPHERE

Hazard applicability: ☑Nome ☑King Island townsite ☑Council townsite ☑Solomon townsite.

Permafrost degradation and sea ice extent are applicable to Nome, King Island, and Solomon, while only permafrost degradation is applicable to Council.

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 3-44). The components of the cryosphere play an important role in climate. Snow and ice reflect heat from the sun, helping to regulate the Earth’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 change.

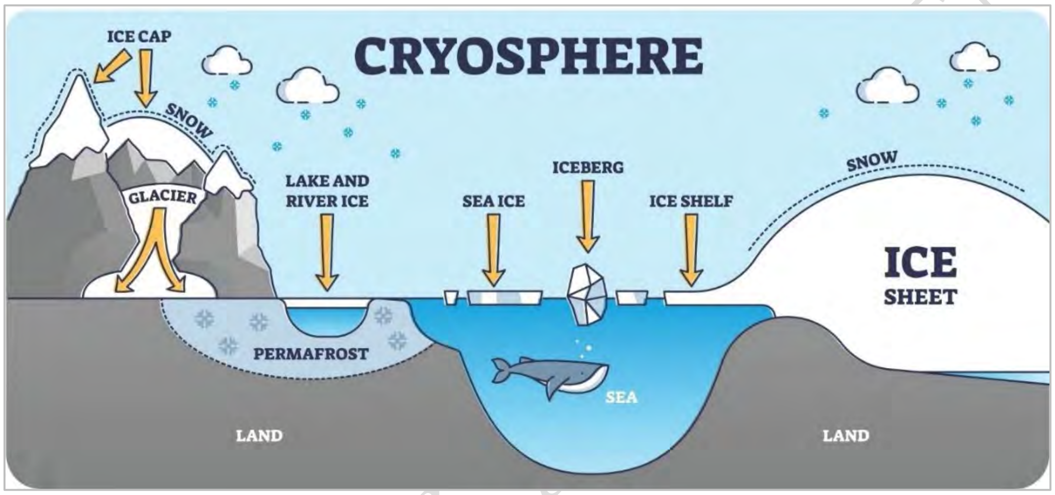


Figure 3-44 Components of the Cryosphere

Hazards of the cryosphere can be subdivided into four major groups: Glaciers, Permafrost, Sea Ice, and Snow Avalanche. Of these four major groups, permafrost degradation and sea ice extent pose a threat to the Nome Area Tribes. Permafrost degradation and sea ice extent are applicable to Nome, King Island, and Solomon, while only permafrost degradation is applicable to Council.

3.3.4.1 Permafrost Degradation

Nature

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.

Permafrost hazards are caused by the effects of changing perennially frozen soil, rock, or sediment (permafrost) and the landscape processes that result from extreme seasonal freezing and thawing.

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.

History

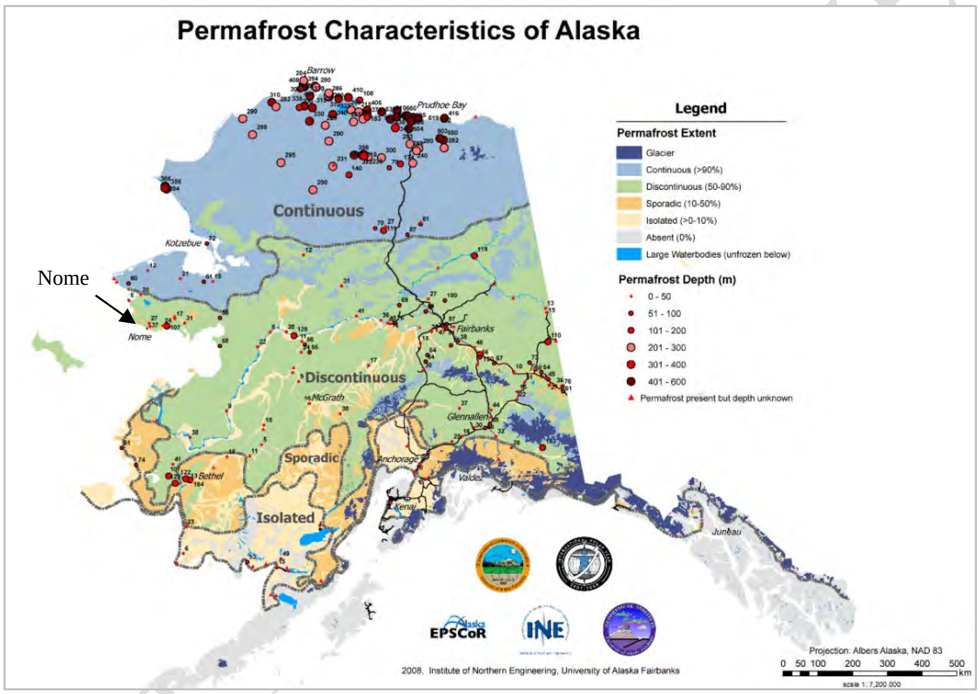
Permafrost underlying Nome has been thawing for several years with rapid thawing recorded in the past decades. Thawing permafrost has led to subsidence and sinkholes throughout the community.

Permafrost thaw is leading to subsidence in Council and Solomon as well, specifically the Solomon cemetery.

Location

Permafrost is found beneath nearly 85% of Alaska. 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 it becomes increasingly thinner and more discontinuous, broken by pockets of unfrozen ground known as taliks, until it becomes virtually absent in Southeast Alaska except for patches of high-elevation alpine permafrost.

According to Permafrost Characteristics Map of Alaska (Figure 3-45) developed for the National Snow and Ice Data Center/World Data Center for Glaciology, Nome, King Island, Council, and Solomon all have **discontinuous permafrost** (Jorgensen et al. 2008).

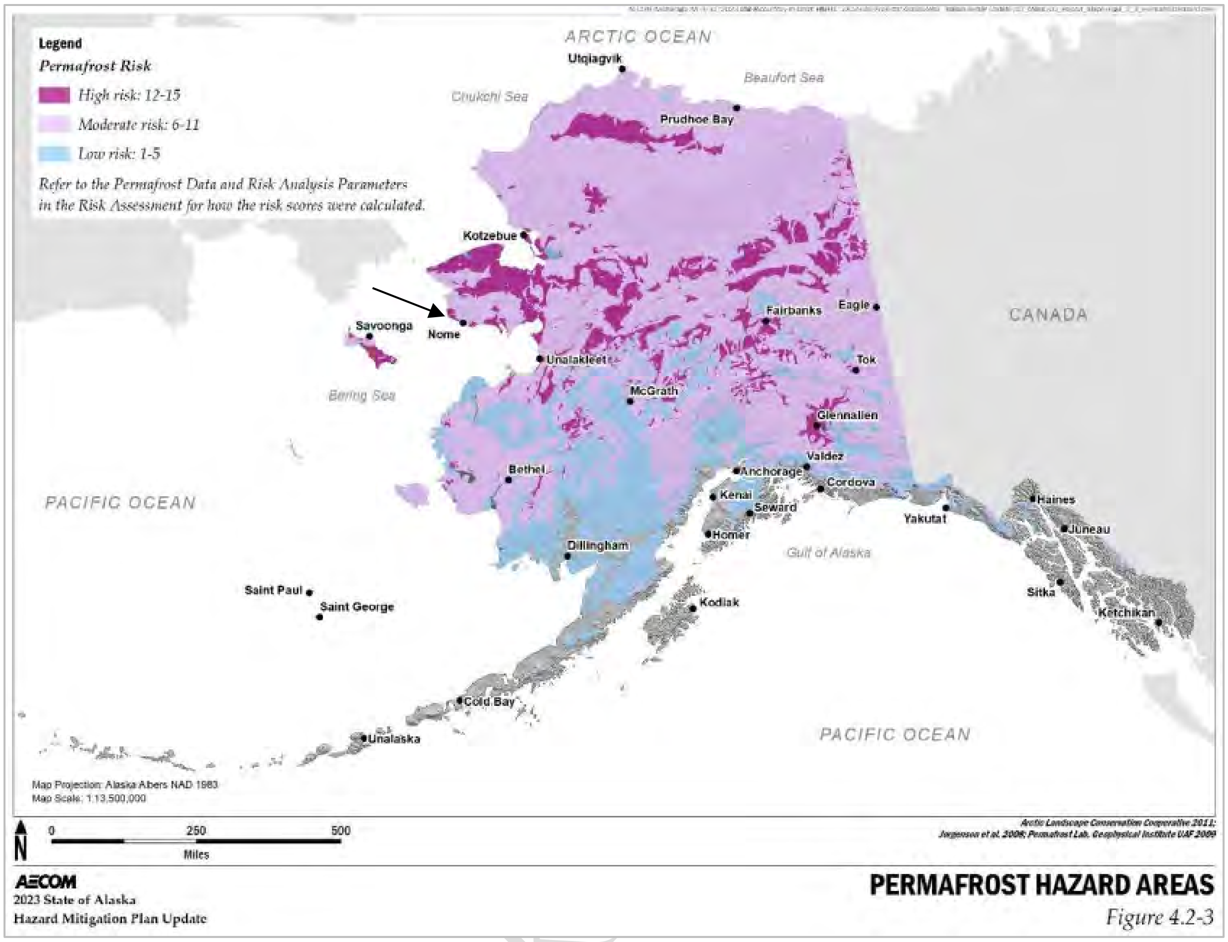


Source: Jorgenson et al. (2008)

Figure 3-45 Permafrost Characteristics of Alaska

The 2023 State of Alaska SHMP identifies statewide permafrost hazard areas (Figure 3-46). Nome, King Island, Council, and Solomon are all located in an area with **moderate to high permafrost risk**.

Subsidence due to permafrost thaw is evident in each community. Subsidence is occurring on their traditional subsistence areas and trails and throughout the community. Sinkholes are common and have to be repaired annually.



Source: DHS&EM 2023

Figure 3-46 Statewide Permafrost Hazard Areas

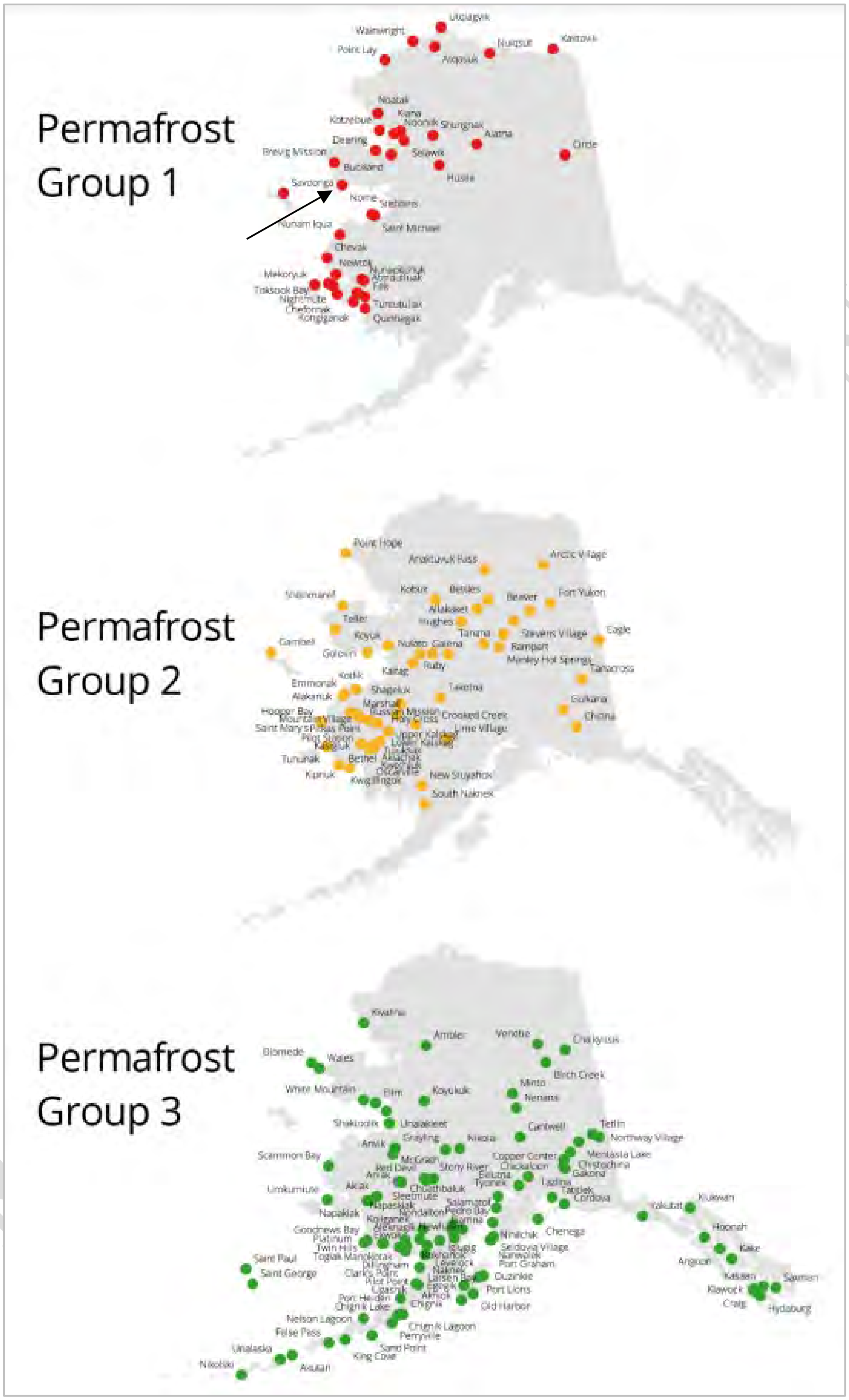
Extent (Magnitude/Severity)

The Denali Commission 2019 Statewide Threat Assessment provides statewide risk ratings for thawing permafrost (Figure 3-47). Nome is located in Group 1, which are the communities that are the most threatened by permafrost thaw. The report states that for Group 1 communities, the risk of damage due to thawing permafrost is high. Ice-rich permafrost is prevalent beneath the community. Thaw settlement is anticipated to be large. Damage to existing infrastructure as a result of thawing permafrost is likely known. The permafrost temperature may be above -2°C but risk of damage also may be extremely high even in the areas with cold permafrost if large near-surface bodies of ground ice (e.g., ice wedges) are affected or may be affected in the future by thermokarst and/or thermal erosion.

UAF/SNAP profiled permafrost characteristics and associated risks and hazards in rural Alaskan communities. The permafrost profile and risk level for Nome is outlined in Figure 3-48. This information was not available for King Island, Council, or Solomon but due to the proximity to Nome, likely has a similar risk level as Nome.

Nome is located in an area that has historically had **discontinuous permafrost**.

Based on past event history and the criteria identified in Table 3-2, the extent of permafrost hazards and resultant damages to people and infrastructure in Nome are considered Critical, where injuries and/or illnesses could result in permanent disability, a complete shutdown of critical facilities for at least two weeks, and more than 25% of property is severely damaged.



Source: Denali Commission 2019

Figure 3-47 Statewide Thawing Permafrost Threat Risk Map

Note: general confidence for this analysis is low due to no reports with ground-ice data or an existing HMP. Estimation is based on general information on surficial geology and permafrost occurrence and analysis of available imagery.
Source: UAF/SNAP 2024f- Community Permafrost Data

Figure 3-48 Nome Permafrost Profile/Risk

Impact

Impacts associated with permafrost degradation include surface subsidence, and infrastructure, building, and/or road damage. In developed areas, ground failure as a result of thawing permafrost can be due to improperly designed and constructed buildings, or buildings built on top of permafrost, and may impact buildings, communities, pipelines, airfields, roads, and bridges. This has the potential for extensive structure loss or costly repairs.

In Nome, King Island, Council, and Solomon, permafrost degradation is leading to subsidence and sinkholes throughout the community. The Planning Team shared that they are having to jack up homes that are shifting and are filling in sinkholes more frequently.

In Solomon, community members are concerned that thawing permafrost and erosion will lead to coffins being unearthed and exposed.

Source: 2017 Nome Tribal Climate Adaptation Plan

Figure 3-49 Solomon Cemetery

Probability of Future Events

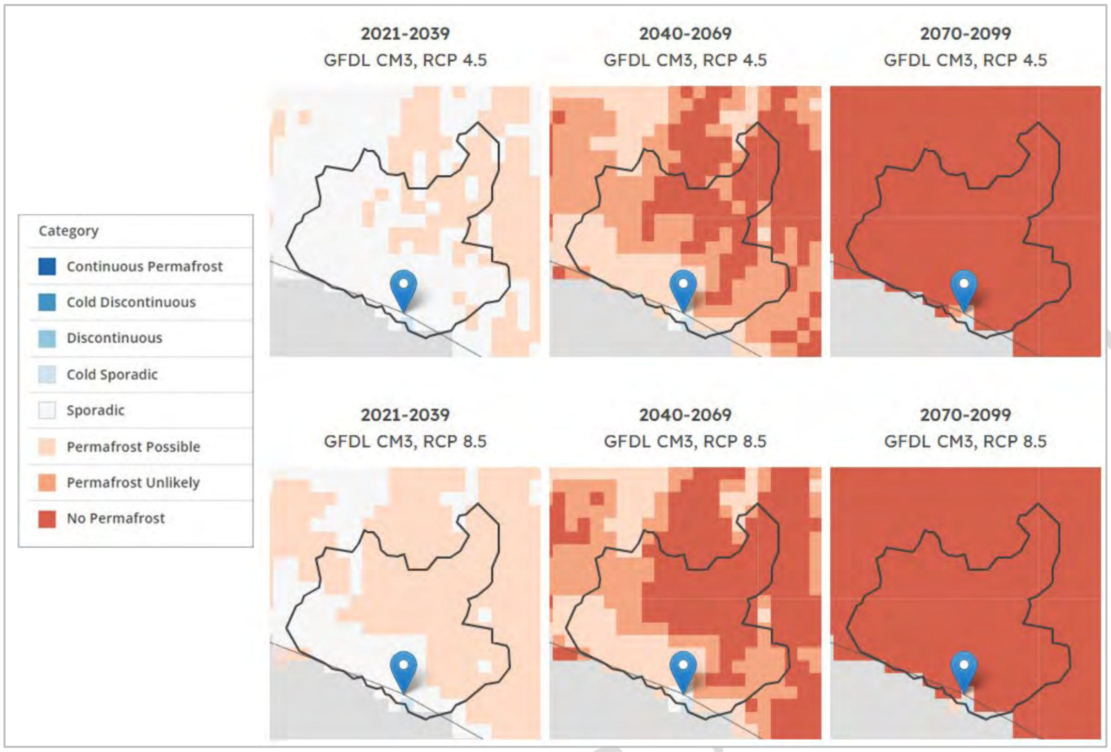
Climate models project that permafrost in Alaska will continue to thaw, and some models project that near-surface permafrost will be lost entirely from large parts of Alaska by the end of the century (USGCRP 2018).

See Figure 3-50 and Figure 3-51 for projections of future ground temperature and permafrost conditions in Nome and Council. This information was not available for King Island or Solomon.

Based on previous occurrences and the criteria identified in Table 3-3, it is Likely that Nome, King Island townsite, Council townsite, and Solomon townsite will experience a permafrost degradation hazard event in the next three years; there is a 1 in 3 years chance of occurring (1/3=33%); and the history of events is greater than 20% but less than or equal to 33% likely per year.

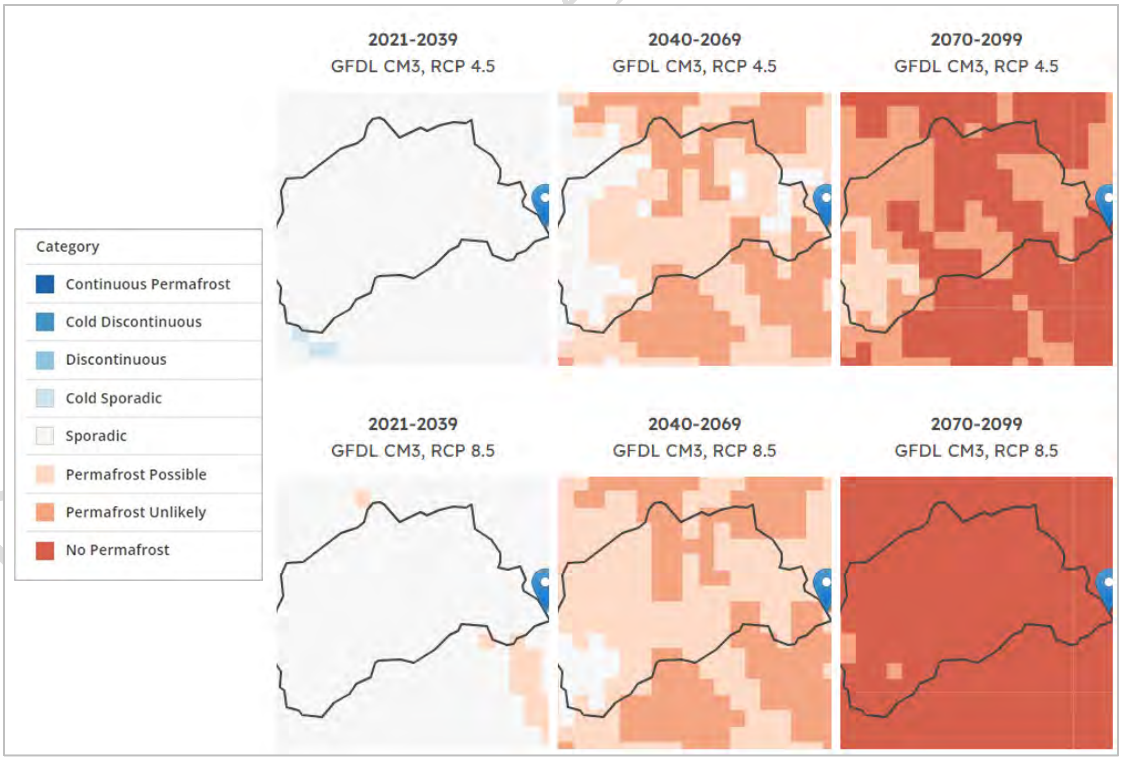
Future Conditions Including Climate Change

Permafrost Degradation	
Changing Factor	**Description of Changes Due to Climate Change**
Nature	Climate change is not anticipated to influence the nature of permafrost hazards in Alaska.
Location	Climate change will impact permafrost locations across Alaska, but the most drastic changes will be seen in the northern/Arctic regions of the state.
Extent	Climate models project that permafrost in Alaska will continue to thaw, and some models project that near-surface permafrost will be lost entirely from large parts of Alaska by the end of the century (USGCRP 2018).
Impact	Impacts associated with permafrost degradation include surface subsidence, infrastructure, building, and/or road damage. Subsidence can be a result of improperly designed and constructed buildings, or buildings built on top of permafrost, and may impact buildings, communities, pipelines, airfields, roads, and bridges. This has the potential for extensive structure loss or costly repairs. Additionally, in areas with permafrost degradation, the frequency and potential of rock falls or rock avalanches has increased (IPCC 2019). Landslides are projected to occur in areas where there is no history of previous events due to the destabilization of mountain slopes from thawing permafrost and glacial decline (IPCC 2019). In Nome, King Island, Council, and Solomon, thawing permafrost will continue to lead to subsidence throughout the community.
Probability of Future Events	Climate models project that permafrost in Alaska will continue to thaw, and some models project that near-surface permafrost will be lost entirely from large parts of Alaska by the end of the century (USGCRP 2018). Figure 3-50 shows projected average annual ground temperature at 3 ft depth in Nome under the GFDL CM3 climate model. Figure 3-51 shows projected average annual ground temperature at 3 ft depth in Council under the GFDL CM3 climate model. This model was not available for King Island or Solomon but based on their proximity to Nome and Council are expected to have similar conditions. Nome and Council have both historically had discontinuous permafrost. Due to climate change, the permafrost profile in Nome is expected to change, but projections of category type change based on climate scenario.



Source: UAF/SNAP 2024a- Northern Climate Reports

Figure 3-50 Mean Projected Annual Ground Temperature in Nome (2021-2100)



Source: UAF/SNAP 2024a- Northern Climate Reports

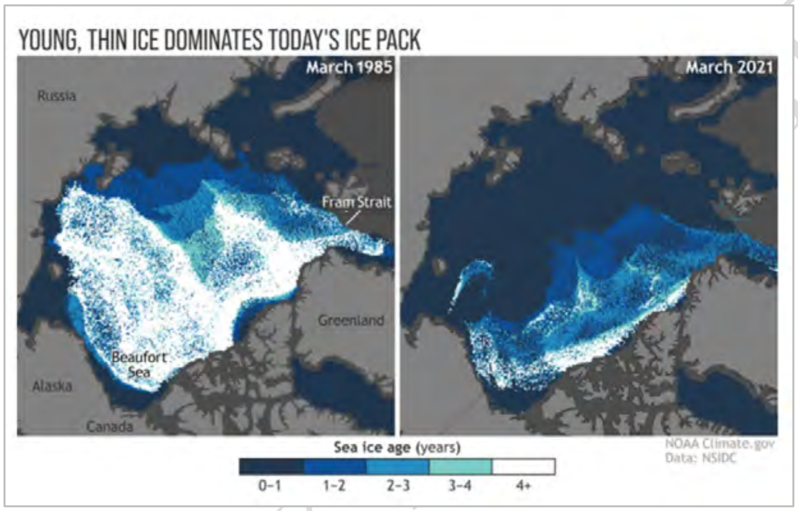
Figure 3-51 Mean Projected Annual Ground Temperature in Council (2021-2100)

3.3.4.2 Sea Ice Extent

Nature

Ice in the Arctic environment consists of shorefast "fast" ice and floating or "pack ice". Pack ice persists year-round in the Arctic, while fast ice forms each winter and melts during the short Arctic summer. All sea ice is dynamic and mobile, and subject to dispersal by winds and currents and open water may persist year-round.

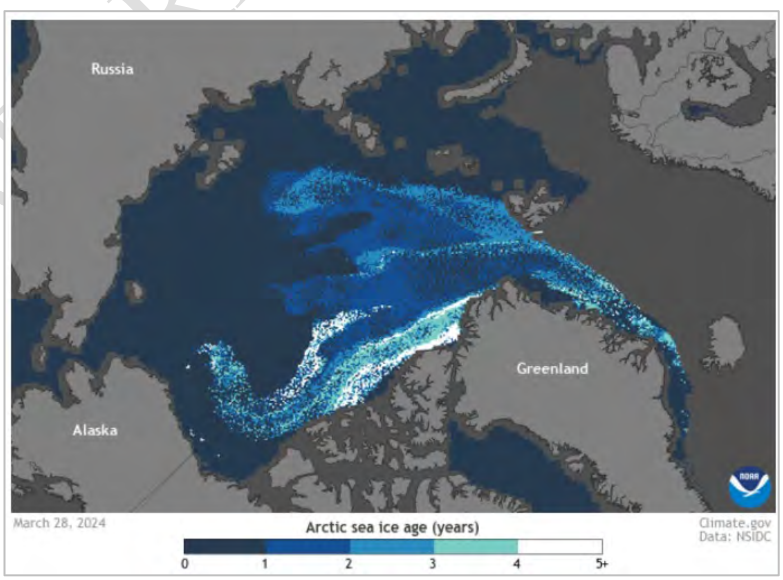
Sea ice can be described by its age, which is when the ice formed. First-year ice formed during the most recent winter and 2-year-old ice formed two winters ago, and so on. Ice thickness is strongly correlated with ice age. First year ice ranges from 4 to 12 inches thick, while multi-year ice ranges from 6 to 12 feet thick. This correlation means that older ice is typically thicker than younger ice.



Source: NOAA 2021

Figure 3-52 Age of Arctic Sea Ice in 1985 vs. 2021

Figure 3-53 shows the age of sea ice in the Arctic on March 28, 2024- note that the majority of ice is between 0-3 years old.

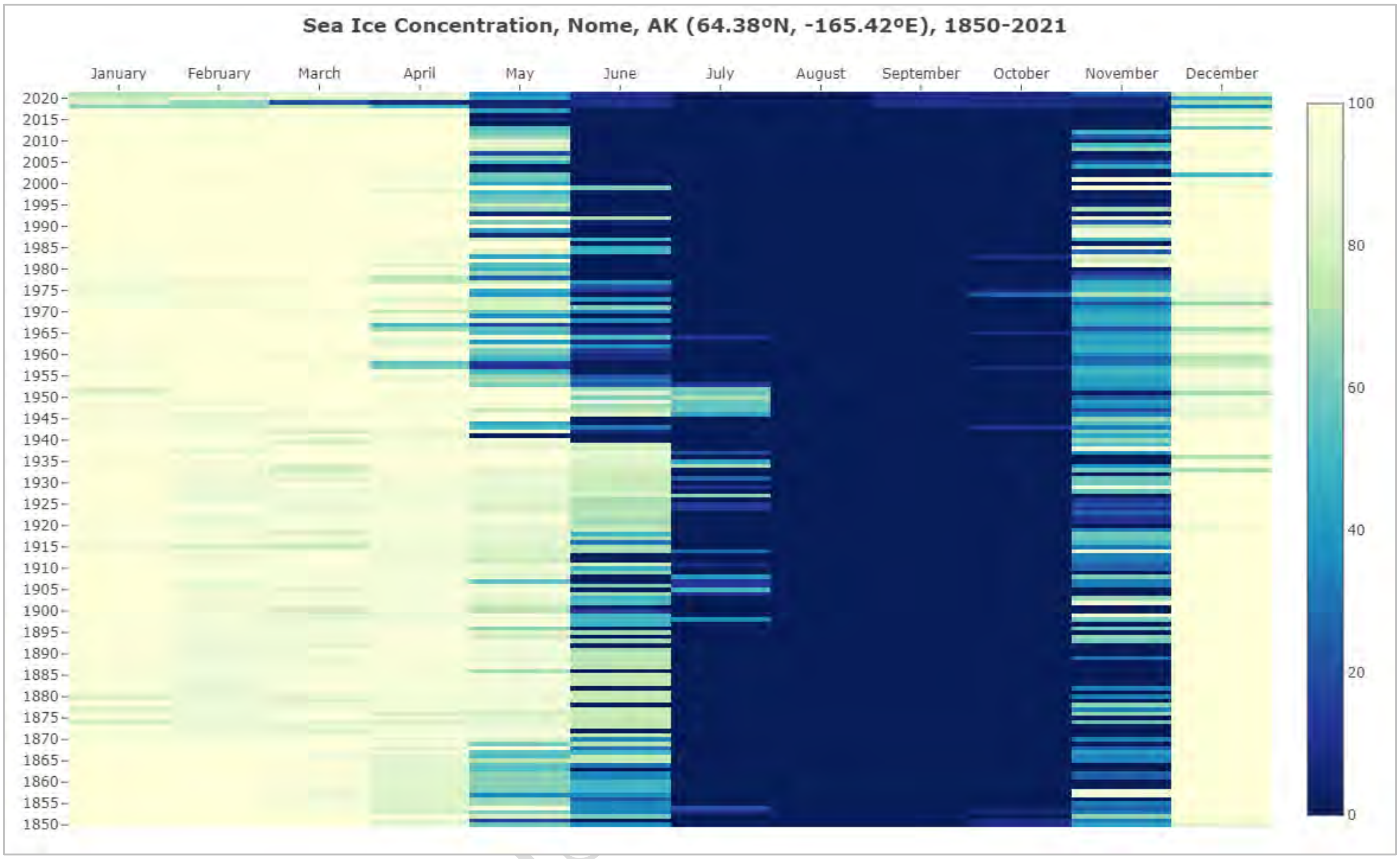


Source: NOAA 2023a

Figure 3-53 Age of Arctic Sea Ice on March 28, 2024

History

The historical sea ice extent in Nome from 1850-2021 is shown in Figure 3-54.



Note: Dark blue represents 0% ice, or open water. Light yellow represents 100% solid ice
Source: UAF/SNAP 2024- Historical Sea Ice Atlas

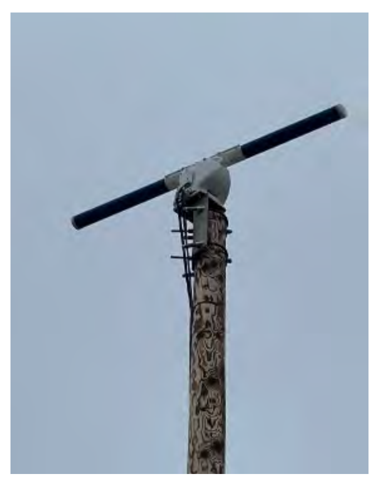
Figure 3-54 Historical Sea Ice Concentration in Nome (1850-2021)

Location

Nome, King Island, and Solomon are located either on an island or along the coast. The Bering Sea/Norton Sound experiences seasonal formations of shorefast ice in Nome. Norton Sound is typically ice free from June 1- October 1.

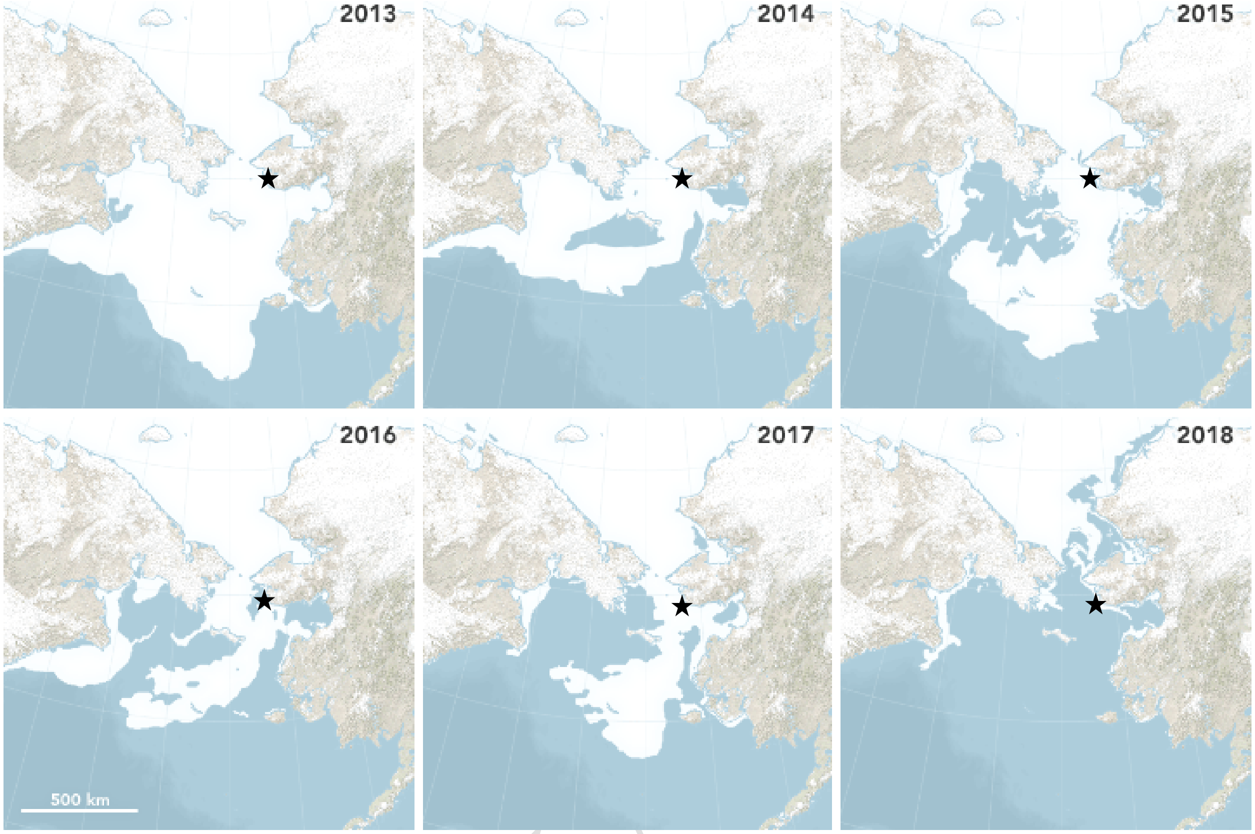
There is a sea ice radar and NOAA webcam at the Port of Nome that provides a visual impression of the sea-ice conditions off Nome. These images establish a longer-term record of key dates in the seasonal evolution of the sea-ice cover, such as: onset of fall ice formation, formation of a stable ice cover, onset of spring melt, appearance of melt ponds, beginning of ice break-up in early summer, removal or advection of sea ice during the summer months (UAF GI 2024).

The images from the radar are updated every 4 minutes on their website: https://seaice.alaska.edu/gi/observatories/nome_radar/.



Source: UAF GI 2024

Figure 3-55 Nome Sea Ice Radar

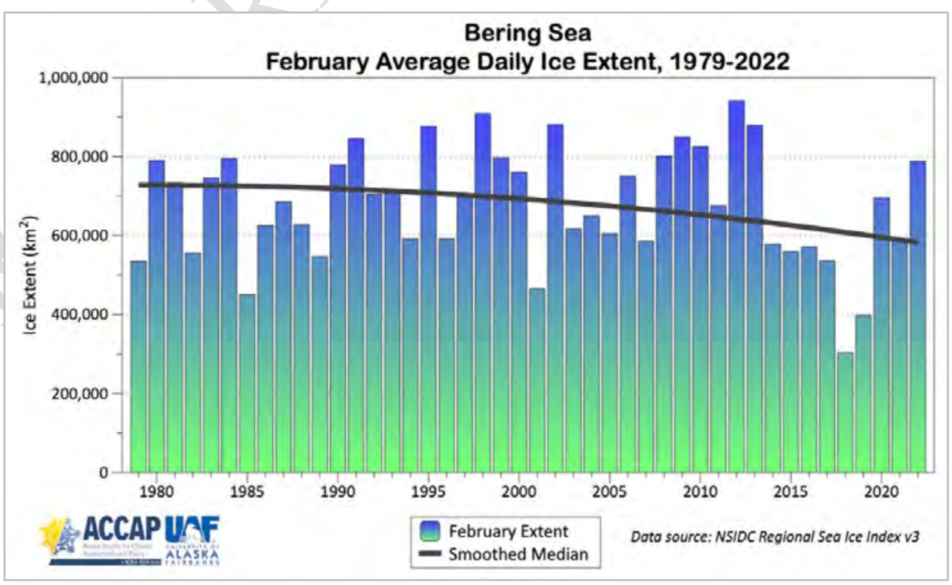


The graphic above shows the maximum ice extent in the Bering Sea during April from 2013-2018. Source: NASA 2019

Figure 3-56 Bering Sea Ice Extent 2013-2018

<u>Extent (Magnitude/Severity)</u>

Figure 3-57 shows the average daily sea ice extent in February in the Bering Sea from 1979-2022.



Source: ACCAP 2023

Figure 3-57 Bering Sea Average February Sea Ice Extent (1979-2022)

Regarding sea ice, Elders in Nome stated: (2017 Nome Tribal Climate Change Adaptation Plan)

"Growing up here, and seeing how it used to be, the ocean would be frozen solid by the end of October or early November. Now we are still seeing open water in mid- or late December these days. We used to have shore ice until May, end of May maybe, but now that first part of May comes around most of the ice is out."

"When I was little, the sea ice thickness and shore ice thickness used to be 5-6 feet thick. Now we are lucky if it gets 3 feet thick"

"It won't thicken in wintertime no more. That's what makes the ice go away faster [when the wind blows]. I used to see icebergs from glaciers that would float down, you don't see those more."

"We have more ice breakouts. We're afraid to go out over the sea."

Impact

Declining sea ice is impacting subsistence in Alaska. Changing sea ice patterns affect marine mammals and their access to hunters. The loss of sea ice creates dangerous conditions for hunting and limits hunting success for subsistence foods.

Another impact of declining sea ice is the increased presence of polar bears on land. In the winter, polar bears hunt seals that are hauled out on the sea ice. Polar bear presence is closely correlated to sea ice extent. If sea ice melts earlier in the season, then bears will come to shore sooner than has been observed historically.

Polar bear sightings are rare in Nome, but they have occurred and pose a serious threat to the community. Polar bears have been sighted in Wales and Diomede in 2024, with a fatal attack in Wales in January 2023.

Source: Nome Nugget 2005

Figure 3-58 Polar Bear on the Beach near Nome (June 16, 2005)

Probability of Future Events

As global temperatures rise, and the extent of sea ice decreases, the probability of sea ice hazards increases. Based on previous occurrences and the criteria identified in Table 3-3, it is Likely that Nome, King Island townsite, and Solomon townsite will experience a sea ice related hazard in the next three years; there is a 1 in 3 years chance of occurring (1/3=33%); and the history of events is greater than 20% but less than or equal to 33% likely per year.

Sea ice hazards do not pose a threat to Council townsite.

Future Conditions Including Climate Change

Sea Ice Extent	
Changing Factor	**Description of Changes Due to Climate Change**
Nature	Climate change, over time, could affect the nature and character of sea ice hazards, with a reduction of thick annual sea ice in the near-shore environment. Until that time, while sea ice is still thick enough to use as a transportation surface, there will be increased hazard of shifting and cracking (DHS&EM 2023).
Location	Sea ice hazards are associated near the shoreline, in locations where sea ice forms. Including the Bering Sea and Norton Sound.

Sea Ice Extent	
Changing Factor	**Description of Changes Due to Climate Change**
Extent	As global temperatures continue to rise, the extent of sea ice is projected to continue to decrease. This will increase the future magnitude and severity of sea ice hazards in the Nome, King Island, and Solomon areas.
Impact	Sea ice and climate are intimately linked. There are three timeframes to consider concerning the impacts of sea ice as climate changes (DHS&EM 2023): 1. Long-term concerns: Regulation of the global climate 2. Intermediate-term concerns: Coastal erosion 3. Immediate concerns: Transportation The Planning Team is concerned about future impacts to their homes, roads, and subsistence areas.
Probability of Future Events	As global temperatures continue to rise, the extent of sea ice is projected to continue to decrease.

3.3.5 RADON

Hazard applicability: ☑Nome ☑King Island townsite ☑Council townsite ☑Solomon townsite

Radon is a public health concern but is not anticipated to impact infrastructure.

3.3.5.1 Nature

Radon is a naturally occurring carcinogenic and radioactive gas and is one of the by-products of uranium. Uranium can be found in soil, water, and rocks such as granite, shale, phosphate, and pitchblende. Uranium decays to produce many by-products, the most familiar of which include radium, radon, and lead. Radon gas can be found throughout the world, and natural uranium and radium deposits are the most common source of airborne radon.

Radon is invisible to all human senses. The only way to detect radon presence is to test the air in the space you suspect its presence. Radon is measured by the level of radioactivity present, expressed as pico Curies per Liter of air (pCi/L). National averages of radon in homes are approximately 1.3 pCi/L, with outside averages measuring approximately 0.4 pCi/L. The U.S. Environmental Protection Agency has established a threshold for indoor radon levels at 4 pCi/L or greater as the presumed level it is economical to reduce radon gas. It should be noted that there is no safe exposure level for radon gas.

The University of Alaska-Fairbanks Cooperative Extension reports that four factors must be present for a building to allow radon to enter the indoor space. If one of the four factors is absent, radon gas is generally not a problem. These include:

1. Uranium content in bedrock or base soil must be present in sufficient levels to produce radon through natural decay.
2. Soil permeability must be at a level that permits rapid gas movement so radon can be transported from its origin to inside a building within 6 days (i.e., approximately two half-lives).
3. A building must have soil contact and entry points including holes, cracks, and intentional perforation to permit the transfer of radon gas into the structure (particularly a basement or crawlspace).

4. A building must have lower pressure than what is present in the soil (which permits gas to flow into the building).

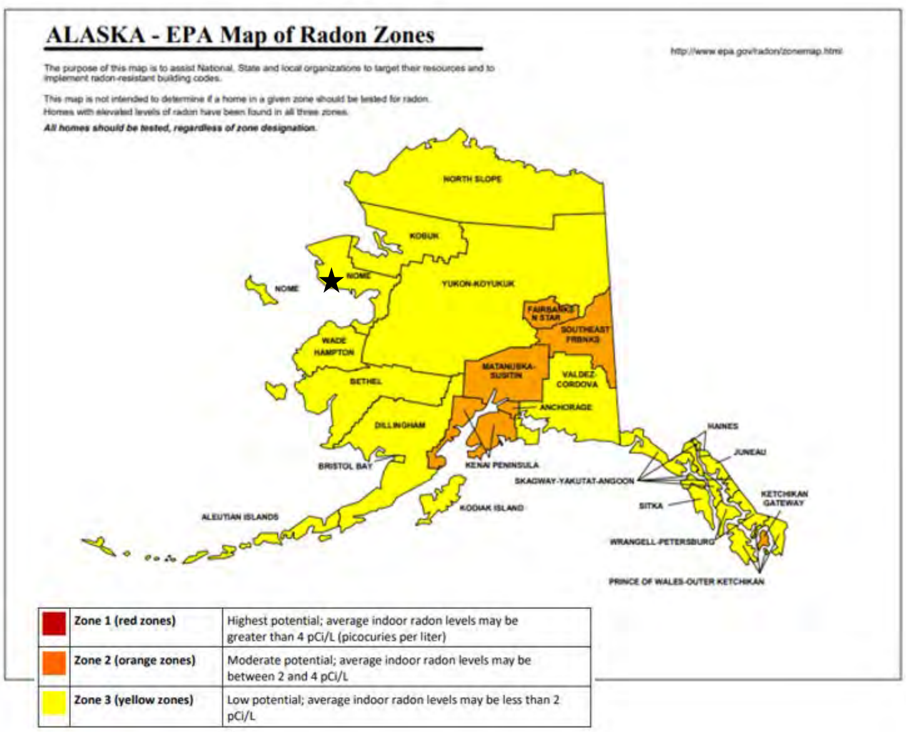
Radon gases enter buildings through sump pumps, floor drains, pores in hollow-block walls, mortar joints, and cracks in foundations, walls, and floors. Water sources can also contain radon, particularly well water. Public and private surface water sources do not typically have radon gas present.

3.3.5.2 History

Radon exposure is an ongoing issue for Nome, and Nome regularly tests for radon. Prior to the Nome High School renovation, there was an underground tunnel for students to travel through to avoid the winter weather when walking between buildings. This tunnel was regularly tested for radon and when levels were high, the tunnel was closed until radon levels were back to normal range. The high school has since undergone renovations and the tunnel is no longer in use.

3.3.5.3 Location

EPA and USGS have established three zones that identify areas nationwide that have the potential for elevated indoor radon levels. The zones were determined by combining indoor radon measurements, local geology, and population densities. The radon potential zones identify the likelihood of radon measurements within specific ranges when tests are completed. The entire Nome area is located in Zone 3, which is an area predicted to have an average radon level of less than 2 pCi/L (Figure 3-59).



Source: EPA 2024

Figure 3-59 Map of Alaska's Radon Zones

3.3.5.4 Extent (Magnitude/Severity)

Based on past event history, potential impacts, and the criteria identified in Table 3-2, the extent of uranium exposure and resultant damages to people and infrastructure in Nome, King Island, Council, and Solomon is considered Limited, with potential for critical facilities to be shut down for more than a week, and more than 10 % of property or critical infrastructure being severely damaged.

3.3.5.5 Impact

Radon does not cause structural damage; however, structural imperfections can allow radon to enter a building and pose serious chronic health risks and even death to inhabitants. Long-term radon exposure is the second leading cause of lung cancer in the U.S.

Historically, increased levels of radon have closed a school tunnel in Nome until levels are back to normal range.

3.3.5.6 Probability of Future Events

Although Nome is located in Radon Level Zone 3, it is important to note that radon levels exceeding 2 pCi/L could be found in isolated areas and the only way to determine exact levels is to test for radon within individual buildings.

As radon exposure is an ongoing issue for Nome, it is Highly Likely that Nome, King Island townsite, Council townsite, and Solomon townsite will be impacted by radon exposure within the calendar year; there is a 1 in 1 year chance of occurring (1/1=100%); and the history of events is greater than 33% likely per year.

Radon is a public health concern but is not anticipated to impact infrastructure.

3.3.5.7 Future Conditions Including Climate Change

Climate change is not anticipated to influence the nature of radon hazards in Nome.

Changing Factor Due to Climate Change	Description of Future Changes Due to Climate Change
Location	Permafrost acts as a radon barrier, reducing radiation to a tenth of the background level, and increasing it behind the barrier (Glover and Blouin 2022). This information suggests that sub-Arctic populations could be exposed to radon levels dangerous to health as a result of climate change thawing of permafrost, with implications for health provision, building codes, and ventilation advice (Glover and Blouin 2022). As permafrost thaws, higher levels of radon may be released and pose a greater threat to the community in areas where radon was not previously detected.
Extent (Magnitude/Severity)	Global temperatures are rising due to climate change, and thawing permafrost is resulting in greater leakage of radon gas into the atmosphere and into residential buildings (Akinyemiju et al. 2022; Stanley et al. 2019).
Impact	As radon exposure increases due to rising global temperatures and melting permafrost, the impact of radon exposure will increase. As global temperatures rise and summers are getting hotter, people are opting to stay indoors and running air conditioners longer and more frequently to avoid the heat. This increased usage of air conditioners and fans decreases air exchange rates in tightly sealed homes, which increases radon concentrations on upper floors of homes (Akinyemiju et al. 2022).
Probability	Radon exposure is projected to increase due to the effects of climate change on melting permafrost (Akinyemiju et al. 2022; Stanley et al. 2019).

3.3.6 FLOOD

Hazard applicability: ☑Nome (coastal and riverine) ☑Council townsite (riverine only) ☑Solomon townsite (coastal and riverine)

For this HMP, it is assumed that King Island is not impacted by coastal flooding. There are no historical records available that discuss flooding impacting the island and the Planning Team is unsure if flooding is a current hazard as the townsite is abandoned. The stilt houses on the Island are on top of a rocky cliff above the Bering Sea (see the cover photo).

3.3.6.1 Nature

Flooding is the accumulation of water in areas that typically do not hold water, or it can result from surplus water from streams, rivers, lakes, reservoirs, glaciers, or coastal water bodies overflowing onto the surrounding floodplains. Floodplains are the adjacent low-lying grounds adjacent to water bodies, formed mainly of sediment deposits from past flooding events.

There are three primary types of flooding that can occur in the communities: rainfall-runoff, snowmelt, and storm surge.

Rainfall-Runoff Flooding: The most common type of flood, rainfall runoff magnitude is determined by rainfall intensity, duration, distribution, and geomorphic characteristics of the watershed. Weather systems that bring strong persistent rainfall differentiate rainfall runoff from the other categories of flooding. Rainfall runoff flooding is more likely to occur in late summer to early fall.

Snowmelt Floods: Spring weather patterns and snowpack depths determine the immensity of this flooding occurrence. Snowmelt takes place in the spring, usually between the months of April through June.

Storm Surges: Storm surges are a coastal flood that occurs when the sea travels inland past the high-tide level, often accompanied by high winds, increasing the destructive force of the water. Storm surge is a significant cause of property damage in Alaska.

Conditions that have a high possibility of resulting in flooding in coastal areas include low atmospheric pressure, strong winds (blowing directly onshore or along the shore with the shoreline to the right of the direction of the flow), and consistent winds persisting from a consistent direction over a long distance across the open ocean (fetch).

Communities that are most susceptible to coastal flooding typically have gradually sloping bathymetry near the shore and exposure to strong winds with a long fetch over the water. Communities and villages along the west coast areas of Alaska, particularly the northwest Arctic Coast, have experienced significant damage from coastal floods. These locations will usually experience coastal flooding during the late summer or early fall. There is a decreased potential for ground failure as shore-fast ice (ice that is "fastened" to the coastline) forms along the coast before winter, but later freeze-ups and earlier fall/winter storms increase the potential of erosion, storm surge flooding and ice override events.

3.3.6.2 History

Nome and Solomon are coastal communities and experience seasonal Bering Sea/ Norton Sound coastal flooding. Council is an upriver community, so they do not experience coastal flooding, but do experience riverine flooding. The history of flooding at the King Island townsite is unknown.

The USACE completed an erosion assessment for Nome during their 2009 Alaska Baseline Erosion Assessment. The Erosion Information Paper dated January 7, 2008, states:

> *"During the recent coastal storms, portions of roads were closed to vehicle traffic resulting in stranded homes and property stressing Nome residents."* (USACE 2008a)

The top 10 storm surge events from 1954-2004 are listed below, in order of maximum surge level.

Table 3-11 Top 10 Storm Surge Events in Nome from 1954-2004

Rank	Starting Date	Maximum Surge (ft)	Minimum Surface Pressure (mb)	Maximum Wind	
				Speed (mph)	Direction
1	11/10/74	9.38	969	48	S
2	10/15/04	8.17	974	45	ESE
3	10/01/04	8.10	973	48	SW
4	11/8/78	7.28	994	40	S
5	10/25/96	7.05	1000	36	SSE
6	11/6/85	6.63	990	37	S
7	14/11/66	6.33	994	53	SSE
8	10/1/55	6.30	969	41	SW
9	11/26/70	6.20	995	43	SW
10	11/12/96	5.94	1002	38	SSE

Source: Chapman et al. (2009)

The National Weather Service's Storm Events Database provides details of historic flood events (January 1996 - November 2023) and their impacts to Nome, Solomon, and Council (Table 3-12). No data was provided for King Island.

Table 3-12 Historic Flood Events in Nome and Council

Date	Event Type	Description/Magnitude of Event
10/28/1996	Storm Surge/ Tide	The remains of typhoon Carlo deepened as it moved north over the western Bering Sea and Far East Russia. The warm front moved over the west coast of Alaska Sunday 27th, and the cold front and Tuesday 29th. Between the two a long fetch of 50-60 kt winds covered the Bering Sea. No damage at Nome.
8/14/1998	Flood	Heavy rain Friday morning and afternoon, preceded by 3 days of rain over the area, caused several rivers on the Seward Peninsula to rise and threaten villages. Minor flooding was reported at Council, on the Niukluk River, and also at Solomon on the north coast of Norton Sound. Rainfall at Nome from the 11th through 14th was 3.34 inches, a one in ten-year event.
8/20/1998	Storm Surge/ Tide	A strong Storm moved north over the Bering Sea resulting in moderate winds across the west coast, and heavy surf on the coast of the Seward Peninsula. No damage occurred at Nome.
5/21/2002	Flood	Record high temperatures over the Seward Peninsula increased snowmelt rapidly causing the flooding of the Snake River which ran over the Kougarok Road in many places. Small streams over the western Seward Peninsula also flooded portions of the Taylor Highway and the Council Highway (all gravel roads). The damage amount is the total for both zones.
11/21/2003	Storm Surge/ Tide	A 984 mb low pressure center in the north Bering Sea on the morning of the 20th deepened to 975 mb near the Bering Strait on the morning of the 21st and continued to move northeast, weakening to 990 mb near Kotzebue on the morning of the 22nd. The frontal system associated with the storm moved over the west coast of Alaska on the 20th, producing blizzard conditions over portions of the northwest coast as well as strong winds through the central Alaska Range. As the low center intensified and moved over the west coast, blizzard conditions again visited the coastal areas, along with high winds. Heavy snow occurred over portions of the interior of Alaska as the frontal system moved through on the 21st and 22nd.

Date	Event Type	Description/Magnitude of Event
		The road to the village of Council was eroded in places. Snow fences (retards drifting snow near the city) were damaged in places. Damage total is $100,000 for these two items.
8/7/2005	High Surf	Southwest winds around 20 knots or 25 mph added to a swell which created high surf in Norton Sound. Some erosion occurred on the road between Nome and Council, between mile 21 and 23; road was still passable to heavy trucks. Property damage amount to the road is unknown.
9/22/2005	Storm Surge/ Tide	A low-pressure center moved north over the eastern Bering Sea on the 22nd reaching the western Seward Peninsula early on the 23rd and deepening to 966 mb. The storm produced elevated sea levels which added to a pre-existing elevated level (about 2 feet) from a weaker storm a day earlier. The total storm surge was around 9 feet as recorded at Nome. Nome ASOS had gusts to 57 mph. Damages in Nome include phone lines down near radio station KICY transmitter. Water reported into several homes in low lying areas like Belmont Street with about one foot of water above the floor of the homes. Basements in a couple of businesses on Front Street were being pumped out at the same rate they were being flooded. The new Harbor Entrance had sand eroded away and nearly exposed the utility sewer line, which had been buried to connect town with the water treatment plant. Seven power poles knocked down on mile 3 of the Nome-Council Road. School was cancelled on Friday the 23rd. Wind blew sidling off some homes, also the siding off one face of radio station KNOM building. Minor roof damage to many homes and businesses, including NWS housing. Minor flooding on road to airport. Golovin: Water covered roadway to a depth of 3 feet. Fuel tanks were floating around. Lower half of town was under several feet of water. Damage amounts include the portion of $100,000 of Individual Assistance to the Bering Strait Regional Education Attendance Area (Schools); Public Assistance Costs of $56,848 to the City of Nome, $53,000 to Nome Joint Utilities.
9/11/2007	Coastal Flood	A 970 mb low in the central Bering Sea was stationary on the 11th and 12th and produced tides about 3 feet above normal and southeast winds to 30 mph with waves 6 to 8 feet over Norton Sound. The State of Alaska Department of Transportation reported that Mile 22 on the road from Nome to Council was washed out, with water overflowing at mile 23 and 24. The DOT reported the cost to repair the road at $12,063.50.
5/4/2009	Flood	An above-average snowpack and extra warm temperatures in early May created overflow of water out of the Nome River covering the Kougarok Road at mile 14 on May 4th and 5th.
5/20/2009	Flood	Overflow on the Tisuk River created washouts on the Nome-Teller Highway at mile 25 and 48 on or about May 20th. The Kougarok Road at mile 38 also received a washout during the same period of time. Estimated Road Damages are $8,000.
10/11/2009	Coastal Flood	A 962 mb low tracked north across the eastern Bering Sea on October 10-11, 2009, and into the Gulf of Anadyr on the evening of the 11th. The storm brought a storm surge along the southern coast of the Seward Peninsula on the morning of the 11th, and tides were approximately 5 1/2 feet above mean sea level at Nome. The storm surge produced flooding along the Nome-Council Road around the time of high tide on the morning of the 11th.
11/11/2009	Coastal Flood	A 980 mb low near Saint Lawrence Island at 9 pm on the 10th deepened rapidly to 955 mb near Nome by 9 am on the 11th. The low then tracked across the Seward Peninsula and slowly weakened to 982 mb near Selawik by 3 pm on the 12th. Strong west winds in the wake of the low caused the water levels to rise 8 to 10 feet across the eastern Norton Sound. No damages were reported in Nome.
11/9/2011	Coastal Flood	A 960 mb low over the southern Aleutians at 0300AKST on the 8th intensified to 945 mb near the Gulf of Anadyr by 2100AKST on the 8th. The low crossed the Chukotsk Peninsula as a 956 mb low at 0900AKST on the 9th, and moved into the southern Chukchi Sea as a 958 mb low by 2100AKST on the 9th. The low then tracked to the northwest and weakened to 975 mb about 150 miles north of Wrangel Island by 1500AKST on the 10th. The storm was one of the strongest storms to impact the west coast of Alaska since November 1974. Coastal flooding was observed at Nome and Golovin, and likely occurred in many uninhabited areas along the southern Seward Peninsula Coast. The coastal flooding at Nome began around 2300AKST on the 8th and continued through 01000AKST on the 10th. The water reached its highest peak at 1624AKST on the 9th, and the Nome Tide gage observed a maximum height of 8.73 feet above the

Date	Event Type	Description/Magnitude of Event
		normal mean low water level. The water levels at Nome peaked about 2 feet lower than during a major Bering Sea storm in November 1974. Low lying areas in Nome such as River Street, F Street and Belmont Point flooded. Dry Creek was wet and looked like a lake all the way to Chicken Hill. Waves crashed over the Nome seawall armor rock on East Front Street and deposited rocks, driftwood, and other debris on the road. Water running into wet wells at the Sewer and water treatment plant overwhelmed the pumps, causing 165,000 gallons of raw wastewater flow into the emergency discharge to the small boat harbor. Some businesses on Front Street had water in their basements, but flooding in the main business district was minor. The Cape Nome Jetty sustained $500,000 worth of damage and another $80,000 is attributed to damages due to wave action and erosion, according to the City of Nome. Portions of the Nome-Council road suffered significant damage, especially beyond mile 25 where large portions of the road were either washed out or covered in a significant amount of debris. It is estimated that the damages to the road alone were approximately 24 million dollars. The storm caused schools in Nome to close early on the 8th and they were shut on the 9th. Many in Nome compared the storm to the storms of November 1974 and October 2004.
8/15/2012	Flood	A trough of low pressure began to develop in the southern Chukchi Sea on August 11, 2012. The trough developed into a closed low aloft near Wrangel Island by the 14th, and the low continued to wobble around in the Chukchi Sea through the 20th. The low produced a long fetch of moist southwest flow aloft and combined with several surface lows and frontal boundaries to transport copious moisture into parts of the western Brooks Range, Chukchi Sea coast, and parts of the Seward Peninsula. Nome, which is along the southern Seward Peninsula, had a weeklong total of 3.74 inches. A runway closure at Nome was compounded by the heavy rainfall, and caused seven Alaska Airlines flights to be cancelled and there were no cargo flights all week.
10/4/2012	Coastal Flood	A strong 972 mb low 300 miles southwest of Nome produced a long fetch of strong winds and waves to the Seward Peninsula from Cape Darby to Cape Rodney on Oct 4th. This raised sea levels 4 to 5 feet above normal and caused minor flooding to some unprotected roads. NWS Staff at Nome reported minor flooding at Belmont Point and some spray at the dock. No damage reported.
11/9/2013	Coastal Flood	A large and persistent area of high pressure which developed over the North Pacific forced the jet stream northward, which directed a series of very strong low-pressure systems into the Bering Sea from the 6th through the 14th of November. This weather pattern transported moisture and energy from the subtropics to the Bering Sea, which strengthened several storms. The storm on the 6th and 7th did not raise storm surge values in the Bering and Chukchi seas to critical levels for coastal flooding. Nonetheless, as the first storm moved across the Chukotsk Peninsula and the associated weather front moved into the western interior, a long fetch of south to southwesterly winds developed across the Bering and Chukchi seas, including Norton Sound. This wind direction pushed water into the west coast and increased surge values, which later contributed to the coastal flooding associated with the second storm. South winds persisted for 24 hours ahead of a second vigorous storm system, which tracked northeast across the Bering and Chukchi seas Friday the 8th and Saturday the 9th and continued into the Beaufort Sea on Sunday the 10th. The coastal waters of western Alaska experienced much stronger winds with this storm. winds from 35 to 55 mph occurred across the west and north coasts of Alaska with local higher gusts over 65 mph. The trajectory of winds remained southwesterly which caused significant surge and coastal flooding for several coastal communities. Surge values peaked between 7 and 14 feet from Norton Sound south to Nunivak Island from the 9th to Sunday the 10th, and the peak was amplified in some communities, such as Kotlik and Stebbins, because it coincided with high tide. Further north, storm surge ranged from 2 to 6 feet along the Chukchi Sea coast and up to 4 feet along the Beaufort Sea coast. On the 16th of the month, the Governor issued a state disaster declaration for the Northwest Arctic Borough, the Bering Straits Region, and the Lower Yukon Region. At Nome, there was minor damage; water level rose to 7.5 feet above tide.
11/14/2013	Coastal Flood	A complex low-pressure center of 993 mb over Kamchatka on the morning of the 12th moved to the southeast Beaufort Sea near Barter Island on the morning of the 14th deepening to 979 mb. This storm brought a variety of hazardous weather to northern Alaska: another surge of sea water across Norton Sound, rising 4 to 8 feet to prolong the inundation which had occurred just a few days earlier though the peak surge did occur during the falling tide so the overall rise in sea level was not as high

Date	Event Type	Description/Magnitude of Event
		as the previous event. A strong warm front with this system spread precipitation across the west coast and interior starting out as freezing rain, then rain, though remaining as snow near the Brooks Range. Some locations in the interior received nearly 1 inch of ice, with many locations receiving one-quarter to one-half inch overall. Very strong westerly winds gusting from 50 to 75 mph developed just behind the warm front as it moved across the west coast and interior of northern Alaska on the afternoon of the 13th through the morning of the 14th. In addition to the wintry mix of precipitation and strong winds, temperatures soared into the lower 40s when the wind arrived. As the low-pressure center continued east of Barter Island on the 14th, a short period of blizzard conditions occurred there. Coastal flooding was reported at Nome and the Road to Council. Minor flooding as water levels rose about 4 feet above tidal values, though no further damage from the previous surge on the 11th Heavy rain fell at Nome (0.52 inches accumulation). Though mostly rain, ground surfaces remained frozen, so the effect was the same as freezing rain on ground surfaces. Although rain ended at about 1300AKST on the 23rd, high winds occurred later that afternoon, as winds at the Nome ASOS and White Mountain AWOS each gusted to 53 kt (61 mph).
10/24/2016	High Surf	A weather front moving east across the southern west coast and Bering Strait and also into Norton Sound brought south-southwest winds around 30 mph over Norton Sound with gusts as high as 51 kt (55 mph). The resulting high surf produced erosion of the Beach Road at Scammon Bay and near Nome. Waves breaking offshore around 6 to 10 feet. At Belmont point housing in Nome, surf crashing against the sea wall causing minor beach erosion.
12/28/2016	Coastal Flood	Back-to-back strong low-pressure systems affected much of the state over several days from December 28th, 2016 until January 2nd, 2017. Heavy snow and blizzard conditions for the west coast and interior as well as minor coastal flooding with higher than normal storm surges (4 to 9 feet) occurred along the southern Seward Peninsula over the course of several days. Strong southerly winds of 50 to 65 mph pushed sea ice on shore and water levels rose in several villages. Villages along Norton sound reported high surge values of 5 to 9 feet breaking up the ice near shore and pushing it up onto the land. High water on roads and near homes were reported in Nome. Minor coastal flooding in Norton sound due to the water level rise and sea ice pushed into villages. Nome minor flooding of homes along Belmont Point.
7/22/2017	High Surf	A weather front moving east across the west coast and Bering Strait and also into Norton Sound brought south-southwest winds around 30 mph over Norton Sound on Saturday July 22nd into Monday of the 24th. The resulting high surf produced erosion around Cape Darby to Unalakleet and near Nome. Waves breaking offshore around 6 to 8 feet and a storm surge of 4 to 5 feet produced minor beach erosion.
11/4/2020	Coastal Flood	A strong low-pressure system combined with strong southerly winds caused minor flooding over portions of the west coast of Alaska November 4th through the 6th. Erosion and a washed away house along Nome-Council Road.
09/17/2022	Coastal Flood	The extratropical remnants of Typhoon Merbok moved north through the Bering Sea from Thursday September 15th to Saturday September 17th. Strong south to southwest winds resulted in a significant storm surge that caused water levels to rise from 8 to 13 feet above the normal high tide line, with the highest water levels observed at Golovin. This resulted in major coastal flooding and the worst flooding in nearly 50 years. Fish camps and other structures along the coast used for hunting and gathering activities were damaged or destroyed across the region. A state disaster declaration was declared for this event.

Source: NWS 2024- Storm Events Database and Storm Prediction Center Product

Additionally, the DHS&EM October 2022 DCI lists the following flooding disaster events which may have affected the area:

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.

162. Nome Highway Disaster: On October 5, 1992, a major Bering Sea Storm with gale-force winds impacted the Norton Sound Coast of the Seward Peninsula in Western Alaska, producing an unusually high storm surge tide and very large waves, particularly in the Nome area. The 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.

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.

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 in the City of Mekoryuk; with potentially unidentified damages in adjacent areas, and additional storm surges likely from continuing weather patterns in this area Alaska. Conditions that exist in the coastal communities of the Northwest Artic Borough as a result of this disaster: severe damage to roadways, power distribution systems, and drain fields. Conditions that exist in the coastal communities of the Bering Strait REAA as a result of this disaster: 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.

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 snowpack 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.

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.

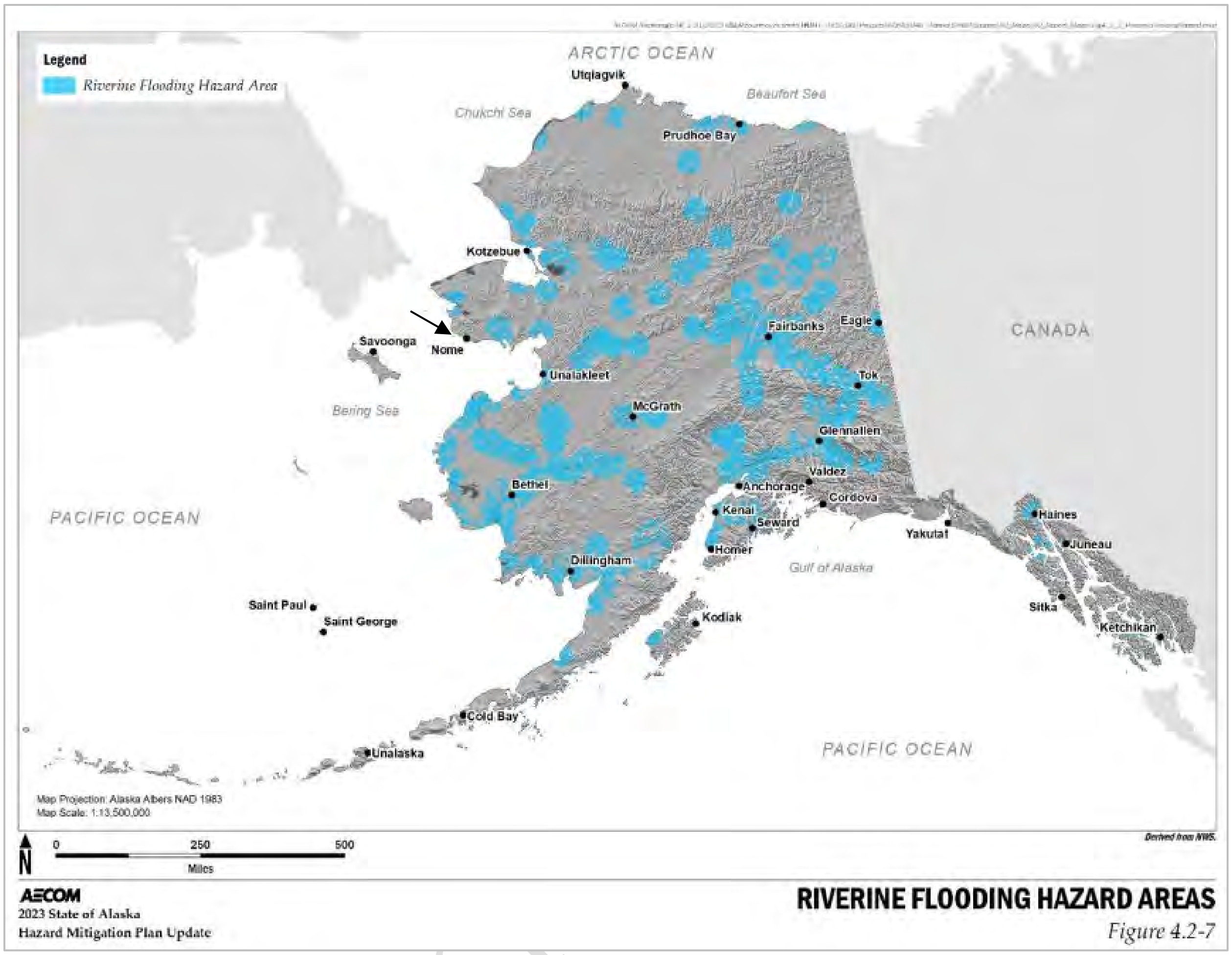
3.3.6.3 Location

Nome is located on the southern side of the Seward Peninsula on the coast of the Norton Sound and the Bering Sea. Typical flood locations in Nome include storm surge along the Norton Sound shoreline and riverine flooding along the Snake River. Typical flood locations in King Island are unknown as no residents reside on the island and no documented historical flood information is available. Typical flood locations in Council include riverine flooding along the Niukluk River. Typical flood locations in Solomon include storm surge along the Norton Sound shoreline and riverine flooding along the Solomon River. The barrier island in front of Solomon protects the community from the direct impacts from Bering Sea/Norton Sound storms.

The 2023 State of Alaska SHMP identifies coastal flooding hazard areas across the state (Figure 3-60). Nome is located in an identified coastal flooding hazard area, but not in a major riverine flooding hazard area (Figure 3-61). Localized riverine flooding has been reported in Nome.

Source: DHS&EM 2023

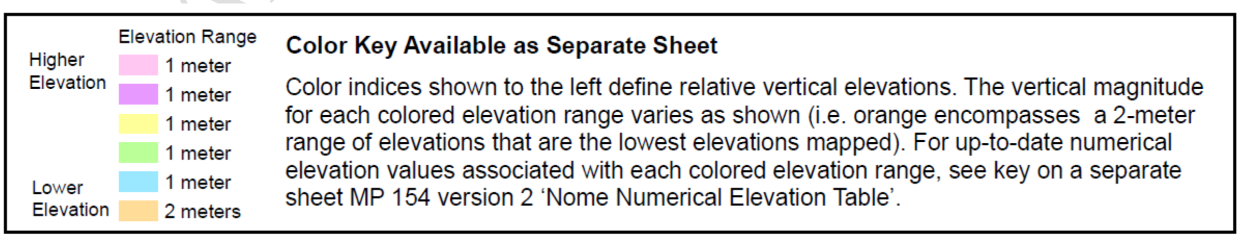
Figure 3-60 Statewide Coastal Flooding Hazard Areas

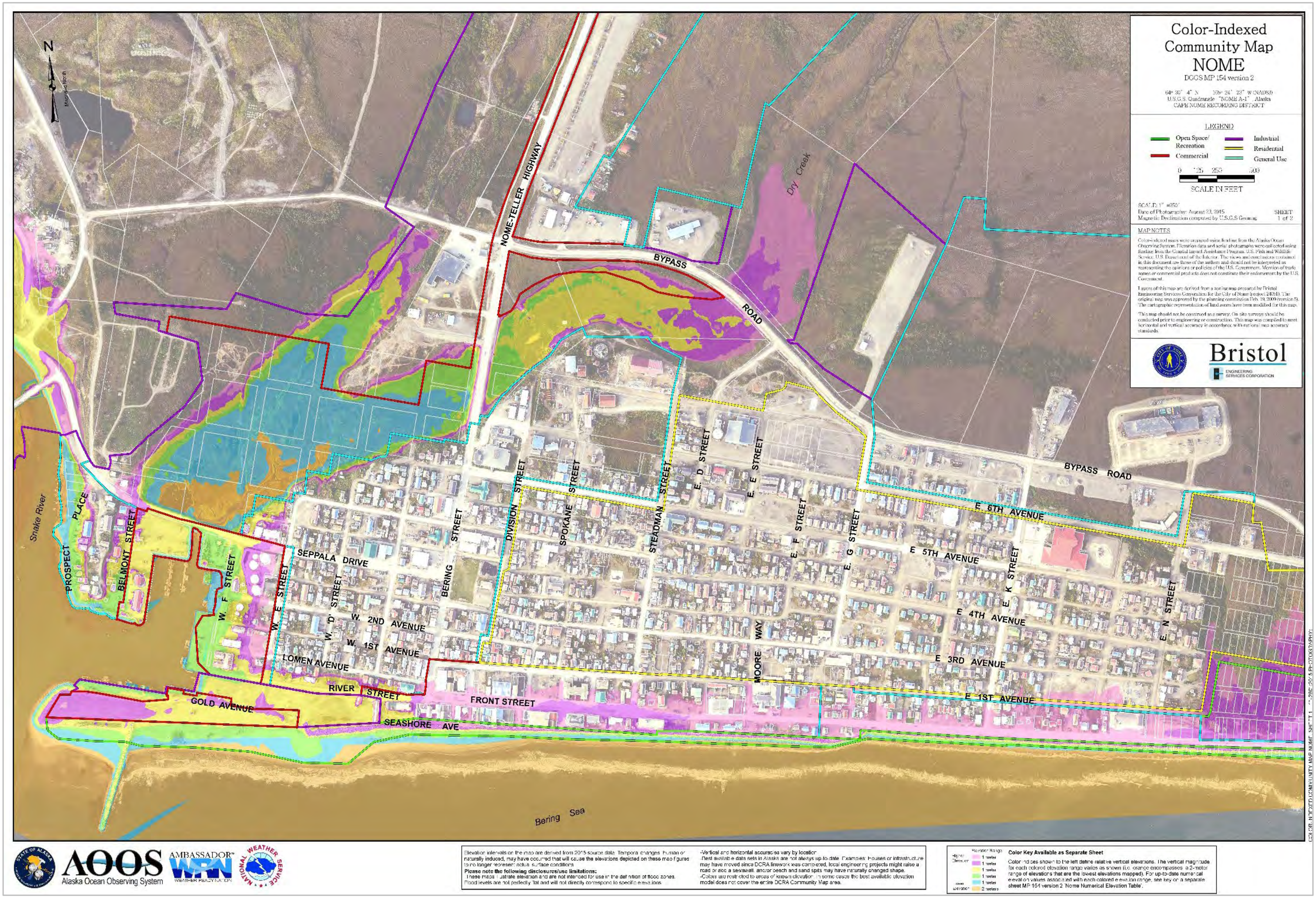


Source: DHS&EM 2023

Figure 3-61 Statewide Riverine Flooding Hazard Areas

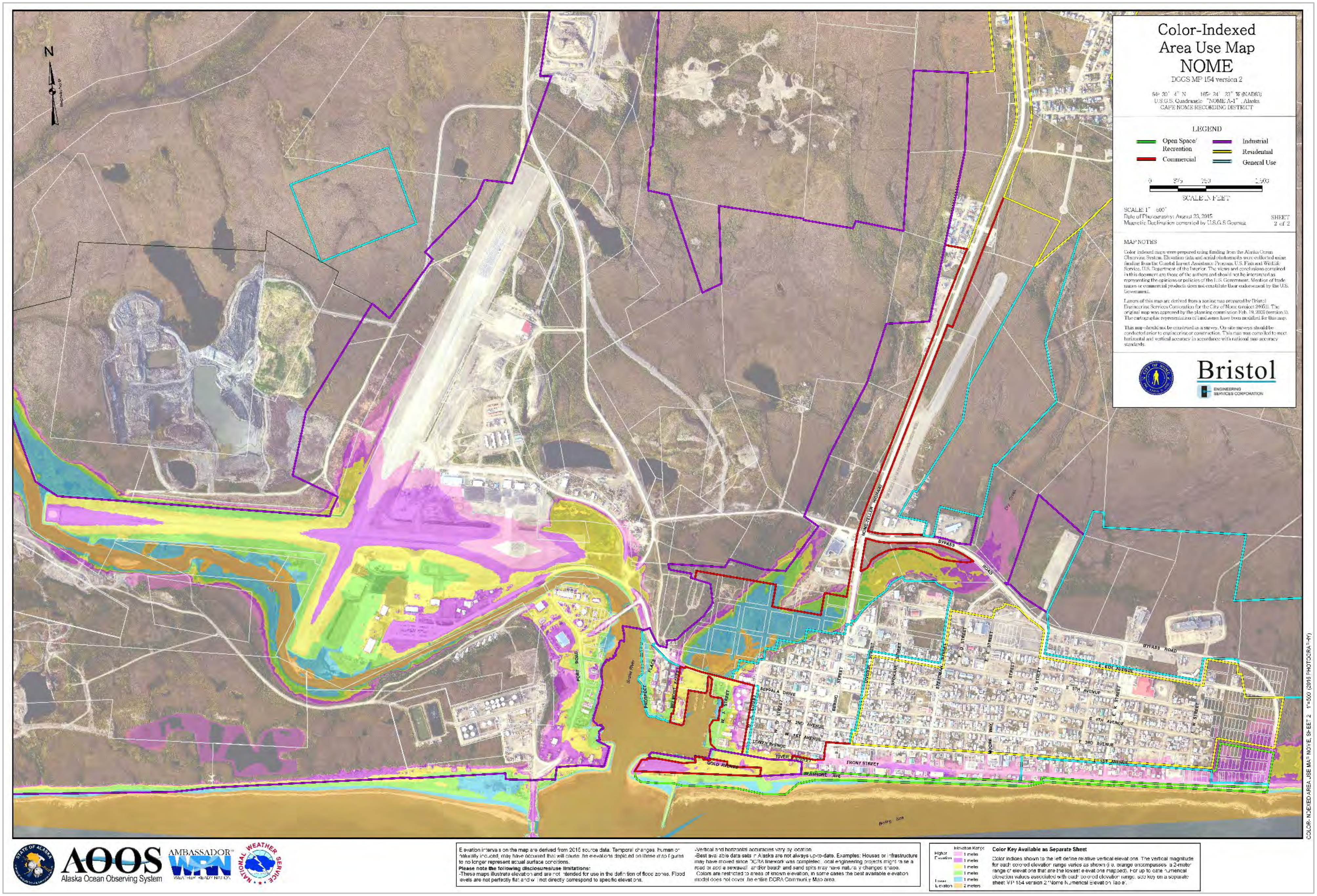
In 2014 and 2017, DGGS released a series of color-indexed elevation maps for flood-vulnerable coastal communities in Western Alaska. These maps were not designed to function as flood inundation maps, but to serve as a temporary tool to communicate about elevations in at-risk coastal communities until true inundation mapping can be completed (Overbeck et al. 2017). The map for Nome was released in 2017 and is shown below. This information is not available for King Island, Council, or Solomon.





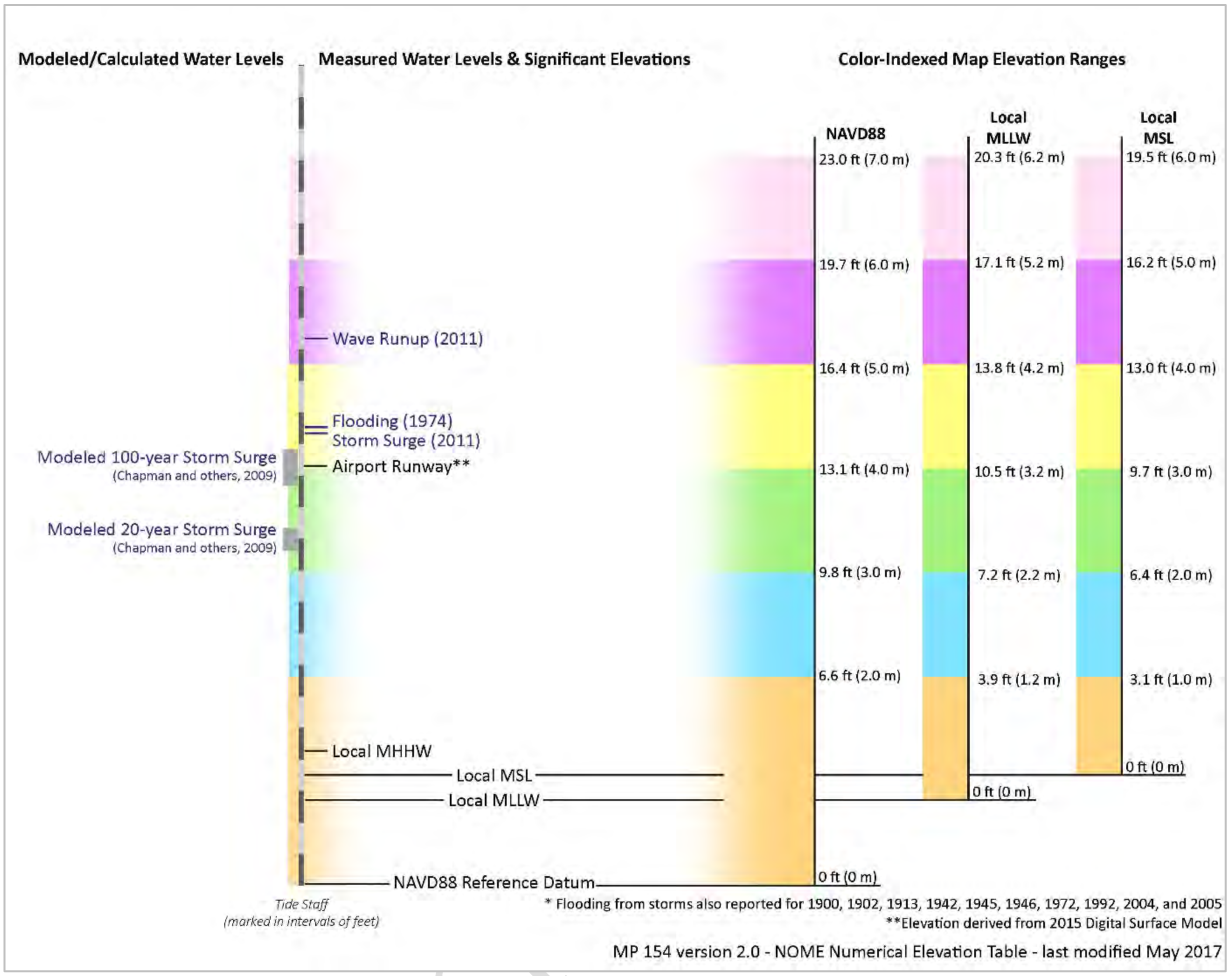
Source: Overbeck et al. (2017)

Figure 3-62 Nome Color-Indexed Elevation Map (1 of 3)



Source: Overbeck et al. (2017)

Figure 3-63 Nome Color-Indexed Elevation Map (2 of 3)



Source: Overbeck et al. (2017)

Figure 3-64 Nome Color-Indexed Elevation Map (3 of 3)

3.3.6.4 Extent (Magnitude/Severity)

Floods are described in terms of their extent (including the horizontal area affected and the vertical depth of floodwaters) and the related probability of recurrence.

The following factors contribute to coastal flooding frequency and severity:

- Time of year
- Atmospheric pressure
- Wind speed/strength
- Wind direction

The City of Nome participates in the National Flood Insurance Program (NFIP) and Community Rating System (CRS) which provides participating communities with discounts on flood insurance for residents located in special flood hazard areas. FEMA conducted a Flood Insurance Study for Nome and updated the Flood Insurance Rate Maps (FIRMs) in May 2010. The City of Nome requires any kind of work done at any time in the floodplain to have a Permit to Develop in a Floodplain Area issued. The FIRMs maps can be found at: https://www.nomealaska.org/disaster-flood-plans/page/flood-plain-information.

The 2017 USACE Floodplain Manager's Report for Council (USACE 2017) states:

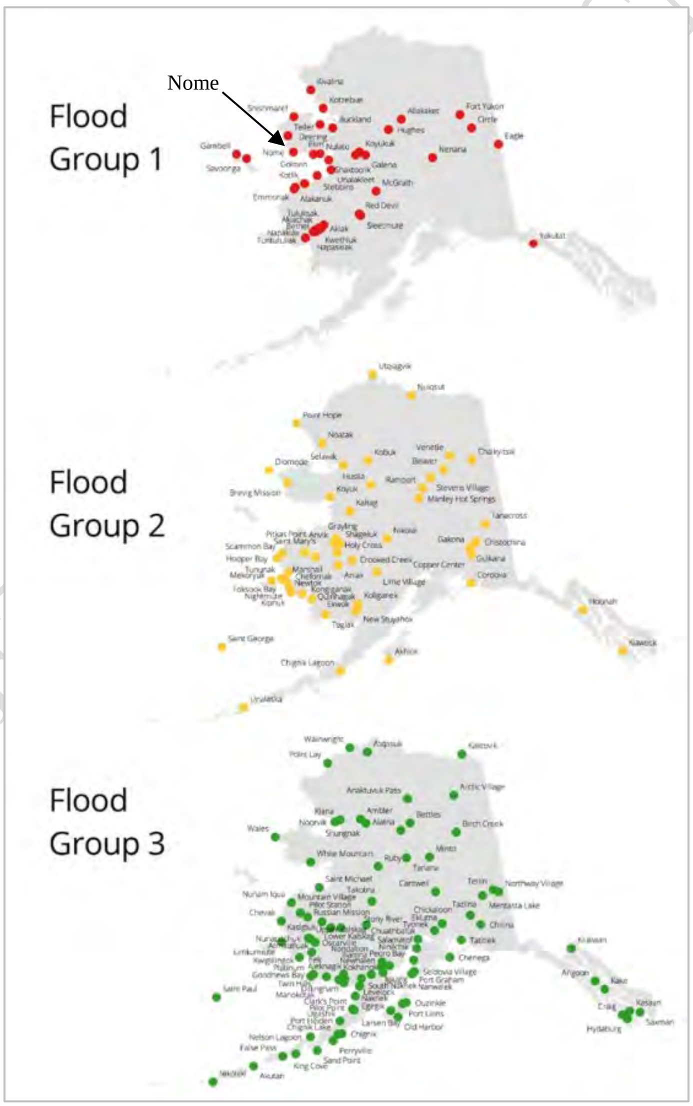
"The community is located approximately 50 ft above the Niukluk River. There is no reported flooding of houses in the community, but there are some minor buildings on the west side of the river that may be subject to flooding. The Council Mine landing strip has been inundated with as much as

2 ft of water from Melsing Creek, which makes the airstrip unusable for approximately 3 weeks in the spring."

Detailed information is not available for King Island, or Solomon.

During Typhoon Merbok, winds peaked at 70 mph in Nome, and storm surge reached just over 10 feet, which is 7 feet above the high tide line. High waters carried debris into the Snake River Bridge, causing damage, and pavement was missing from East Front street.

The Denali Commission 2019 Statewide Threat Assessment provides statewide risk ratings for flooding (Figure 3-65). Nome is located in Group 1, which are the communities that are most threatened by flooding. Group 1 indicates that flooding is commonly immediate to critical infrastructure. Damages resulting from a moderate flood or compounding erosion would impact community sustainability, present life safety concerns, affect access to emergency services, and/or require support from outside the region to assist the community in responding to the event. Communities that are included in Group 1 should direct resources towards determining the best response to the threat. Note that a community must have a short or mid-term time to damage rating to be included in Group 1.



Source: Denali Commission 2019

Figure 3-65 Statewide Flooding Threat Risk Map

Based on past event history and the criteria identified in Table 3-2, the extent of flooding and resultant damages to people and infrastructure in Nome, Council, and Solomon is considered Critical where injuries and/or illnesses could result in permanent disability, a complete shutdown of critical facilities may last for at least two weeks, and more than 25% of property would be severely damaged. The extent of flooding is unknown in King Island due to no historically documented flooding events.

3.3.6.5 Impact

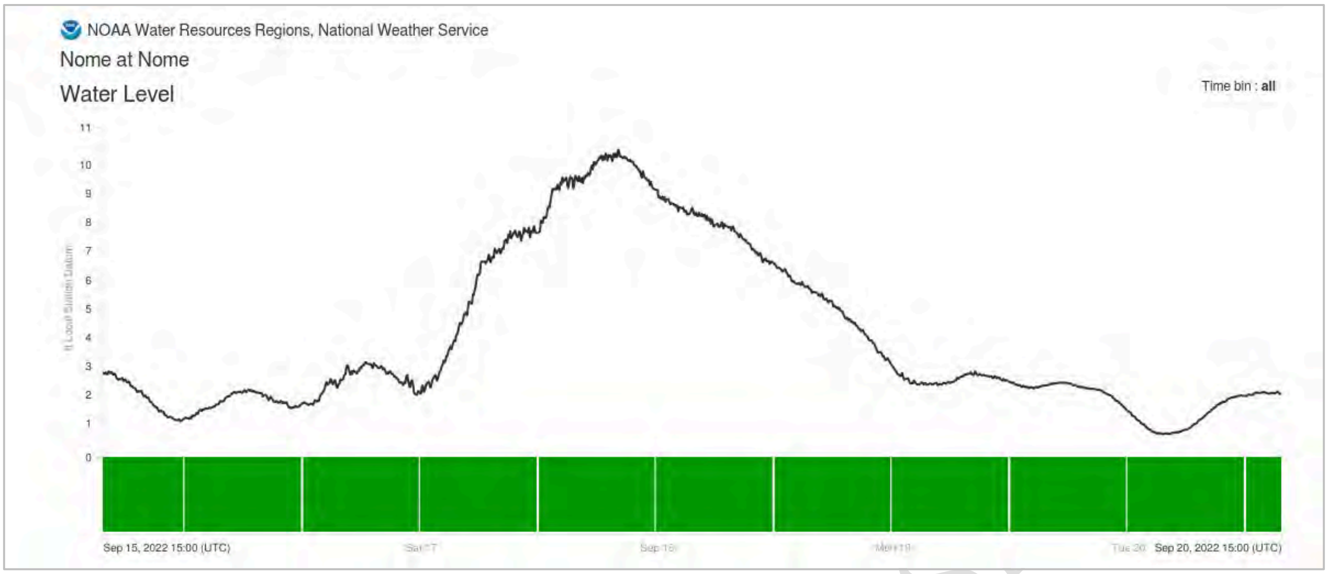
Floods may disrupt the normal function of a community by placing excessive pressure on emergency response and can bring a heavy economic burden to communities through the closure of vital infrastructure, communications, utilities, and transportation services. Additionally, floods can negatively impact subsistence activities, such as berry harvesting locations, that the community relies upon when these locations remain flooded for extended periods of time, topsoil layers become eroded, or locations become inundated with debris.

Flooding causes more deaths than any other natural hazard nationwide. Damage to infrastructure from floods may include the following:

- Floodwaters overtaking structures, causing water damage to structural elements and contents
- High-velocity flooding carrying debris and causing damage to structures, roads, bridges, culverts, and other features. Debris accumulation may create blockage to water movement and cause feature overtopping or backwater damages
- Flooding can inundate wastewater treatment plants of sewage lagoons causing the release of sewage, hazardous or toxic materials release. Storage tanks may be damaged, and pipelines severed all of which could be catastrophic to rural remote communities

Historic flood events in Nome have caused road washouts and erosion, damage to water and sewer treatment plants, school closures, and delayed or cancelled cargo flights carrying food and supplies.

During Typhoon Merbok, the Planning Team states that in Nome, there was severe damage and erosion to the Nome-Council road, subsistence camps were damaged, debris was deposited on their beach, and storm surge caused flooding throughout the community. In Solomon, a shelter cabin was washed inland and a tribal member experienced flooding in Nome. Additionally, tribal members' cabins were also lost and destroyed in Solomon. The Solomon BnB, the only income the Tribe generates in their Village, was forced to have an emergency shut down and cancelled the end of season reservations. One tribal citizen was stranded in Solomon due to the roads washing out, and emergency services had to rescue the citizen. The roadway to Solomon was washed in our several areas all along the highway. North of Nome at Woolley Lagoon, which is located on land privately owned by the King Island Native Corporation, there was erosion damage and debris that washed up onto the beach. No damages were reported in Council as the Village is not located near the coast.



Source: NOAA 2024

Figure 3-66 Water Level in Nome During Typhoon Merbok

Source: CBC News 2022. Photo Credit: Kim Knudsen

Figure 3-67 Damage from Typhoon Merbok to Coastal Cabins in Nome (September 2022)

Source: CBC News 2022. Photo Credit: Kim Knudsen

Figure 3-68 Overturned Shed in Water in Nome from Typhoon Merbok (September 2022)

Source: High North News 2022. Photo Credit: Jeremy Perkins

Figure 3-69 Destroyed Road in Nome from Typhoon Merbok (September 2022)

Source: High North News 2022. Photo Credit: Jeremy Perkins

Figure 3-70 Flooding and Erosion of Nome-Council Hwy from Typhoon Merbok (September 2022)

Source: High North News 2022. Photo Credit: Jeremy Perkins

Figure 3-71 Flooding of Nome Airport and Facilities from Typhoon Merbok (September 2022)

Source: Alaska Public Media 2023. Photo Credit: Amanda Noyakuk

Figure 3-72 Cabin Pushed into the Snake River from Typhoon Merbok (September 2022)

Source: Village of Solomon 2024

Figure 3-73 Damage to Nome-Council Road from Typhoon Merbok (September 2022)

3.3.6.6 Probability of Future Events

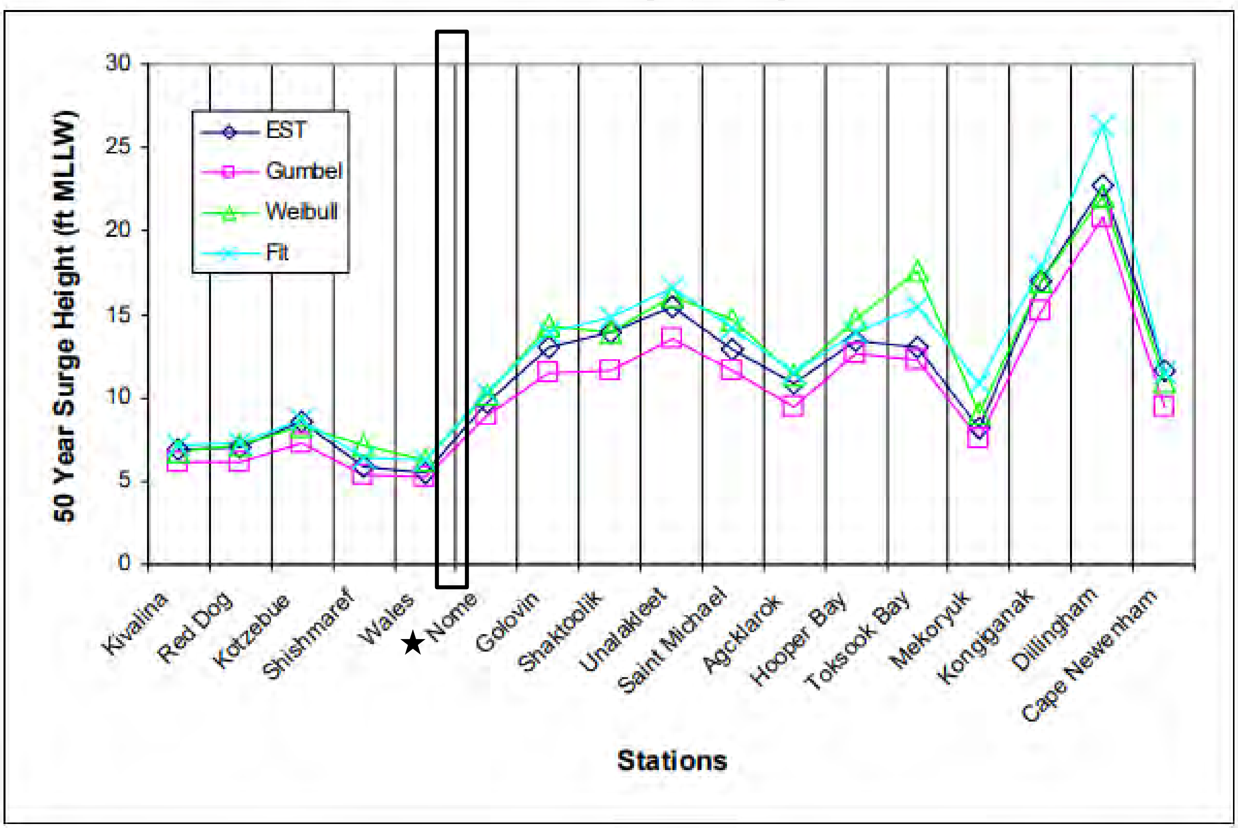
Many flood damages are predictable based on rainfall and seasonal thaw patterns. Most of the annual precipitation is received from April through October with August being the wettest. This rainfall leads to flooding in early/late summer and/or fall. Spring snowmelt increases runoff, which can cause excessive surface flooding.

Chapman et. al (2009) ran two different models to estimate storm surge levels for different flood intervals in Nome- the results are below (Table 3-13 and Figure 3-74). Results for the Gumbel and Log-Fit models are not available for Nome. Surge height is estimated in ft MLLW.

Table 3-13 Estimated Surge Levels in Nome Based on Flood Frequency

	Return Interval							
Model	2 years	5 years	10 years	15 years	20 years	25 years	50 years	100 years
EST	--	5.01	6.30	7.05	7.58	7.91	8.89	9.74
Weibull Distribution	3.67	5.84	7.09	--	--	--	9.42	10.30
Average	**3.67 ft**	**5.43 ft**	**6.70 ft**	**7.05 ft**	**7.58 ft**	**7.91 ft**	**9.16 ft**	**10.02 ft**

Note: The EST model assumes that future events will be statistically similar in magnitude and frequency to past events.
Source: Chapman et al. (2009)



Source: Chapman et al. (2009)

Figure 3-74 Estimated 50-year Surge Level in Nome

Based on previous occurrences and the criteria identified in Table 3-3, it is Likely that Nome, Council townsite, and Solomon townsite will experience a flood event i in the next three years; there is a 1 in 3 years chance of occurring (1/3=33%); and the history of events is greater than 20% but less than or equal to 33% likely per year.

There is unknown probability about future flooding events at King Island townsite.

3.3.6.7 Future Conditions Including Climate Change

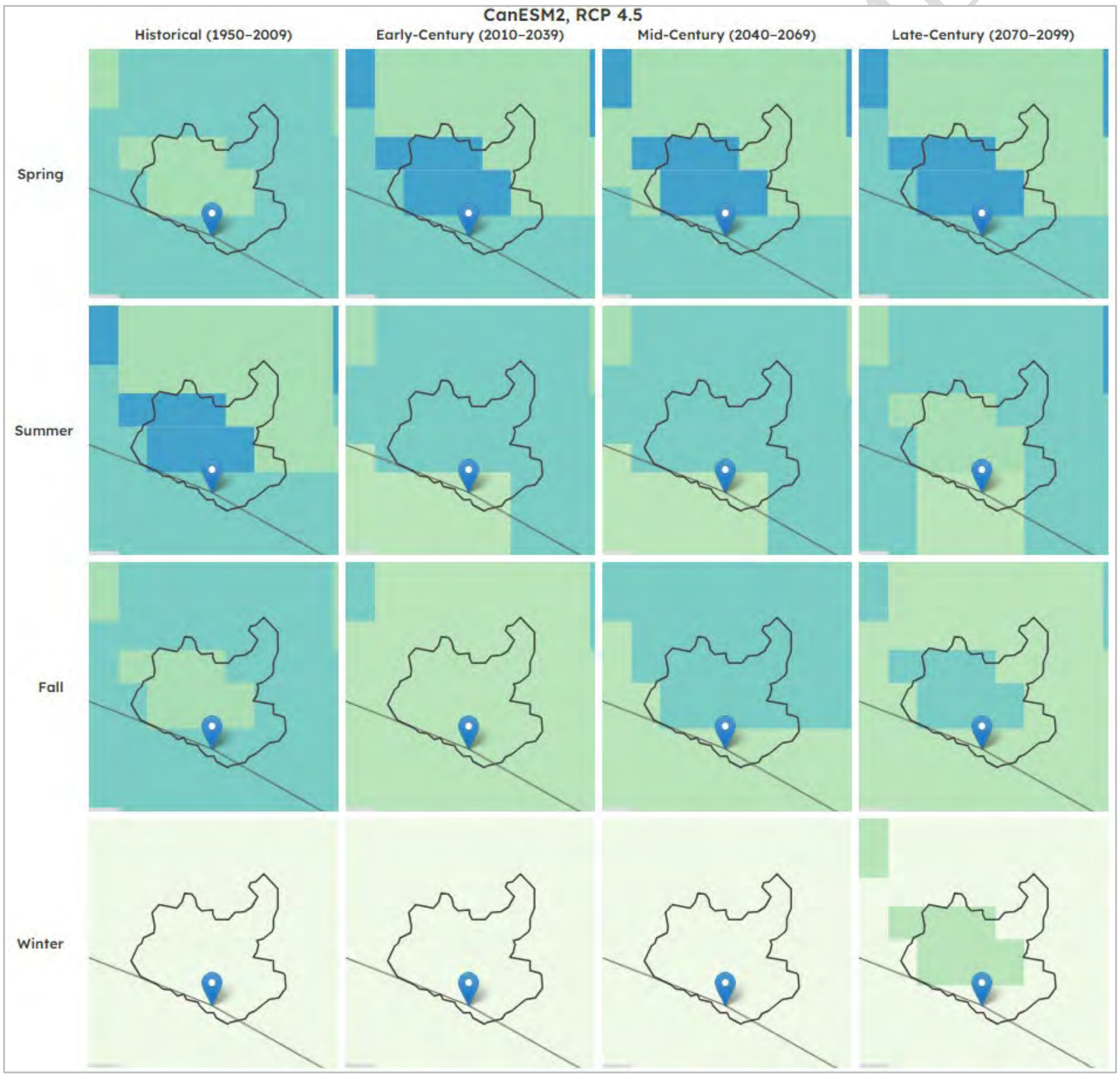
Due to climate change, the nature or location of flooding events in Nome, Council, or Solomon are not anticipated to change.

Changing Factor	Description of Future Changes due to Climate Change
Extent (Magnitude/ Severity)	Due to climate change, the extent of flooding events is expected to increase. Flooding and erosion of coastal and river areas affect over 87% of the Alaska Native communities (USGCRP 2018). A study by Melvin et al. (2016) projects that increases in floods will result in the largest climate-change related damages in Alaska. According to the States at Risk Climate Change Preparedness Report Card, Alaska's coastal floodplain is expected to expand by over 15,000 square miles, which accounts for the greatest increase of any state (States at Risk 2015). Similarly, the loss or retreat of shore-fast sea ice will expose coastlines to greater flood and erosion threat during seasonal coastal storms (USGCRP 2018). This will lead to intensified flooding events throughout the state.
Impact	As the extent of flooding is projected to increase, this will lead to a greater impact by flooding on Alaska's coastal communities, including damage to critical roadways and infrastructure, damage to homes and critical facilities, and increased loss of life. Throughout the end of the 21st century, coastal communities are projected to experience serious changes in tidal amplitudes and increased annual local sea levels, which were once 100-year events (IPCC 2019).
Probability of Future Events	Due to climate change, the frequency of flooding events is expected to continue to increase. According to the EPA and NOAA records, coastal flooding events are increasing in frequency in Alaska (EPA 2022).

The following figures show the historical and projected changes in runoff in Nome, Council, and Solomon. Increased runoff may lead to higher flooding potential in these communities.

Runoff, Nome (Sitŋasuaq), 1950–2099, CanESM2 model

		Early–Century (2010–2039)		Mid–Century (2040–2069)		Long–Term (2070–2099)	
Season	Historical (Modeled, 1950–2009)	Low Emissions (RCP 4.5)	High Emissions (RCP 8.5)	Low Emissions (RCP 4.5)	High Emissions (RCP 8.5)	Low Emissions (RCP 4.5)	High Emissions (RCP 8.5)
Spring	1.3 in/season	1.3 in/season 0	1.6 in/season +0.3	1.6 in/season +0.3	1.1 in/season −0.2	1.2 in/season −0.1	0.9 in/season −0.4
Summer	1.2 in/season	1 in/season −0.2	1.2 in/season 0	1.1 in/season −0.1	0.8 in/season −0.4	1.1 in/season −0.1	1 in/season −0.2
Fall	0.5 in/season	0.7 in/season +0.2	0.6 in/season +0.1	0.8 in/season +0.3	0.7 in/season +0.2	0.7 in/season +0.2	0.9 in/season +0.4
Winter	0 in/season	0.2 in/season +0.2	0.1 in/season +0.1	0.2 in/season +0.2	0.4 in/season +0.4	0.3 in/season +0.3	0.6 in/season +0.6

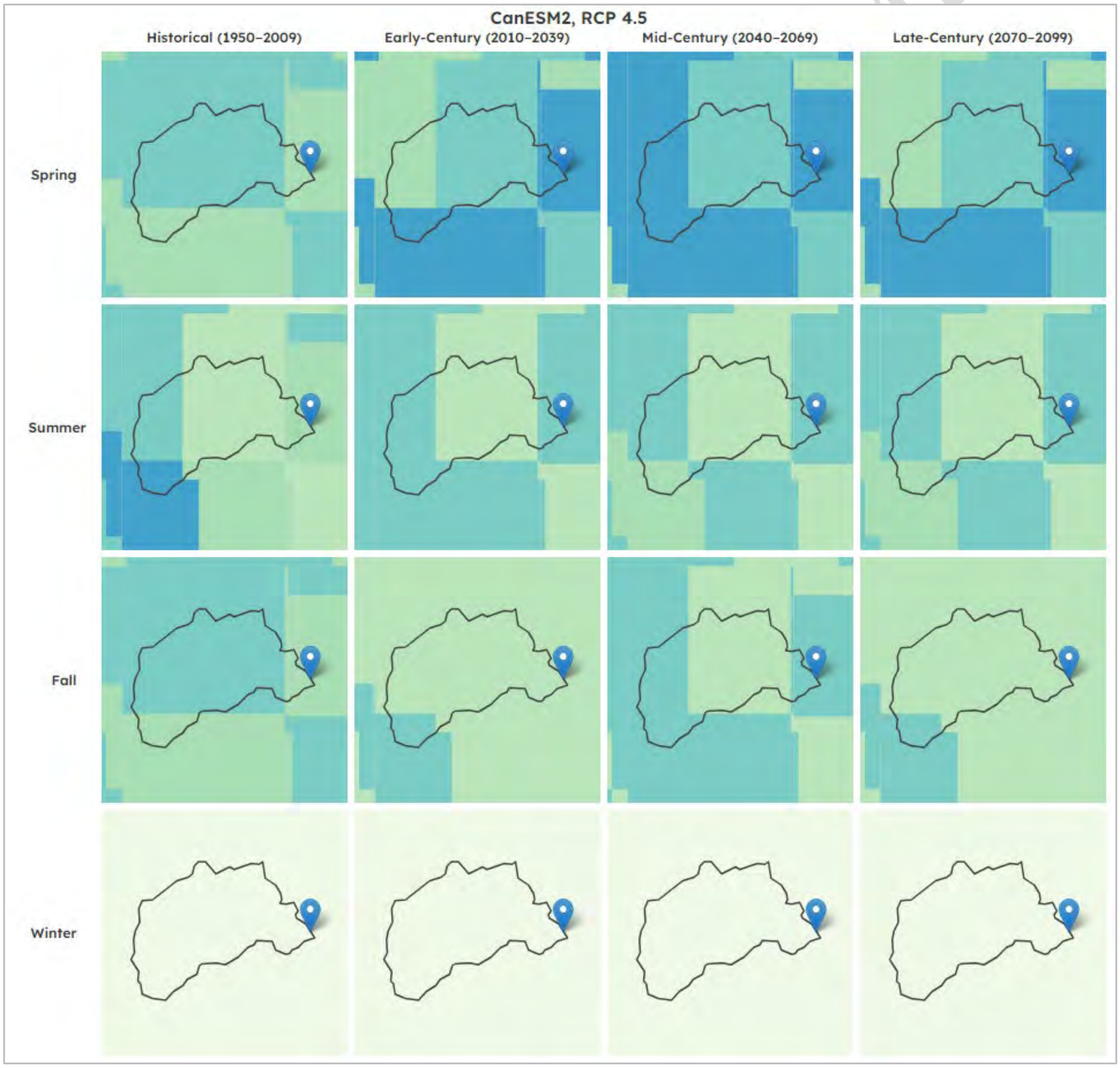


Source: UAF/SNAP 2024a- Northern Climate Reports

Figure 3-75 Historical and Projected Changes in Runoff in Nome (1950-2099)

Runoff, Council, 1950-2099, CanESM2 model

		Early-Century (2010-2039)		Mid-Century (2040-2069)		Long-Term (2070-2099)	
Season	Historical (Modeled, 1950-2009)	Low Emissions (RCP 4.5)	High Emissions (RCP 8.5)	Low Emissions (RCP 4.5)	High Emissions (RCP 8.5)	Low Emissions (RCP 4.5)	High Emissions (RCP 8.5)
Spring	1.5 in/season	1.8 in/season +0.3	2 in/season +0.5	1.8 in/season +0.3	1.3 in/season -0.2	1.5 in/season 0	1.2 in/season -0.3
Summer	1 in/season	1 in/season 0	1.2 in/season +0.2	1.1 in/season +0.1	0.8 in/season -0.2	1.1 in/season +0.1	1.1 in/season +0.1
Fall	0.5 in/season	0.7 in/season +0.2	0.6 in/season +0.1	0.9 in/season +0.4	0.9 in/season +0.4	0.8 in/season +0.3	1.1 in/season +0.6
Winter	0 in/season	0.2 in/season +0.2	0.1 in/season +0.1	0.2 in/season +0.2	0.4 in/season +0.4	0.3 in/season +0.3	0.8 in/season +0.8

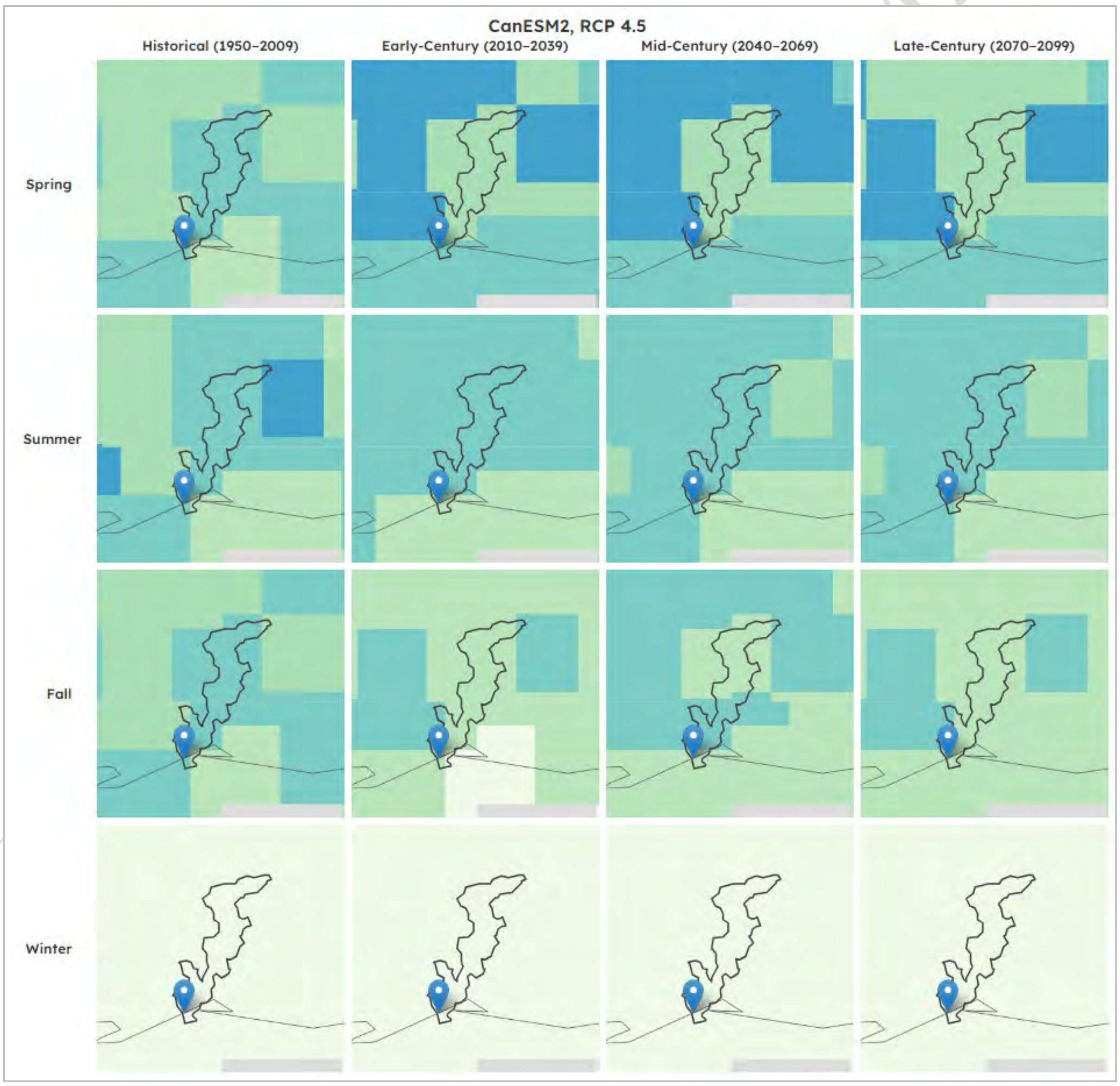


Source: UAF/SNAP 2024a- Northern Climate Reports

Figure 3-76 Historical and Projected Changes in Runoff in Council (1950-2099)

Runoff, Solomon, 1950–2099, CanESM2 model

Season	Historical (Modeled, 1950–2009)	Early-Century (2010–2039) Low Emissions (RCP 4.5)	Early-Century (2010–2039) High Emissions (RCP 8.5)	Mid-Century (2040–2069) Low Emissions (RCP 4.5)	Mid-Century (2040–2069) High Emissions (RCP 8.5)	Long-Term (2070–2099) Low Emissions (RCP 4.5)	Long-Term (2070–2099) High Emissions (RCP 8.5)
Spring	1.5 in/season	1.8 in/season +0.3	2.1 in/season +0.6	1.9 in/season +0.4	1.4 in/season −0.1	1.5 in/season 0	1.1 in/season −0.4
Summer	1.3 in/season	1.1 in/season −0.2	1.3 in/season 0	1.3 in/season 0	0.9 in/season −0.4	1.2 in/season −0.1	1.1 in/season −0.2
Fall	0.5 in/season	0.7 in/season +0.2	0.6 in/season +0.1	0.9 in/season +0.4	0.9 in/season +0.4	0.7 in/season +0.2	1 in/season +0.5
Winter	0 in/season	0.2 in/season +0.2	0.1 in/season +0.1	0.2 in/season +0.2	0.4 in/season +0.4	0.4 in/season +0.4	0.8 in/season +0.8



Source: UAF/SNAP 2024a- Northern Climate Reports

Figure 3-77 Historical and Projected Changes in Runoff in Solomon (1950-2099)

3.3.7 TSUNAMI

Hazard applicability: ☑Nome ☑Solomon townsite

Council townsite is an upriver community and is not directly threatened by tsunamis, and King Island townsite is located on top of a rocky cliff above the Bering Sea, out of potential tsunami inundation.

3.3.7.1 Nature

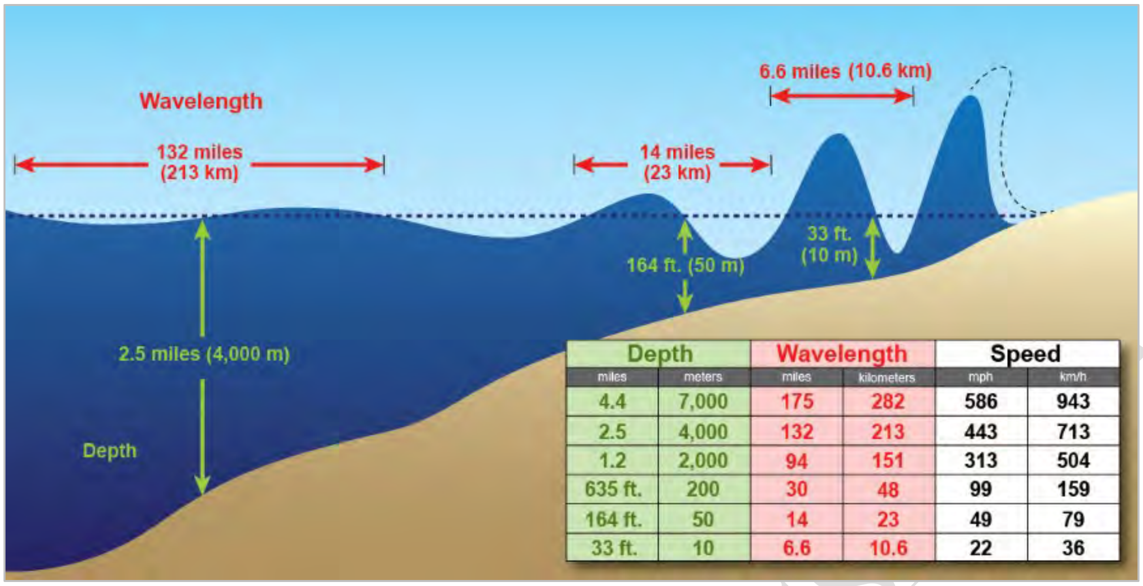
A tsunami is a series of traveling waves of extremely long wavelength and period generated by a sudden vertical displacement of water. This displacement of water can be triggered by underwater volcanic eruptions, large landslides, or earthquakes at or below the ocean floor. In Alaska, seismically generated earthquakes near the subduction zone pose the primary tsunami threat to coastal communities.

- **Seismically generated tsunamis** are generated by an earthquake event. Seismically-generated tsunamis in Alaska most commonly occur along the subduction zone in the Aleutian Islands. Earthquakes have also generated tsunamis in the back arc area in the Bering Sea and the eastern boundary of the Aleutian Arc plate. Seismically-generated tsunamis typically reach land 20 to 45 minutes after starting. 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 and may require immediate evacuation.
- **Landslide generated tsunamis** can be generated by subaerial (land) or submarine (underwater) landslides. Landslides may be triggered by an earthquake and one earthquake may trigger multiple landslides and resulting tsunamis. These events are particularly dangerous because they are able to form the largest tsunami events as they possess the largest amount of kinetic energy, and they do not typically provide any warning before generating.
- **Volcanic generated tsunamis** are the least common type of tsunamis in Alaska, as only one volcanic eruption event has been confirmed in the state. In 1883, the Saint Augustine volcano triggered a tsunami when the north side of the mountain collapsed. The resulting tsunami inundated Port Graham with waves that were 30 feet high. On January 15, 2022, a large submarine volcano in Tonga erupted, which triggered a widespread Pacific-wide tsunami. The eruption was heard throughout parts of Alaska, as far north as Fairbanks, nearly 6,000 miles away. The National Tsunami Warning Center issued a tsunami advisory for much of the Alaskan coastline, as unusual and strong currents with waves up to 3 feet were predicted. The community of King Cove recorded waves of just over 2 feet, but no significant damage was reported. The National Tsunami Warning Center stated that an evacuation warning would have been issued if waves reached 3.2 feet.

Many tsunamis are often undetected because of their long wavelengths. Some wavelengths are hundreds of miles long and only 3 feet high and cannot be felt by mariners as it passes beneath their vessel. The wavelength of the tsunami waves and their period will depend on the generating mechanism and the dimensions of the source event. If the tsunami is generated from a large earthquake over a large area, its initial wavelength and period will be greater. If the tsunami is caused by a local landslide, both its initial wavelength and period will be shorter.

The speed that a tsunami will travel will depend on the depth of the water it is travelling through. The tsunami will travel faster in deeper water and will begin to slow down once the depth of the water decreases. In the deep ocean, they can travel at speeds over 500 mph and have the capacity to cross entire oceans in one day.

As a tsunami enters shallow waters and nears land, it begins to slow down, the wavelengths decrease, waves grow in height, and currents intensify (Figure 3-78). Once the tsunami makes landfall, its speeds slow down to 20-30 mph.



Source: NOAA 2023b

Figure 3-78 Cross Section of a Tsunami Propagation

3.3.7.2 History

Worldwide seismic activity and tsunamis have only begun being recorded in the early 1900s. There is a lack of record for historical tsunamis, including Alaska.

Paleotsunami studies conducted in this region demonstrate that significant tsunamis have occurred in this region in the past, and, therefore, can occur in the future (Medvedeva et al. 2023). A history of tsunamis along the Bering coast of the Kamchatka region over the past 4,000 years indicates that the northern Kuril-Kamchatka Subduction Zone produces tsunamigenic earthquakes every few centuries (Medvedeva et al. 2023). Analyzing the 4500-year paleoseismic record, 12–15 tsunamis have been documented in the southwestern part of the Bering Sea (Medvedeva et al. 2023).

Date	Location of Effects	Distance From Source	Max. Water Height	Comments
11/5/1910	Nome, Solomon	59 km	Unknown	Floods Extraordinary--Tidal Wave in Alaska--Settlement Wiped Out November 5, 1910. The flooding of Nome, in Alaska, has been of a most extraordinary character. Solomon, a small settlement east of Nome, has been completely wiped out by terrible surf, which was accompanied by neither wind nor rain. The flooding of Nome is inexplicable. It is now announced that no storm occurred there, but that the flooding followed on a rush of the tide. It is probable that a volcanic disturbance took place in the seabed miles distant from Nome, and thus the abnormal tide was formed. In the rush of the tide schooners were driven ashore. If icebergs had been as far southward as usual, they would have dashed against the buildings of the streets on the waterfront. (reference #7596) Much Property Destroyed and Many Lives Lost Nome, Alaska, November 5. A violent submarine earthquake or volcanic eruption is thought to be the cause of a great tidal wave which swept the Nome coast, flooding that city and causing heavy damage to shipping. Although there was no loss of life, 90 residents of the lowlands along the beach saw all their belongings swept away, and barely escaped with their

Date	Location of Effects	Distance From Source	Max. Water Height	Comments
				lives. Great waves swept away the frail structures along the beach and carried many small coasting vessels far up on the beach. The flood came without warning. There was complete calm at the time, but the waves were of a giant size, as though raised by a hurricane. No reports of earthquakes have been received, but for several months Mount Bogosloff and Mount Shishalden, near Unimak Pass, have been spouting fire and lava at short intervals, and the Bogosdloff lands have been undergoing peculiar contortions. Reports are anxiously awaited from other points along the coast. (reference #7595) Traditional Knowledge from Ellen Balto Stenberg. Excerpt from Story #11 (1998) I was born in Nome Alaska December 29th, 1904 on the Sand Spit. We lived in a small cabin outside of Nome which was between the Bering Sea and the Snake River. Our father worked in a gold mine in Alaska. He was injured by a falling bucket in the mine December 2nd, 1904 and died the next day. Because of permafrost the body could not be buried deep and when a tidal wave came years later the graves were washed out and his body was found. There was a write up of a dance hall girl in a well-known magazine about her body being washed up and recognized. (reference #7615)
3/11/2011	Nome	4454 km	0.04 m	The March 11, 2011 a M9.1 earthquake near the east coast of Honshu, Japan, generated a devastating tsunami that was observed all over the Pacific and caused tremendous devastation locally. There were no damages reported in Nome.

Source: NCEI/WDS 2024

Source: University of Washington Libraries, Special Collections

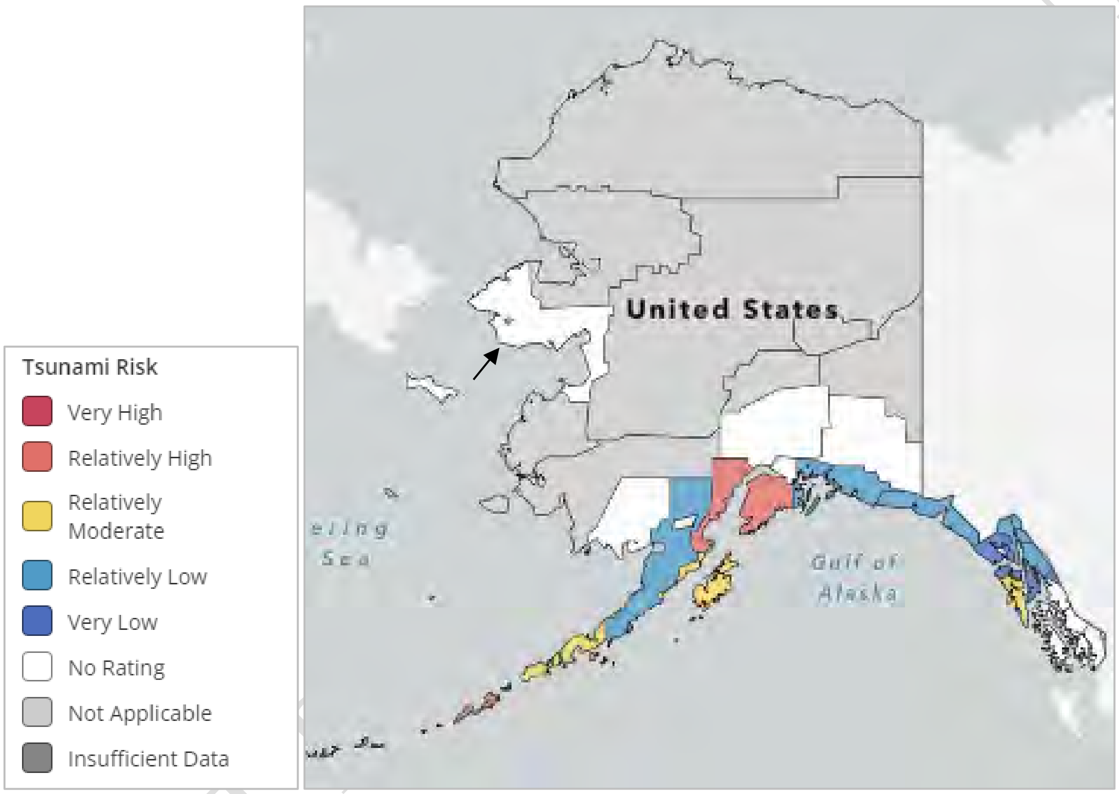
Figure 3-79 Tidal Wave in Nome, 11/02/1910

The Planning Team shared that they have evacuated Nome in recent years due to potential tsunamis, but no tsunamis came.

3.3.7.3 Location

Tsunami hazards for the Arctic region including the Bering and Chukchi Seas are traditionally considered insignificant due to the low seismic activity in the region. Low population density and rare tide gauge network lead to the lack of information on tsunami hazards here (Medvedeva et al. 2023).

FEMA's National Risk Index provides the following map for the National Tsunami Risk (Figure 3-80). The tsunami risk for the Bering Strait region is labeled as having "No Rating".

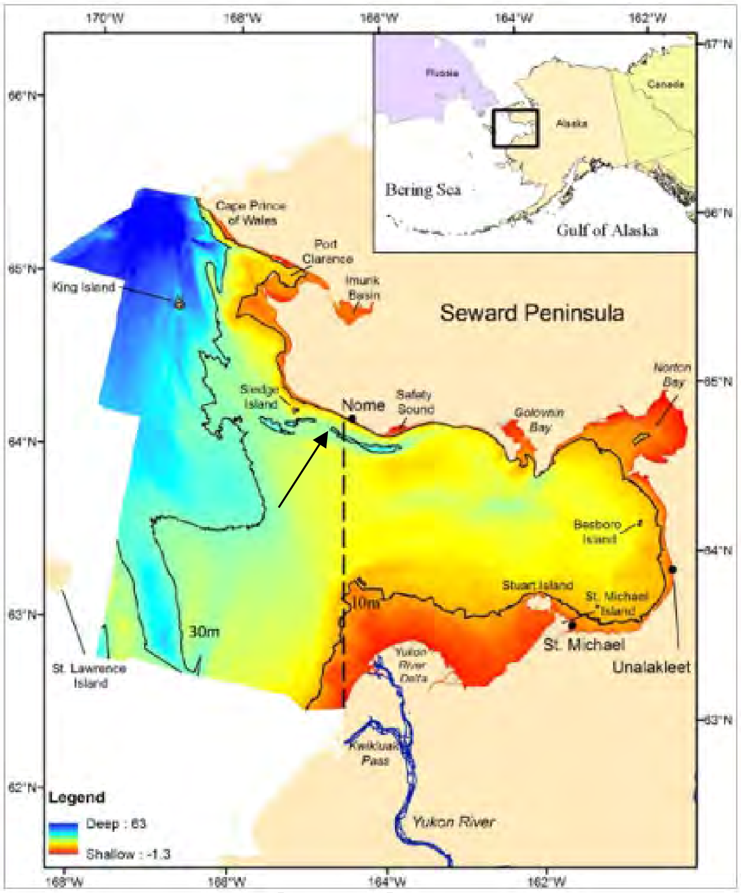


Source: FEMA National Risk Index 2024

Figure 3-80 National Tsunami Risk Map

Tsunamis are not commonly reported in the Norton Sound region. This is thought to be due to the depth of the Sound and outlying Bering Sea, which may not allow for typical tsunami propagation. Compared to the average depth of the ocean, which is 12,100 feet (3,688 meters), Norton Sound is very shallow- with a maximum depth of 207 feet (63 meters) in the outer waters along the Bering Sea, while the Sound itself has an average depth of just 43 feet (13 meters) (Figure 3-81) (NOAA Fisheries 2022).

However, without inundation mapping, it is difficult to predict how a tsunami would actually propagate in this region.



Source: Prescott and Zimmermann 2015

Figure 3-81 Bathymetry of Norton Sound

3.3.7.4 Extent (Magnitude/Severity)

Using the criteria listed in Table 3-2 as well as the absence of recorded tsunami events and inundation mapping, the extent of tsunamis in Nome and Solomon are considered to be Negligible with minor injuries, the potential for critical facilities to be shut down for less than 24 hours, less than 10% of property or critical infrastructure being severely damaged.

This rating is subject to change once inundation mapping is completed.

3.3.7.5 Impact

Potential impacts from a tsunami will vary and are dependent on many factors, but impacts range from barely detectable to completely destructive. Tsunamis have an effect on beaches once they hit the shore, and may also affect mouths of bays, tidal flats, and the shoreline of large coastal rivers. Tsunamis can diffract around islands and land masses and since they are asymmetrical, the waves may be much stronger in one direction than the other, further affecting the surrounding coastal features. Tsunamis propagate outward from their source, so coasts in the "shadow" of land masses are typically safe from the effects of the tsunami.

DGGS has a library of tsunami inundation maps for many coastal communities that are threatened by tsunamis. A tsunami inundation map has not been made for any community along the West Coast of Alaska.

Nome and Solomon have not been historically impacted by tsunamis, but without inundation mapping, the Planning Team wanted to identify it as a potential hazard.

3.3.7.6 Probability of Future Events

Based on previous occurrences and the criteria identified in Table 3-3, it is Unlikely that Nome or Solomon townsite will experience a tsunami event in the next ten years. The event has up to 1 in 10 years chance of occurring (1/10=10%) and the history of events is less than or equal to 10% likely per year.

Tsunamis do not pose a threat to King Island townsite or Council townsite.

The Planning Team states that they are concerned with future potential tsunamis that may impact Nome and Solomon as they do not have inundation mapping and do not know the potential of a tsunami in the communities. The Planning Team expressed concerns that a tsunami would be devasting to the communities.

3.3.7.7 Future Conditions Including Climate Change

Climate change is not anticipated to influence the nature or location of future tsunamis in Alaska.

Changing Factor	Description of Future Changes Due to Climate Change
Extent (Magnitude/Severity)	Sea level rise will affect water tables near coastlines and potentially lead to heightened tsunami inundation hazards (Dura et al. 2021).
Impact	Sea level rise due to climate change could significantly influence tsunami disasters as the sea level is a critical parameter affecting the intensity of tsunamis (Alhamid et al. 2022).
Probability	Due to climate change, impacts on melting permafrost and the projected increased frequency of rockslides and landslides from increased precipitation, the probability of future tsunami events as a result of these hazards may increase. Climate change is not anticipated to influence the probability of future earthquake-induced tsunamis.

3.3.8 EROSION

Hazard applicability: ☑Nome ☑Council townsite ☑Solomon townsite

It is unknown if erosion is occurring at the King Island townsite, but erosion has been identified on King Island Native Corporation lands north of Nome at Woolley Lagoon.

3.3.8.1 Nature

Erosion is defined as the wearing away of the ground surface as a result of the movement of wind, water, or ice. Erosion is a gradual process, but it can occur rapidly as the result of storms, floods, permafrost degradation, or another event. The effects from erosion can be seen over time as the result of long-term environmental changes such as melting permafrost.

Erosion poses a threat to communities where disappearing land threatens infrastructure and development. Nome, Council, and Solomon experience coastal and riverine erosion. King Island only experiences coastal erosion.

<u>Coastal erosion</u>

Coastal erosion is described as the wearing or washing away of coastal lands. Coastal erosion occurs over the area near the top of the bluff out into the near-shore region to about the water depth of 30 feet. Coastal erosion is measured as the rate of change in the position or horizontal displacement of a shoreline over a period of time. Bluff recession is the most visible aspect of coastal erosion because of the dramatic change it causes to the landscape. As a result, this aspect of coastal erosion usually receives the most attention from the community.

Coastal erosion can occur from rapid, short-term, daily, seasonal, or annual natural events such as wind, waves, storm surge, coastal storms, and/or flooding. Human activities such as boat wakes and dredging may also play a factor. The most intense erosion often occurs during storms, particularly because the highest energy waves are generated under storm conditions.

Coastal erosion may also be attributed to multi-year impacts and long-term climatic change. These impacts may include sea-level rise, subsidence, lack of sediment supply, or long-term human factors such as the construction of shore protection structures and dams, or aquifer depletion.

Groins, jetties, seawalls, or revetments are human attempts to control shoreline erosion. As a result, these structures may actually lead to increased erosion on the opposite side of the structure.

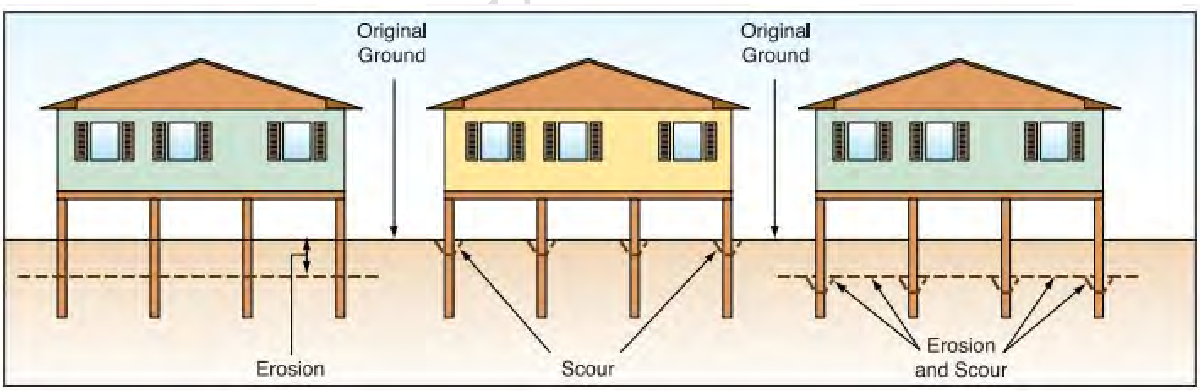
Damage from coastal erosion is typically a gradual event. However, significant storm events can cause the Earth beneath infrastructure and homes to weaken. In extreme but not unheard-of cases, homes built near the coast have fallen into the sea due to eroded cliffs.

<u>Coastal scour</u>

Scour occurs when floodwater passes around obstructions in the water column. As the water flows around an object, it must change direction and accelerate. Soil can be loosened and suspended by this process or by waves striking the object, and be carried away.

Scour effects are generally localized, ranging from small to large shallow conical depressions in the sand around individual structures. Effects from scour increase with increasing flow velocity and turbulence, and with increasing soil erodibility.

Figure 3-82 shows the differences between coastal erosion and scour. A building may be subject to either or both, depending on the building location.



Source: FEMA 2009- Erosion, Scour, and Foundation Design

Figure 3-82 Distinguishing Between Coastal Erosion and Scour

A combination of natural and human-induced factors influences the erosion process in Nome. For example, shoreline orientation and exposure to prevailing winds, open ocean swells and waves all influence erosion rates. These can be altered by human development by the addition of jetties, groins, and seawalls/revetments. Beach composition also influences erosion rates. A beach comprised of primarily large rocks and boulders is more resistant to erosion compared to a beach comprised of silt and sand. Other factors that may influence coastal erosion include:

- Geomorphology
- Nature of coastal topography
- Embankment or shoreline type

- Embankment and shoreline exposure to wind and waves
- Structure types along the shoreline
- Proximity to erosion-inducing structures
- High hazard zone encroachment
- Development density
- Elevation of river embankment; or coastal dunes and bluff

Riverine Erosion

Riverine erosion is similar to coastal erosion but occurs on a riverbed or riverbank rather than the coast. Riverine erosion is a natural process in almost any river but can be intensified by human influence. The variables that influence the stability (or erodibility) of stream banks in riverine erosion include:

- Critical height of the slope
- Inclination of the slope
- Cohesive strength of the soil in the slope
- Distance of the structure in question from the shoulder of the stream bank
- Degree of stabilization of the surface of the slope
- Level and variation of groundwater within the slope
- Level and variation in level of water on the toe of the slope
- Tractive shear stress of the soil
- Frequency of rise and fall of the surface of the stream

Riverine Scour

Riverine scour is caused by the immense force of water flowing and build up of ice in and around the river channels. Scour may have different influences depending on the stability of the river channels; material deposition and scour are constant issues in less stable braided channels, whereas more stable meandering channels have occasional scour resulting from human activities like boat wakes and dredging.

Often human influence in attempts to control scour often makes it worse, leading to progressed embankment loss or damage. Examples of control methods include groins, jetties, levees, or revetments.

3.3.8.2 History

The USACE completed an erosion assessment for Nome during their 2009 Alaska Baseline Erosion Assessment. The Erosion Information Paper dated January 7, 2008, states:

> *"Nome has both coastal and river erosion, primarily caused by storm surges with high tides and winds on Norton Sound. Two jetties, 200 and 400 feet long, were built between 1919 and 1935 to stabilize the Snake River mouth and estuary. The jetties contributed to beach erosion during severe storms in the late 1930s and 1940s.*
>
> *The new harbor entrance channel is reportedly causing erosion of the Snake Riverbank along Seppala Drive, which follows the Snake River to where it empties into the Nome Boat Harbor at Belmont Point. The eroding bank is 10 feet high Alaska Department of Transportation and Public Facilities (DOT&PF), funded through Federal Emergency Management Agency, was used in the recent past as an erosion protection measure. The present erosion area along Seppala Drive is less than 100 feet from the roadway; utility poles, telephone and cable lines, the airport runway, and airport facilities. The DOT&PF is planning to repair Seppala Drive in 2008.*
>
> *Additional erosion problems are accruing along the Nome-Council Road at the popular subsistence area locally called "Nook" at the southern extent of Safety Sound, and within the Nome city limits just east of Nome abutting the locally called "east beach" area. The road is used to access subsistence camps. Road substrate has been subject to significant erosion and is impacting road quality severely. During the recent*

coastal storms, listed below, portions of roads were closed to vehicle traffic resulting in stranded homes and property stressing Nome residents.

There were 3 major coastal erosion events during the last 20 years: in October 1994, September 2004, and October 2005, each involving about 600 linear feet along the beach. A seawall, constructed in 1949 and completed in 1951, extends 3,350 feet from the existing entrance channel of the port to the east along Front Street. The seawall is a rock-rivetted slope at a height of over 18 feet. The rocks used for the seawall came from Cape Nome, 13 miles east of Nome, at an estimated cost of $1 million. The state completed a 3,750-foot eastern extension of the seawall in 1993 to control significant erosion beyond the eastern edge of the seawall. The remaining beach in front of the wall has narrowed and become steeper, resulting in the potential for waves striking the wall to be larger. The City of Nome is responsible for maintaining the seawall. Annual maintenance is necessary." (USACE 2008a)

The USACE also completed an erosion assessment for Council during their 2009 Alaska Baseline Erosion Assessment. The Erosion Information Paper dated May 6, 2008, states:

"The Council community map completed by the State of Alaska Division of Community and Regional Affairs in 1980 indicates flood prone areas but does not delineate areas of erosion. No community erosion survey was completed, and no Corps information was found regarding erosion in Council. A National Oceanic and Atmospheric Administration National Climatic Data Center Event Record stated an October 2004 storm surge cut through the Nome-Council Road at Mile 22, resulting in the isolation of approximately 10 seasonally occupied residences in Council." (USACE 2008b)

USACE erosion information papers are not available for King Island or Solomon.

The Planning Team shared that erosion is occurring north of Nome, at Woolley Lagoon, an important recreational and subsistence site for the KINC.

3.3.8.3 Location

In Nome, erosion occurs along the Norton Sound shoreline, Snake River, and the Nome-Council Road (Figure 3-84 and Figure 3-86). A rock revetment was built east of the Snake River to just beyond Nome Bypass Road that mitigates erosion in front of the main town site. The revetment extends three miles to the Nome River and has resisted erosion from major storms but requires upkeep (USACE 2008a).

Woolley Lagoon, a subsistence area for the King Island Native Community, is being impacted by erosion (Figure 3-83). Strong storms, high tides, wind and waves, and flooding are causes of and factors contributing to erosion.

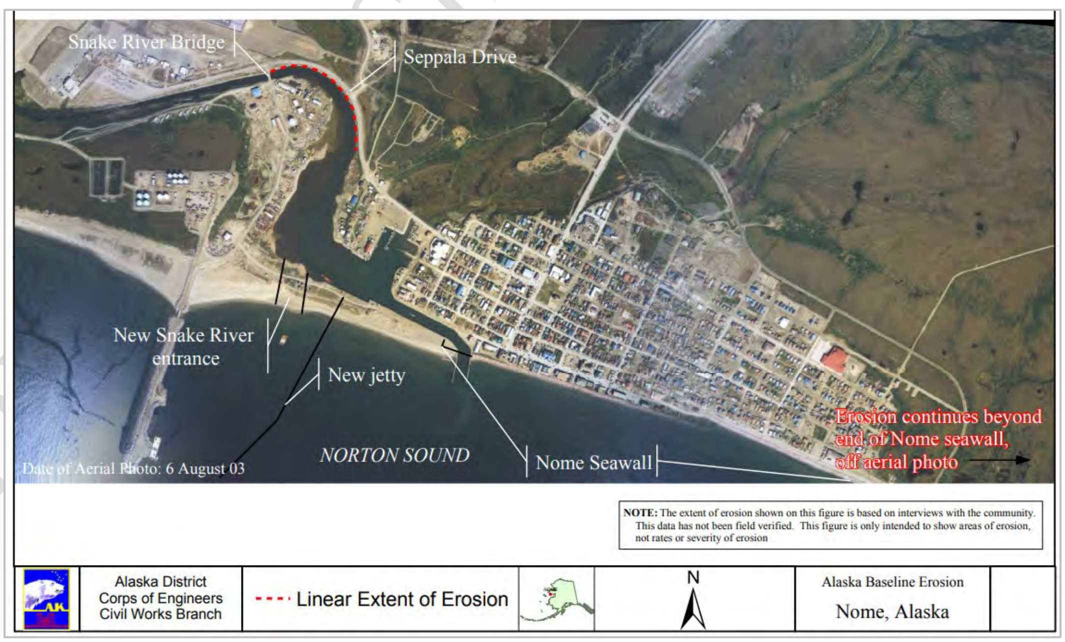
Photo Credit: Tom Thulen

Figure 3-83 Woolley Lagoon (2009)

The Planning Team shared that erosion is threatening subsistence areas and culturally sacred sites, such as cemeteries at Council and Solomon.

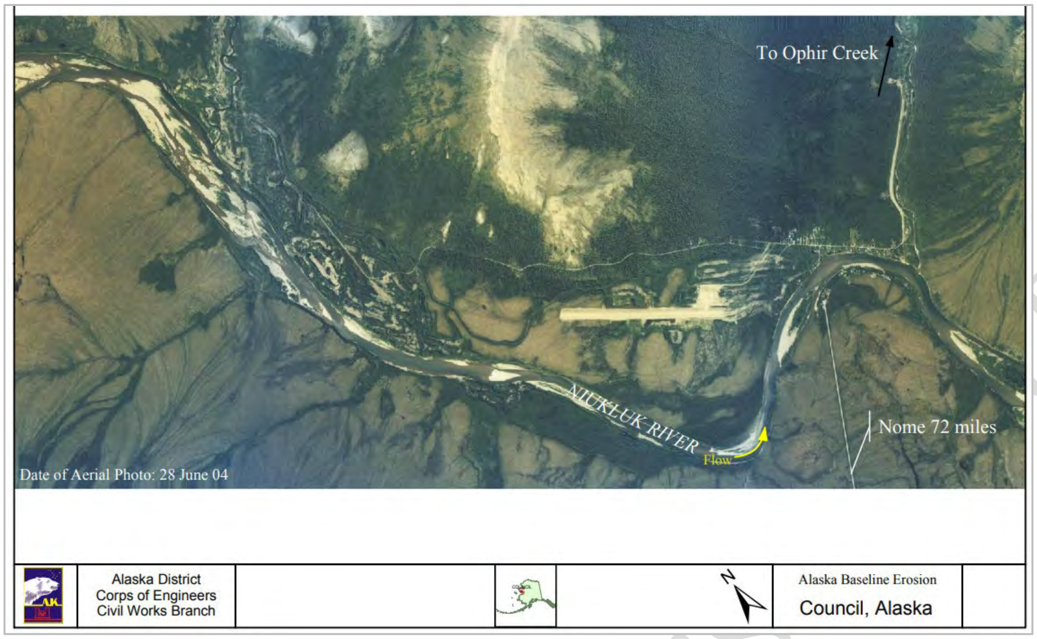
3.3.8.4 Extent (Magnitude/Severity)

The linear extent of erosion in Nome and Council are shown below (this information is not available for King Island or Solomon). These areas were identified by members of the community. The map is intended to show areas of erosion in Nome and does not provide rates or severity of erosion (USACE 2008a). No erosion areas were identified in Council (USACE 2008b).



Source: USACE 2008a

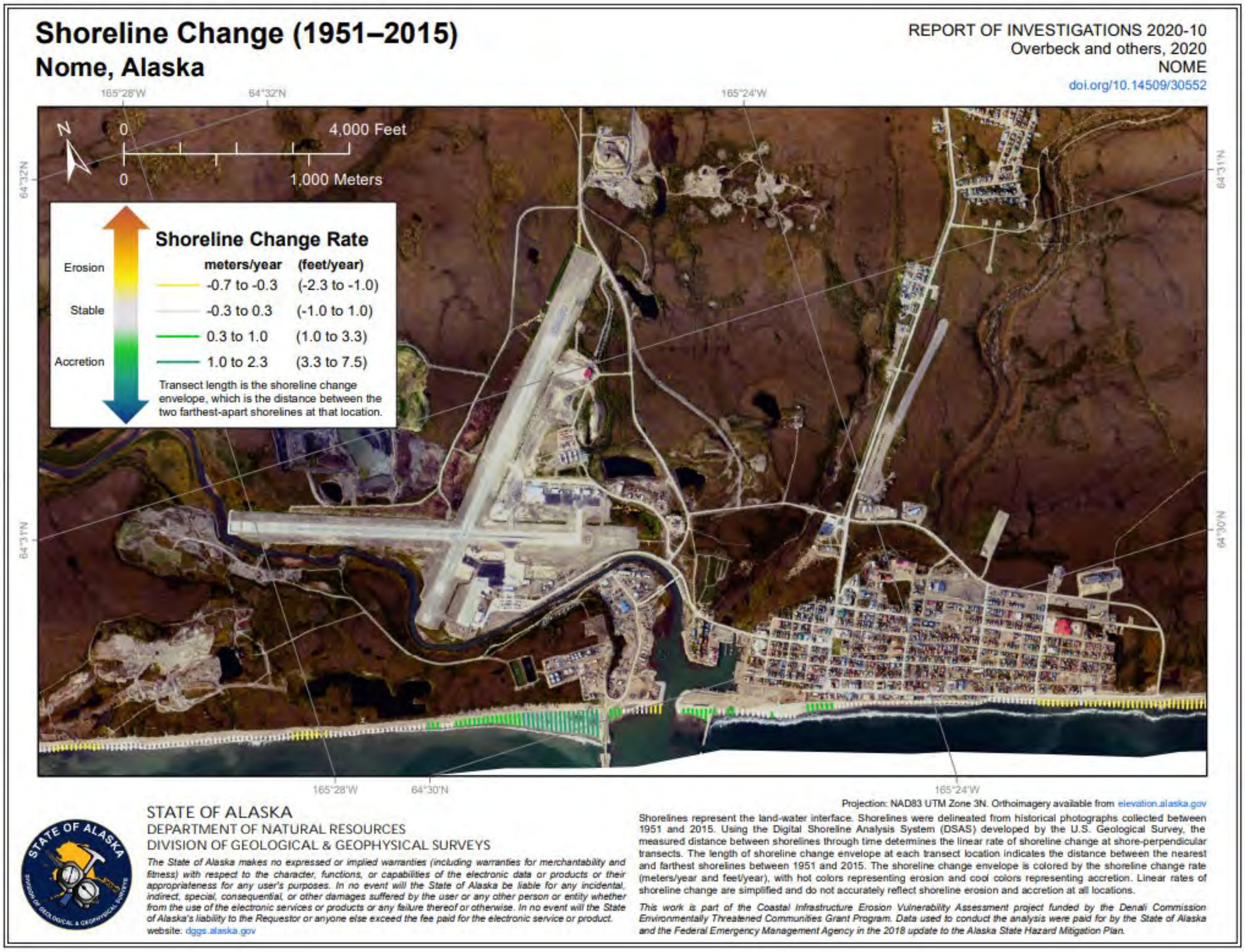
Figure 3-84 Linear Extent of Erosion in Nome (2008)



Source: USACE 2008b

Figure 3-85 Linear Extent of Erosion in Council (2008)

In 2020, DGGS published long-term shoreline change maps for 48 Alaska communities. In western Alaska, shoreline change was calculated by evaluating historical and recent aerial imagery of the communities (Overbeck et. al 2020). Shoreline change in Nome from 1951-2015 is shown in Figure 3-86 (this information was not available for King Island, Council, or Solomon). In Nome, the maximum rate of erosion during from 1951-2015 is estimated at **-2.3 feet per year** (ft/yr) with an uncertainty of +/-0.3 ft/yr.



Source: Overbeck et al. 2020- Shoreline change at Alaska coastal communities

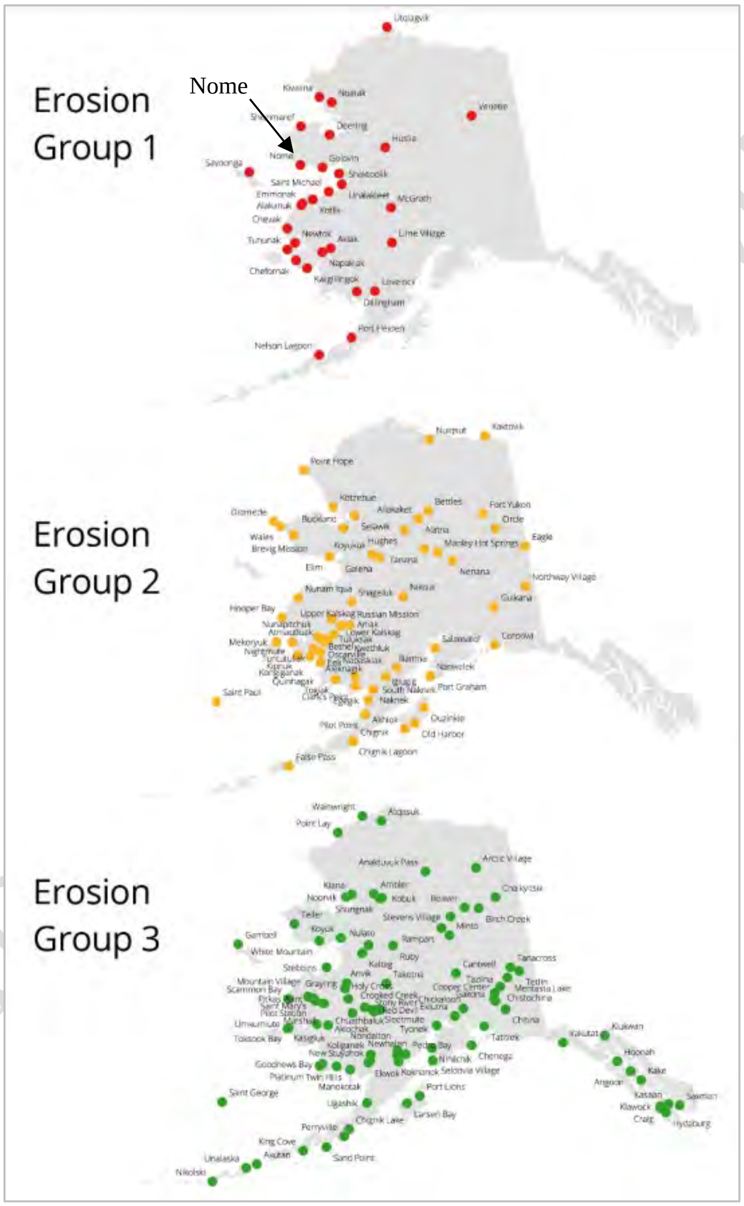
Figure 3-86 Shoreline Change in Nome (1951-2015)

A subsequent report by DGGS in 2021 (Erosion Exposure Assessment- Nome) summarizes the extent of erosion in Nome (Buzard et al. 2021). The report states:

"Nome is located on the southern coast of the Seward Peninsula along the Bering Sea facing Norton Sound. From 1951 to 2015, the shoreline remained mostly stable with erosion rates reaching up to 2.3 feet per year east of town (Overbeck and others, 2020). Erosion in Nome is primarily caused by storm surge flooding and wave action. Several major storms have impacted Nome (U.S. Army Corps of Engineers [USACE], 2008; City of Nome, 2017), but the beaches appear to have recovered to their original extent, resulting in relatively stable or slow long-term erosion trends.

A rock revetment was built east of the Snake River to just beyond Nome Bypass Road that mitigates erosion in front of the main town site. The revetment extends three miles to the Nome River and has resisted erosion from major storms but requires upkeep (USACE, 2008). ***Due to the relatively stable erosion trends and the extensive protection structures in place, we cannot forecast erosion at Nome.*** *Beach erosion can be measured from repeated beach elevation surveys using GPS or digital elevation models. DGGS collected beach elevations in 2012 and 2019. Continued monitoring and a longer record of beach elevation data can help identify whether and when infrastructure may become exposed to erosion."*

The Denali Commission 2019 Statewide Threat Assessment provides statewide risk ratings for erosion (Figure 3-87). Nome is located in Group 1, which are the communities that are most threatened by erosion. Group 1 indicates that erosion is commonly immediate to critical infrastructure. Damages resulting from a moderate flood or compounding erosion would impact community sustainability, present life safety concerns, affect access to emergency services, and/or require support from outside the region to assist the community in responding to the event. Communities that are included in Group 1 should direct resources towards determining the best response to the threat. Note that a community must have a short or mid-term time to damage rating to be included in Group 1.



Source: Denali Commission 2019

Figure 3-87 Statewide Erosion Threat Risk Map

Based past erosion events, shoreline change mapping, the 2019 Denali Commission Statewide Threat Assessment, and the criteria identified in Table 3-2, the magnitude and severity of erosion impacts in Nome, Council townsite, and Solomon townsite are considered Critical where injuries and/or illnesses could result in permanent disability, a complete shutdown of critical facilities may last for at least two weeks, and more than 25% of property would be severely damaged.

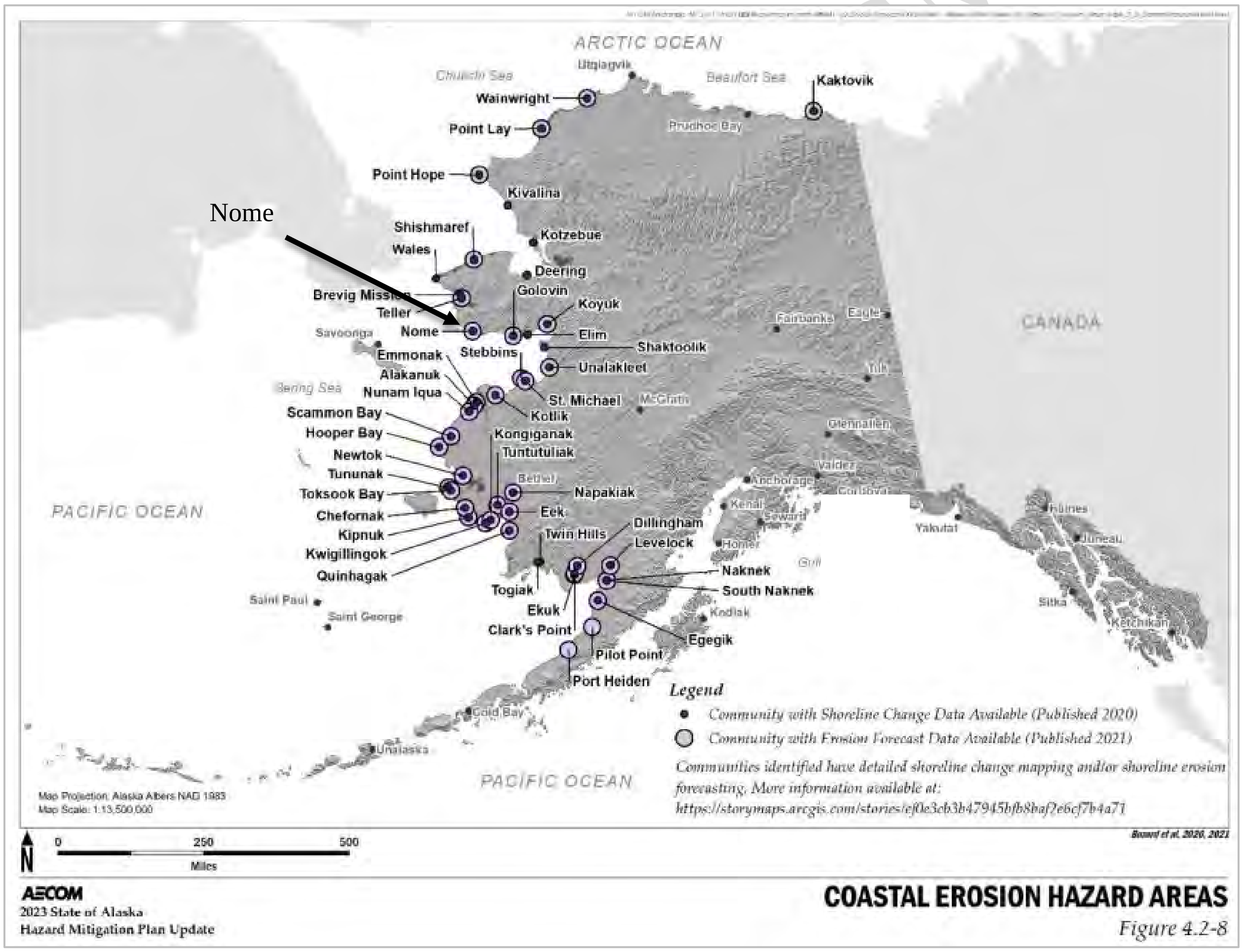
3.3.8.5 Impact

Impacts from erosion can range in severity and include loss of land and potentially any infrastructure built on the land. Other impacts include damage to public utilities (fuel headers and electric and water/wastewater utilities), loss of the Native aquatic habitats, high sediment loads reducing water quality, and economic impacts associated with the costs of trying to mitigate the impacts from erosion.

The Planning Team shared that their subsistence areas and culturally sacred sites such as their cemeteries are being impacted by erosion.

3.3.8.6 Probability of Future Events

The 2023 State of Alaska SHMP identifies coastal erosion hazard areas across the state. Nome is located in an identified coastal erosion hazard area.



Source: DHS&EM 2023

Figure 3-88 Statewide Coastal Erosion Hazard Areas

In Nome, a rock revetment was built east of the Snake River to just beyond Nome Bypass Road that mitigates erosion in front of the main town site. The revetment extends three miles to the Nome River and has resisted erosion from major storms but requires upkeep (USACE 2008a).

While this protection measure mitigates some erosion in Nome, additional erosion is anticipated during annual storms, such as the impacts from Typhoon Merbok.

Based on the 2007 USACE baseline erosion assessment, historical impacts, erosion shoreline change report and the criteria identified in Table 3-3, it is Likely that Nome, Council townsite, and Solomon townsite will experience erosion in the next three years; there is a 1 in 3 years chance of occurring (1/3=33%); and the history of events is greater than 20% but less than or equal to 33% likely per year.

There is unknown probability about future erosion events at King Island townsite.

3.3.8.7 Future Conditions Including Climate Change

Climate change is not anticipated to influence the nature of future erosion events in Nome.

Changing Factor due to Climate Change	Description of Future Changes due to Climate Change
Location	As the extent of erosion increases due to climate change, new facilities may be impacted that are not currently impacted by erosion.
Extent (Magnitude/Severity)	Increased severity and magnitude of winter storms, loss of coastal sea ice, sea level rise, and increased precipitation are already increasing the severity and magnitude of erosion events in Alaska, and the trend is expected to continue. This will lead to increased damage to infrastructure, especially in Alaska's coastal villages (Larsen et al. 2008).
Impact	The primary climatic forces affecting erosion are changes in temperature, water levels, precipitation, vegetation loss/changes, and storms. All of these factors are anticipated to be affected by climate change, which will result in increased localized impacts from erosion in Alaska.
Probability of Future Events	Increased precipitation, increased frequency and intensity of winter storms, and sea level rise are all expected to continue, which will continue to increase erosion events in Alaska (Larsen et al. 2008).

3.3.9 LANDSLIDE

Hazard applicability: ☑Nome ☑King Island townsite ☑Council townsite ☑Solomon townsite

3.3.9.1 Nature

Ground failure is a blanket term used to describe any ground movement mechanisms including avalanche, landslide, subsidence, and unstable soils gravitational or other soil movement. Soil movement may be caused by activities such as rain, snow, and/or water saturation induced avalanches or landslides. Seismic activity, melting permafrost, river or coastal embankment undercutting, or in combination with steep slope conditions are also conditions for soil movement.

Landslides are a dislodgment and fall of a mass of soil or rocks along a sloped surface, or for the dislodged mass itself. The term is used for varying phenomena, including mudflows, mudslides, debris flows, rock falls, rockslides, debris avalanches, debris slides, and slump-earth flows. The susceptibility of hillside and mountainous areas to landslides depends on variations in geology, topography, vegetation, and weather. Landslides may also be triggered or exacerbated by indiscriminate development of sloping ground, or the creation of cut-and-fill slopes in areas of unstable or inadequately stable geologic conditions.

Additionally, avalanches and landslides often occur secondary to other natural hazard events, thereby exacerbating conditions, such as:

- Earthquake ground movement can trigger events ranging from rock falls and topples to massive slides.
- Intense or prolonged precipitation can cause slope over-saturation and subsequent destabilization failures such as avalanches and landslides.
- Climate change-related drought conditions may increase wildfire conditions where a wildland fire consumes essential stabilizing vegetation from hillsides significantly increasing runoff and ground failure potential.

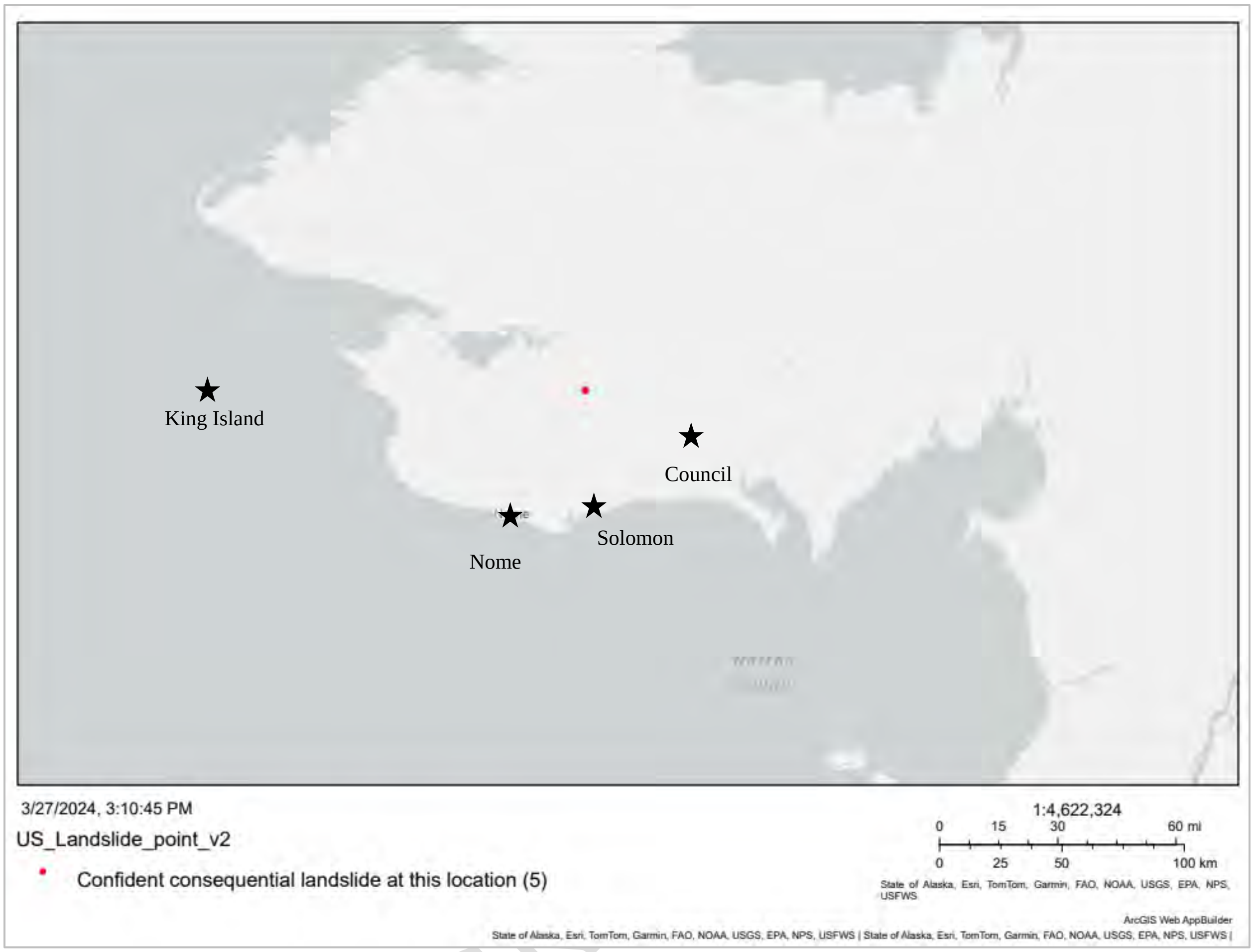
The USGS identifies six landslide types, distinguished by material type and movement mechanism including:

1. **Slides**, the more accurate and restrictive use of the term landslide, refers to a mass movement of material, originating from a discrete weakness area that slides from stable underlying material. A *rotational slide* occurs when there is movement along a concave surface; a *translational slide* originates from movement along a flat surface.
2. **Debris Flows** arise from saturated material that generally moves rapidly down a slope. A debris flow usually mobilizes from other types of landslides on a steep slope, and then flows through confined channels, liquefying and gaining speed. Debris flows can travel at speeds of more than 35 miles per hour (mph) for several miles. Other types of flows include debris avalanches, mudflows, creeps, earth flows, debris flows, and lahars.
3. **Lateral Spreads** are a type of landslide generally occurs on gentle slope or flat terrain. Lateral spreads are characterized by liquefaction of fine-grained soils. The event is typically triggered by an earthquake or human-caused rapid ground motion.
4. **Falls** are the free-fall movement of rocks and boulders detached from steep slopes or cliffs.
5. **Topples** are rocks and boulders that rotate forward and may become falls.
6. **Complex** is any combination of landslide types.

3.3.9.2 History

The Planning Team shared that northeast of Nome, the road near Salmon Lake moved entirely due to the land sliding and other subsistence areas surrounding Nome are beginning to slide. Landslides have been documented on King Island and continue to threaten the area. Landslides are also threatening the cemetery in Solomon and areas in Council.

Figure 3-89 shows historical landslides in the Nome area. This slide occurred on June 9, 2018, on the Kougarok Road/Nome-Taylor Highway near Salmon Lake. This event is labeled as “Moderate Rockfall” and caused $592 worth of damage with only maintenance and operations (M&O) and heavy machinery needed to repair the road. There is high confidence that another slide will occur here in the future.



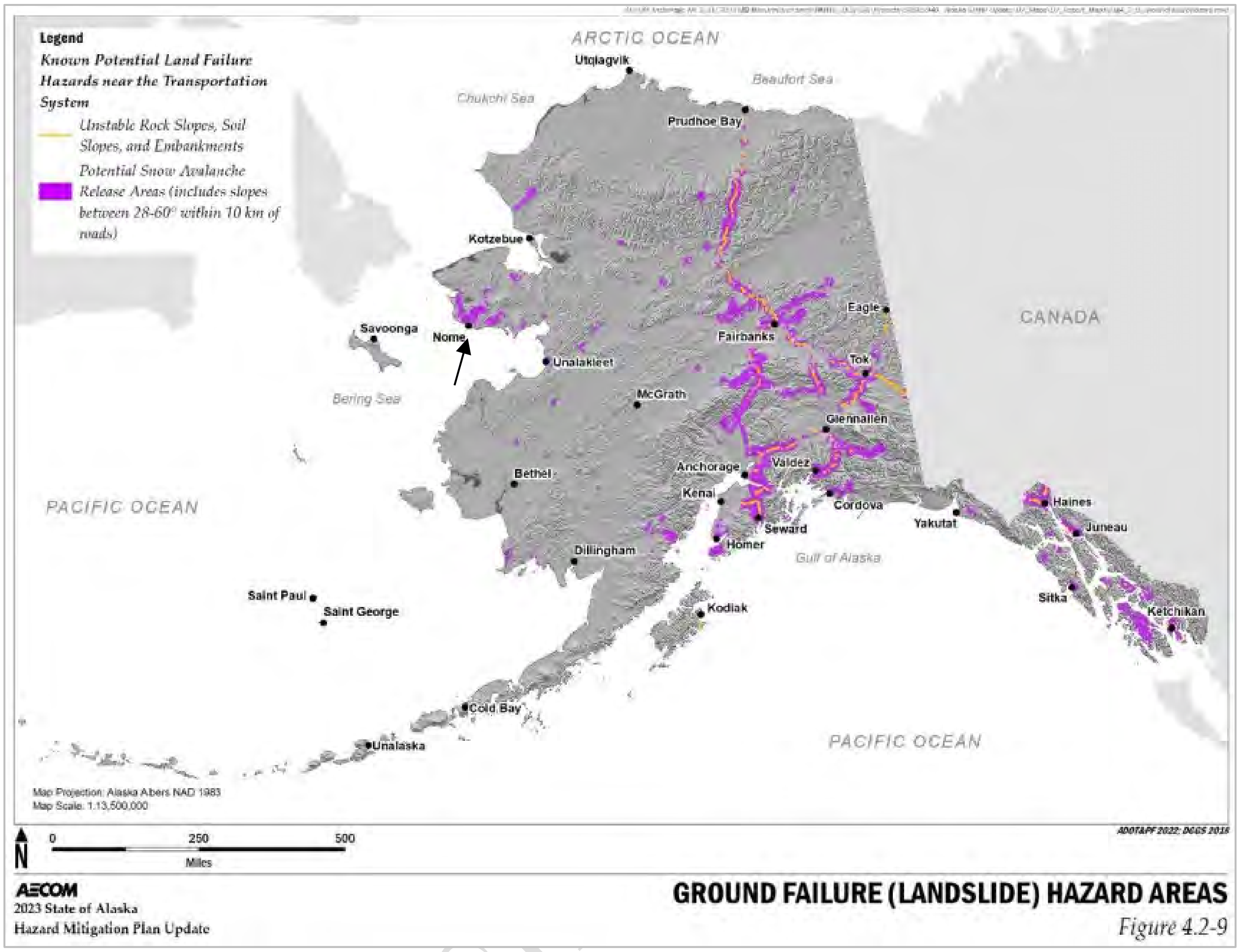
Source: AKDOT 2024

Figure 3-89 Historical Landslides in the Nome Area (December 2003 – 06/30/2022)

3.3.9.3 Location

The 2023 State of Alaska SHMP identifies land failure hazard locations across the state (Figure 3-90). Nome is located in a potential snow avalanche release and landslide area. These hazard areas are defined by slopes between 28-60º.

The cemetery at Solomon townsite is also threatened by landslides as heavy rains lead to unstable slopes.



Source: DHS&EM 2023

Figure 3-90 Landslide Hazard Areas in Alaska

3.3.9.4 Extent (Magnitude/Severity)

Damage from ground failure or landslides ranges from minor with minimal repairs required to a massive economic impact with the possible destruction of critical community infrastructure such as transportation or critical structures.

Based on past ground failure history and the criteria identified in Table 3-2, the extent of ground failure and resultant damages to people and infrastructure in Nome, King Island, Council, and Solomon is considered to be Limited with potential for critical facilities to be shut down for more than a week, where injuries and/or illnesses could result in permanent disability, and 10% of property or critical infrastructure being severely damaged.

3.3.9.5 Impact

Impacts associated with landslides include tsunamis, surface subsidence, infrastructure, building, and/or road damage. While ground failure itself may not pose a sudden and catastrophic threat, landslides may. Subsidence in bluffs may cause the ground to become less stable, potentially increasing the probability and impact of landsides.

3.3.9.6 Probability of Future Events

Based on previous occurrences and the criteria identified in Table 3-3, it is Possible that Nome, King Island townsite, Council townsite, and Solomon townsite will experience a landslide event in the next five years; there is a 1 in 5 years chance of occurring (1/5=20%); and the history of events is greater than 10% but less than or equal to 20% likely per year.

3.3.9.7 Future Conditions Including Climate Change

Climate change is not anticipated to impact the nature of future landslides in Nome, King Island townsite, Council townsite, and Solomon townsite.

Changing Factor due to Climate Change	Description of Future Changes due to Climate Change
Location	Landslides are projected to occur in areas where there is no history of previous events due to the destabilization of mountain slopes from thawing permafrost (IPCC 2019).
Extent (Magnitude/Severity)	Landslides are expected to increase in magnitude with increased areas of effect as permafrost thaws (IPCC 2019).
Impact	Landslides are projected to occur in areas where there is no history of previous events due to the destabilization of mountain slopes from thawing permafrost (IPCC 2019), which could increase future impacts to Nome, King Island townsite, Council townsite, and Solomon townsite.
Probability of Future Events	An increase in storms and rainfall as well as destabilization of mountain slopes is anticipated to support an increase in landslides.

3.4 SUMMARY OF VULNERABILITY

This section outlines the risk and vulnerability processes from various hazard impacts in determining potential losses for the community.

This section addresses the remaining portion of Element B of the Tribal Mitigation Plan regulation checklist.

Regulation Checklist- 44 CFR § 201.7 Tribal Mitigation Plans
ELEMENT B. Hazard Identification and Risk Assessment
B3. Does the plan include a description of each identified hazard's impact, as well as an overall summary of the vulnerability of the tribal planning area? [44 CFR § 201.7©(2)(ii)]
Source: FEMA 2017 (Tribal)

3.4.1 OVERVIEW

A vulnerability analysis estimates the exposure extent that may result from a hazard event, within a given area and with a given intensity. This analysis provides quantitative data that may be used to identify and prioritize potential mitigation measures. This then allows the communities to focus their efforts and attention on areas with the greatest risk of damage.

Tribal members of the Nome Area Tribes are year-round residents of Nome, and all of the Tribes have assets in the Nome Area. Therefore, those assets are located in the same geographic area and thus experience the same vulnerability to hazards. However, King Island, Council, and Solomon's historic townsites are located outside of Nome, and will have different vulnerability to natural hazards.

The following tables provide an overview of the Nome Area Tribes' hazard vulnerability.

Table 3-14 Nome Area Vulnerability Overview (All Tribes)

Hazard	Nome Area Hazard Vulnerability (applicable for all Tribes)			
	% of Jurisdiction's Geographic Area	% of Population	% of Residences	% of Critical Facilities
Earthquake	100	100	100	100
Severe Weather	100	100	100	100
Wildland/Tundra Fire	100	100	100	100
Changes in the Cryosphere (permafrost & sea ice)	100	100	100	100
Radon	100	100	Radon is a public health concern but is not anticipated to impact infrastructure.	
Flood	10	3	2	31
Tsunami	10	3	2	31
Erosion	5	0	0	0
Landslide	5	0	0	0

Table 3-15 King Island Historic Townsite Vulnerability Overview

<table>
<tr><th rowspan="2">Hazard</th><th colspan="4">King Island's Hazard Vulnerability</th></tr>
<tr><th>% of Jurisdiction's Geographic Area</th><th>% of Population</th><th>% of Residences</th><th>% of Critical Facilities</th></tr>
<tr><td>Earthquake</td><td>100</td><td>N/A</td><td>N/A</td><td>100</td></tr>
<tr><td>Severe Weather</td><td>100</td><td>N/A</td><td>N/A</td><td>100</td></tr>
<tr><td>Wildland/Tundra Fire</td><td colspan="4">Hazard does not exist in this location.</td></tr>
<tr><td>Changes in the Cryosphere (permafrost)</td><td>100</td><td>N/A</td><td>N/A</td><td>100</td></tr>
<tr><td>Radon</td><td>100</td><td>N/A</td><td>N/A</td><td>Radon is a public health concern but is not anticipated to impact infrastructure.</td></tr>
<tr><td>Flood</td><td colspan="4" rowspan="3">Hazard does not exist in this location.</td></tr>
<tr><td>Tsunami</td></tr>
<tr><td>Erosion</td></tr>
<tr><td>Landslide</td><td>100</td><td>N/A</td><td>N/A</td><td>100</td></tr>
</table>

N/A: Not Applicable. There is no resident population on King Island nor occupied residences. Tribal members travel to the island during the summer for subsistence purposes.

Table 3-16 Council Historic Townsite Vulnerability Overview

<table>
<tr><th rowspan="2">Hazard</th><th colspan="4">Council's Hazard Vulnerability</th></tr>
<tr><th>% of Jurisdiction's Geographic Area</th><th>% of Population</th><th>% of Residences</th><th>% of Critical Facilities</th></tr>
<tr><td>Earthquake</td><td>100</td><td>100</td><td>100</td><td>100</td></tr>
<tr><td>Severe Weather</td><td>100</td><td>100</td><td>100</td><td>100</td></tr>
<tr><td>Wildland/Tundra Fire</td><td>100</td><td>100</td><td>100</td><td>100</td></tr>
<tr><td>Changes in the Cryosphere (permafrost)</td><td>100</td><td>100</td><td>100</td><td>100</td></tr>
<tr><td>Radon</td><td>100</td><td>100</td><td colspan="2">Radon is a public health concern but is not anticipated to impact infrastructure.</td></tr>
<tr><td>Flood</td><td>100</td><td>100</td><td>100</td><td>100</td></tr>
<tr><td>Tsunami</td><td colspan="4">Hazard does not exist in this location.</td></tr>
<tr><td>Erosion</td><td>100</td><td>100</td><td>100</td><td>100</td></tr>
<tr><td>Landslide</td><td>100</td><td>100</td><td>100</td><td>100</td></tr>
</table>

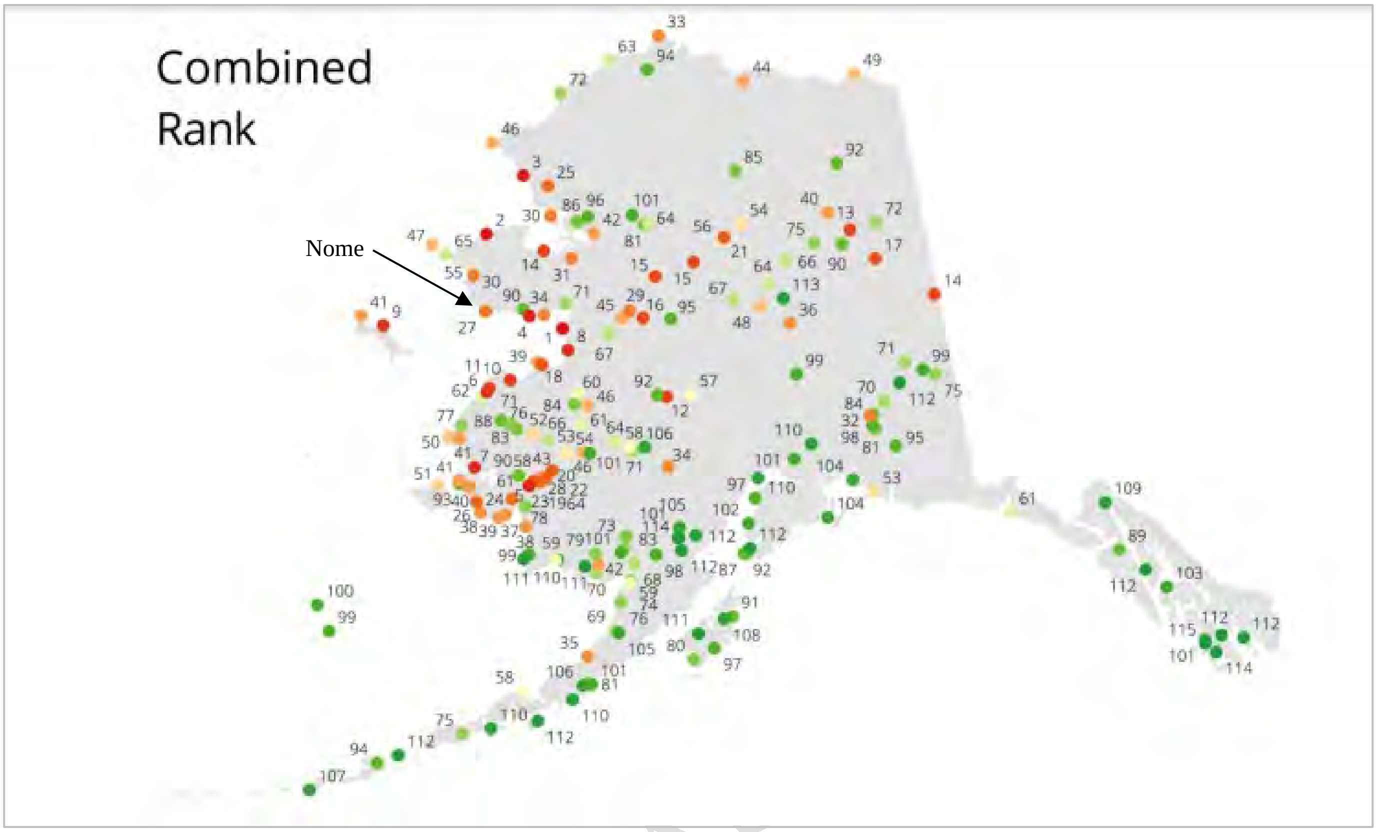
Note: There is no resident population in Council nor year-round occupied residences. Tribal members travel to the community during the summer for subsistence purposes.

Table 3-17 Solomon Historic Townsite Vulnerability Overview

Hazard	Solomon's Hazard Vulnerability			
	% of Jurisdiction's Geographic Area	% of Population	% of Residences*	% of Critical Facilities
Earthquake	100	100	100	100
Severe Weather	100	100	100	100
Wildland/Tundra Fire	100	100	100	100
Changes in the Cryosphere (permafrost & sea ice)	100	100	100	100
Radon	100	100	Radon is a public health concern but is not anticipated to impact infrastructure.	
Flood	80	100	100	68
Tsunami	80	100	100	68
Erosion	65	75	75	68
Landslide	5	0	0	0

*Note: There is no resident population in Solomon nor year-round occupied residences. Tribal members travel to the community during the summer for subsistence purposes and to run the Solomon BnB.

The 2019 Denali Commission 2019 Statewide Threat Assessment provides a map of the combined threat for the 187 rural communities evaluated in the study (Figure 3-91). The communities with the greatest combined threat are dark red while the communities with the lowest combined threat are shown in dark green. The color gradient shown in the legend depicts the relative ranking of all communities. Overall, Nome ranked 27 out of 115 (dark orange). King Island, Council, and Solomon were not included in this study.



Source: Denali Commission 2019

Figure 3-91 Statewide Combined Threat Risk Map (Nome)

3.4.2 POPULATION AND BUILDING STOCK

Population data for Nome was obtained from the DCRA's 2022 certified population data. There is no year-round population in King Island, Council, or Solomon.

Estimated replacement values for residential building structures were obtained from the 2022 US Census, which estimated the median home value per structure in Nome was $333,300. Replacement costs in Alaska typically exceed US Census structure estimates due to material purchasing, barge or airplane delivery, and construction in Alaska, therefore, residential replacement values are generally understated.

The United States Department of Housing and Urban Development (HUD) estimates an average 3-bedroom residential structure in Nome, King Island, Council, and Solomon has a replacement value of $724,888 (HUD 2022). The more conservative HUD approximation for replacement value was used for this analysis. A total of 1,495 housing units (Nome) were considered in this analysis. No residential properties in King Island, Council, or Solomon were used in the analysis as the historic townsites are primarily used for subsistence activities in the summer months.

Table 3-18 Nome Estimated Population and Building Inventory

Population	Residential Buildings	
DCCED 2022 Data	Total Housing Units (2021 Census data)	Total Value of Buildings*
3,469	1,495	US Census: $498,283,500 HUD: **$1,083,707,560** (used for analysis)

Sources: US Census 2022- Nome city population data, DCRA 2024, HUD 2022.

*The 2021 US Census estimates median house value at $333,300. However, the United States Department of Housing and Urban Development (HUD) determined that the average structural replacement value of a 3-bedroom residential building in Nome, King Island, Council, and Solomon is $724,888 per structure.

3.4.3 VULNERABILITY ASSESSMENT METHODOLOGY

To complete this analysis, the Planning Team, along with Fairweather Science, used the DCRA community profiles (Council and Solomon- 1980), available community planning documents (LEDPs) and the 2016 City of Nome HMP as the basis for critical facilities in Nome as well as the Tribes' historic townsites. The Planning Team provided information on newly constructed or deconstructed facilities and these critical facilities were then mapped in relation to a potential hazard's threat exposure and vulnerability.

Hazard	Methodology
Earthquake Severe Weather	It is assumed that the entire Planning Area is threatened by earthquakes and severe weather. DGGS's Quaternary Fault and Folds Database was used to determine which faults are near the Villages and an earthquake risk map (Figure 3-10) was used to determine the potential PGA and resultant damages/intensity at each location. ☑Nome ☑King Island townsite ☑Council townsite ☑Solomon townsite
Wildland/ Tundra Fire	It is assumed that all identified critical facilities are threatened by wildland/tundra fire. ☑Nome ☑Council townsite ☑Solomon townsite
Changes in the Cryosphere	Permafrost hazard areas were determined by using a permafrost zones layer on ArcGIS. Any facilities with underlying permafrost were labeled as threatened by thawing permafrost. ☑Nome ☑King Island townsite ☑Council townsite ☑Solomon townsite
	Sea ice hazards are not anticipated to cause infrastructure damage. Impacts from the decrease in sea ice extent is discussed with impacts to subsistence and food sovereignty. ☑Nome ☑King Island townsite ☑Solomon townsite
Radon	Radon hazard areas were determined by EPA's radon zones map of radon exposure in the Nome area. Radon exposure is a public health concern, but is not anticipated to cause infrastructure damage. ☑Nome ☑King Island townsite ☑Council townsite ☑Solomon townsite
Flood	The City of Nome participates in NFIP and the 5/3/2010 FIRM maps were used to determine facilities at risk of flooding. For King Island, Council, and Solomon, critical facilities threatened by flooding, were determined by the Planning Team, historically flooded locations/facilities, DCRA community profile maps, and agency reports. ☑Nome ☑Council townsite ☑Solomon townsite
Tsunami	None of the communities have tsunami inundation mapping. The same methodology used to determine flood hazard areas was used to estimate potential damages from a tsunami until formal inundation mapping is completed. ☑Nome ☑Solomon townsite
Erosion	Erosion hazard areas were determined by the Planning Team, agency reports (DGGS, USACE), and other scientific studies. ☑Nome ☑Council townsite ☑Solomon townsite
Landslide	Landslide hazard areas were determined by the Planning Team as well as historical landslides in Alaska DOT's historical landslide inventory.

Hazard	Methodology
	☑Nome ☑King Island townsite ☑Council townsite ☑Solomon townsite

An analysis was conducted to assess the risks of each identified hazard. This analysis looked at the potential effects of each hazard on values of critical facilities at risk without considering the probability or level of damage. The analysis also represents the number of people at risk from each hazard but does not estimate the number of potential injuries or deaths.

3.4.4 DATA LIMITATIONS

The provided vulnerability estimates use the best data currently available, and the methodologies used result in a risk approximation. These estimates may be used to understand relative risk from hazards and potential losses. However, uncertainties are inevitable in any loss estimation. This is due in part from incomplete scientific knowledge or data concerning hazards and their effects on the built environment. As well as the use of approximations and simplifications, when necessary, for a comprehensive analysis.

It should be noted that the results from the quantitative vulnerability assessment are limited to the exposure of people, buildings, and critical facilities and infrastructure to the identified hazards. It was beyond the scope of this MJHMP to develop a more detailed or comprehensive assessment of risk. A more comprehensive assessment may include loss of facility/system function, annualized losses, people injured or killed, shelter requirements, and/or economic losses. Such impacts may be addressed with future updates of this MJHMP or other planning documents.

3.4.5 ASSET INVENTORY

Assets that may be affected by hazard events include population, residential buildings, and critical facilities and infrastructure.

A critical facility is defined as a facility that provides essential products and services to the public. Critical facilities assist in preserving the quality of life in Nome (and the historic townsites) and fulfilling important public safety, emergency response, and disaster recovery functions.

The critical facilities profiled in this plan include the following:

- Transportation Facilities & Equipment
- Emergency Services
- Medical Facilities
- Education Facilities
- Utilities
- Shelters
- Community Facilities

Table 3-19 Critical Facilities in Nome That Are Utilized By All Tribes In The Area

Facility Type	# of Occupants	Facility Name	Address	Latitude	Longitude	Facility Value	Building Type	Facility Owner	Cryosphere	Earthquake	Flood	Erosion	Landslide	Severe Weather	Tsunami	Volcano	Wildfire	Radon
Transportation & Equipment	30	Airport – Cargo, Passenger Lynden, NAC, AK Air, Bering)		64°30’39”N	165°26’40”W	$80,000,000	-	SOA/ Private	x	x	x			x	x		x	
	0	Airport Runways (Engstrom’s, City, State)		64°30’39”N	165°26’40”W	$3,000,000	-	SOA	x	x				x			x	
	0	Heavy Equipment- Tumet		64°32’14”N	165°24’35”W	$50,000,000	-	Private	x	x				x			x	
	0	Heavy Equipment- DOT/PF		64°32’32”N	165°24’30”W	$50,000,000	-	SOA	x	x				x			x	
	0	Heavy equipment/Rock quarry Cape Nome Quarry		64°26’13”N	165°00’26”W	$100,000,000	-	Private	x	x				x			x	
	0	Grader Greg- Heavy Equipment storage		64°30’20”N	165°23’56”W	$948,130	W2	CON	x	x				x			x	
	0	Small Boat Harbor		64°30’05”N	165°25’12”W	$5,000,000	-	CON	x	x	x			x	x		x	
	0	Port, Cape Nome - BSNC		64°29’37”N	165°26’22”W	$100,000,000	-	Private	x	x	x			x	x		x	
	5	Port office building		64°30’08”N	165°25’16”W	$120,668	W2	CON	x	x	x			x	x		x	
	0	Port/ Shipping Services Alaska Logistics, AML – Barges		64°30’07”N	165°26’02”W	$20,000,000	-	Private	x	x				x			x	
Emergency Services	5	Police station/animal shelter		64°30’18”N	165°23’43”W	$13,276,363	W2	CON	x	x				x			x	
	2	Fire/Building Inspector Department		64°30’05”N	165°24’29”W	$2,451,269	W2	CON	x	x				x			x	
	4	Fire Dept- Icy View Station		64°31’10”N	165°22’28”W	$354,874	W2	CON	x	x				x			x	
	2	Search and rescue team 3-129ldg..		64°30’05”N	165°24’29”W	$750,000	W2	CON	x	x				x			x	

Facility Type	# of Occupants	Facility Name	Address	Latitude	Longitude	Facility Value	Building Type	Facility Owner	Cryosphere	Earthquake	Flood	Erosion	Landslide	Severe Weather	Tsunami	Volcano	Wildfire	Radon
Medical	20	Health NSHC Facilities		64°29’53”N	165°22’46”W	$1,000,000	W2	NSHC	x	x				x			x	
Education	20	Nome Elementary School		64°29’51”N	165°22’59”W	$2,500,000	W2	CON	x	x				x			x	
	75	Nome High School		64°32’31”N	165°24’18”W	$2,500,000	W2	CON	x	x				x			x	
	75	Nome Charter School		64°32’32”N	165°24’26”W	$2,500,000	W2	CON	x	x				x			x	
	30	Nome Preschool		64°29’48”N	165°22’56”W	$2,500,000	W2	CON	x	x				x			x	
Utilities	0	Fuel/Tank farm (Bonanza, Crowley, NJUS)		64°30’11”N	165°26’15”W	$70,000,000	OTF	Private	x	x				x			x	
	0	Utility System – Nome joint utility system		64°30’23”N	165°25’45”W	$100,000,000	-	CON/ NJUS	x	x	x			x	x		x	
	5	Public works building		64°29’53”N	165°24’34”W	$1,748,241	W2	CON	x	x	x			x	x		x	
Shelters	50	Aurora Inn – room, rental, BSNC		64°29’47”N	165°23’51”W	$3,000,000	W2	Private	x	x	x			x	x		x	
	0	Old Youth Facility – rooms, rental		64°29’48”N	165°23’08”W	$2,000,000	W2	Private	x	x				x			x	
	15	Bering Sea Women’s – for women and children		64°30’06”N	165°24’33”W	$4,000,000	W2	Non-profit	x	x				x			x	
	20	BSRHA/Munqsri/NEST at winter houses homeless population (elder and special needs population)		64°29’57”N	165°24’29”W	$2,000,000	W2	Non-profit	x	x				x			x	
	15	Office building Kawerak Facilities (main, old)		64°30’03”N	165°24’40”W	$20,000,000	W2	Kawerak	x	x				x			x	
	5	Kawerak Head Start		64°29’55”N	165°23’16”W	$3,419,000	W2	Kawerak	x	x				x			x	
	3	Office Building Old Federal Building – BSNC		64°29’51”N	165°24’19”W	$2,000,000	W2	Private	x	x	x			x	x		x	

Facility Type	# of Occupants	Facility Name	Address	Latitude	Longitude	Facility Value	Building Type	Facility Owner	Cryosphere	Earthquake	Flood	Erosion	Landslide	Severe Weather	Tsunami	Volcano	Wildfire	Radon
Community	3	USPS		64°29’49”N	165°24’19”W	$2,000,000	W2	USPS	x	x	x			x	x		x	
	20	Prison–Anvil Mountain Correctional Center		64°32’14”N	165°24’46”W	$5,000,000	W2	SOA	x	x				x			x	
	15	Prison–Seaside Center – privately owned		64°29’50”N	165°24’14”W	$1,000,000	W2	Private	x	x	x			x	x		x	
	0	Building/fire inspector		64°30’05”N	165°24’29”W	$2,451,269	W2	CON	x	x				x			x	
	0	Garco		64°30’05”N	165°25’58”W	$935,922	W2	CON	x	x	x			x	x		x	
	0	Landfill/dump building combined		64°31’19”N	165°16’53”W	$1,062,212	W2	CON	x	x				x			x	
	2	Library, museum-old		64°30’10”N	165°23’55”W	$4,566,689	W2	CON	x	x				x			x	
	1	Mini Convention Center		64°29’53”N	165°24’48”W	$1,242,473	W2	CON	x	x	x			x	x		x	
	2	Cemetery Morgue		64°30’14”N	165°25’17”W	$423,847	W2	CON	x	x				x			x	
	0	Community Cemetery		64°30’18”N	165°25’16”W	$2,500,000	-	CON	x	x				x			x	
	0	NEC Cemetery		64°30’05”N	165°26’21”W	$2,500,000	-	CON	x	x				x			x	
	0	Fort Davis Post Cemetery		64°29’13”N	165°18’36”W	$2,500,000	-	CON	x	x				x			x	
	1	St. Joe’s Church		64°29’56”N	165°24’07”W	$2,720,269	W2	CON	x	x				x			x	
	5	Recreation Center		64°30’04”N	165°23’44”W	$8,573,948	W2	CON	x	x				x			x	
	2	Richard Foster museum/library		64°30’10”N	165°23’55”W	$21,091,545	W2	CON	x	x				x			x	
	2	Visitor Center		64°29’52”N	165°24’36”W	$275,957	W2	CON	x	x	x			x	x		x	
	15	XYZ Senior Center		64°29’54”N	165°24’34”W	$2,399,029	W2	CON	x	x	x			x	x		x	
	0	NACTEC 3-131ldg. and garage		64°32’35”N	165°24’12”W	$3,179,121	W2	CON	x	x				x			x	
	7	Grocery Store- AC		64°30’20”N	165°24’18”W	$5,000,000	W2	Private	x	x				x			x	
	7	Grocery Store- Hanson’s		64°30’03”N	165°24’29”W	$5,000,000	W2	Private	x	x				x			x	
	3	Hardware Stores- Grizzley		64°30’21”N	165°24’03”W	$3,000,000	W2	Private	x	x				x			x	
	3	Hardware Store- Builder’s Industrial Supply		64°30’06”N	165°24’56”W	$3,000,000	W2	Private	x	x	x			x	x		x	
	10	Fish Plant (NSEDC)		64°30’05”N	165°25’19”W	$10,000,000	W2	NSEDC	x	x	x			x	x		x	

Facility Type	# of Occupants	Facility Name	Address	Latitude	Longitude	Facility Value	Building Type	Facility Owner	Cryosphere	Earthquake	Flood	Erosion	Landslide	Severe Weather	Tsunami	Volcano	Wildfire	Radon
	5	Credit Union 1		64°30’03”N	165°24’31”W	$1,666,667	W2	Private	x	x				x			x	
	5	Wells Fargo		64°29’49”N	165°24’17”W	$1,666,667	W2	Private	x	x	x			x	x		x	
	5	Northrim Bank		64°30’08”N	165°24’21”W	$1,666,667	W2	Private	x	x				x			x	
	3	Court house in old hospital		64°30’08”N	165°24’21”W	$1,000,000	W2	Private	x	x				x			x	
	1	Pioneer Hall – cooking facilities		64°29’49”N	165°24’06”W	$2,000,000	W2	Private	x	x				x			x	
	5	Churches – cooking facilities (Multiple locations)				$50,000,000	W2	Non-profit	x	x				x			x	
	0	Armory – gym facility		64°29’46”N	165°23’55”W	$2,000,000	W2	SOA	x	x	x			x	x		x	

Total: **503** **Total:** **$795,490,826**

Figure 3-92 shows the location of critical facilities in Nome that all of the Tribes rely on. The majority of these facilities are owned by the City of Nome or State of Alaska.

Figure 3-92 Map of Critical Facilities in Nome (Utilized by all of the Tribes)

Table 3-20 Nome Eskimo Community Critical Facilities in Nome

Nome Eskimo Community's Assets in Nome																		
Facility Type	# of Occupants	Facility Name	Address	Latitude	Longitude	Facility Value	Building Type	Facility Owner	Cryosphere	Earthquake	Flood	Erosion	Landslide	Severe Weather	Tsunami	Volcano	Wildfire	Radon
Government	5	Tribal Offices and Hall		64°30'04"N	165°24'11"W	$1,000,000	W2	NEC	x	x				x			x	
Community	0	Empty lot		64°29'46"N	165°23'33"W	$100,000	Gravel	NEC	x	x	x			x	x		x	
	0	Culturally Sacred or Significant Sites																
	0	Subsistence Camps																
Total:	**5**				**Total:**	**$1,100,000**												

The locations of culturally sacred sites and subsistence camps are sensitive. Contact the Tribal office if you need further information

Figure 3-93 Map of Nome Eskimo Community's Critical Facilities in Nome

Table 3-21 King Island Native Community Critical Facilities

King Island Native Community's Assets in Nome																			
Facility Type	# of Occupants	Facility Name	Address	Latitude	Longitude	Facility Value	Building Type	Facility Owner	Cryosphere	Earthquake	Flood	Erosion	Landslide	Severe Weather	Tsunami	Volcano	Wildfire	Radon
Government	3	Tribal Offices and Hall		64°29'49"N	165°23'15"W	$1,000,000	W2	KINC IRA	x	x				x			x	
Community	4	1 duplex in town		64°29'53"N	165°23'22"W	$500,000	W2	KINC IRA	x	x				x			x	
	8	2 duplex in Icy View		64°31'19"N	165°22'21"W	$700,000	W2	KINC IRA	x	x				x			x	
	1	Old Grizzley shop		64°31'18"N	165°22'18"W	$1,000,000	W2	KINC IRA	x	x				x			x	
	0	Vacant lot		64°30'08"N	165°23'55"W	$100,000	Gravel	KINC IRA	x	x				x			x	
	0	Woolley Lagoon		64°51'20"N	166°24'01"W	$750,000	N/A	Corporation	x	x				x			x	
	0	Culturally Sacred or Significant Sites																
	0	Subsistence Camps																
Total:	**16**				**Total:**	**$4,050,000**												

King Island Native Community's Assets in King Island																			
Facility Type	# of Occupants	Facility Name	Address	Latitude	Longitude	Facility Value	Building Type	Facility Owner	Cryosphere	Earthquake	Flood	Erosion	Landslide	Severe Weather	Tsunami	Volcano	Wildfire	Radon
Community	0	Former BIA School		64°57'41"N	168°04'15"W	Unknown	W2	Corporation	x	x			x	x				
	0	Cemetery		64°57'43"N	168°04'15"W	Unknown	N/A	Corporation	x	x			x	x				
	0	Old Church		64°57'41"N	168°04'14"W	Unknown	W2	Corporation	x	x			x	x				
	0	Culturally Sacred or Significant Sites																
	0	Subsistence Camps																
Total:	**0**				**Total:**	**Unknown**												

Radon is a public health concern but is not anticipated to impact infrastructure.
The locations of culturally sacred sites and subsistence camps are sensitive. Contact the Tribal office if you need further information

Figure 3-94 Map of King Island's Critical Facilities in Nome

Figure 3-95 Map of King Island's Critical Facilities on King Island

Table 3-22 Native Village of Council Critical Facilities

Native Village of Council's Assets in Nome																		
Facility Type	# of Occupants	Facility Name	Address	Latitude	Longitude	Facility Value	Building Type	Facility Owner	Cryosphere	Earthquake	Flood	Erosion	Landslide	Severe Weather	Tsunami	Volcano	Wildfire	Radon
Government	3	Tribal Office		64°29'54"N	165°23'19"W	$300,000	W2	NVC	x	x				x			x	
Community	0	Culturally Sacred or Significant Sites																
	0	Subsistence Camps																
Total:	**3**				**Total:**	**$300,000**												

Native Village of Council's Assets in Council																		
Facility Type	# of Occupants	Facility Name	Address	Latitude	Longitude	Facility Value	Building Type	Facility Owner	Cryosphere	Earthquake	Flood	Erosion	Landslide	Severe Weather	Tsunami	Volcano	Wildfire	Radon
Utility/ Transportation	0	Pumphouse		64°53'39"N	163°40'24"W	$100,000	W2	None	x	x	x	x		x			x	
	0	1300 ft airstrip		64°53'44"N	163°41'40"W	$5,000,000	Gravel	SOA	x	x	x	x		x			x	
Community	0	Camp Bendeleben		64°53'33"N	163°40'26"W	$300,000	W2	CNC	x	x			x	x				
	0	Community Building		64°53'37"N	163°40'13"W	$200,000	W2	NVC	x	x			x	x				
	0	Fish Camps		64°53'40"N	163°40'35"W	$200,000	W2	Private	x	x			x	x				
	0	Cemetery		64°53'56"N	163°40'47"W	$250,000												
	0	Culturally Sacred or Significant Sites																
	0	Subsistence Camps																
Total:	**0**				**Total:**	$6,050,000												

Radon is a public health concern but is not anticipated to impact infrastructure.
The locations of culturally sacred sites and subsistence camps are sensitive. Contact the Tribal office if you need further information or assistance.

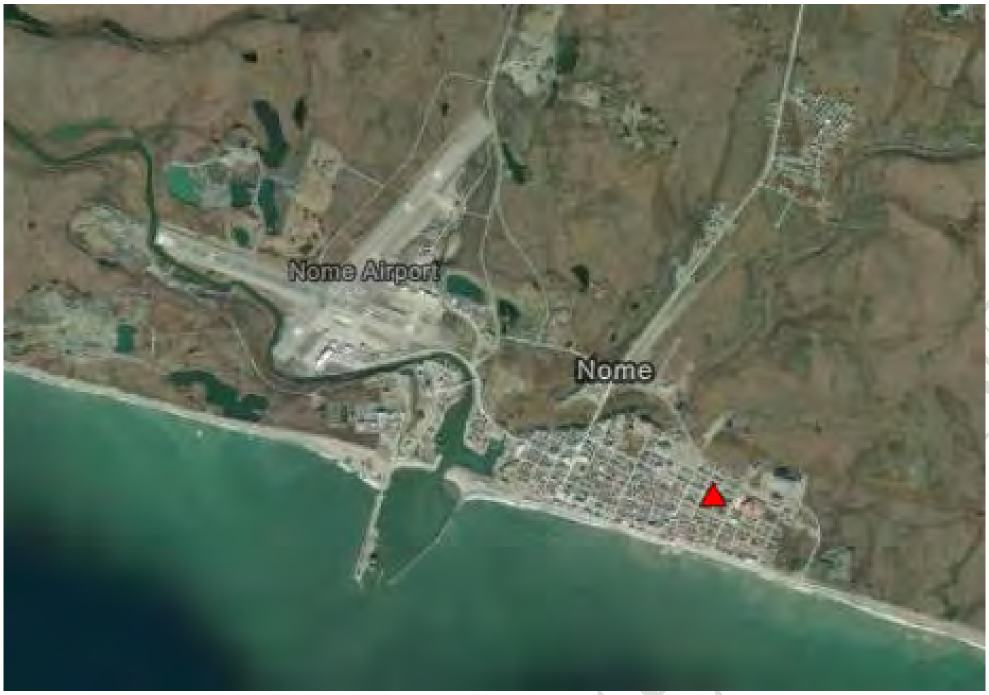


Figure 3-96 Map of Council's Critical Facilities in Nome

Figure 3-97 Map of Council's Critical Facilities in Council

Table 3-23 Village of Solomon Critical Facilities

Village of Solomon's Assets in Nome

Facility Type	# of Occupants	Facility Name	Address	Latitude	Longitude	Facility Value	Building Type	Facility Owner	Cryosphere	Earthquake	Flood	Erosion	Landslide	Severe Weather	Tsunami	Volcano	Wildfire	Radon
Government	8	Solomon Building (3 apartments/1 office)		64°30'04"N	165°24'22"W	1,000,000	W2	VOS	x	x				x			x	
Community	0	5 lots (E 6th Ave)		64°29'56"N	165°23'13"W	$650,000	Gravel	VOS	x	x				x			x	
	2	Tiny Home (at Solomon Building)		64°30'04"N	165°24'22"W	$150,000	W2	VOS	x	x				x			x	
	0	Culturally Sacred or Significant Sites																
	0	Subsistence Camps																
Total:	**10**				**Total:**	**$1,800,000**												

Village of Solomon's Assets in Solomon

Facility Type	# of Occupants	Facility Name	Address	Latitude	Longitude	Facility Value	Building Type	Facility Owner	Cryosphere	Earthquake	Flood	Erosion	Landslide	Severe Weather	Tsunami	Volcano	Wildfire	Radon
Transportation	0	Road maintained by the State		Throughout the Village		$5,000,000	Gravel	SOA	x	x	x	x		x	x		x	
	0	Old Runway		64°33'42"N	164°26'34"W	$5,000,000	Gravel	SNC	x	x				x			x	
	0	Boat Launch at Bonanza		64°32'03"N	164°29'05"W	$1,000,000	W2	SNC	x	x	x	x		x	X		x	
	0	Safety Bridge		64°28'19"N	164°44'49"W	$250,000		SOA	x	x				x			x	
	0	Bonanza Bridge		64°32'41"N	164°26'12"W	$ 250,000		SOA	x	x	x	x		x	x		x	
	0	East Fork Bridge		64°41'32"N	164°16'49"W	$250,000		SOA	x	x				x			x	
	0	Big Hurrah Bridge		64°39'19"N	164°19'05"W	$250,000		SOA	x	x				x			x	

Village of Solomon's Assets in Nome

Facility Type	# of Occupants	Facility Name	Address	Latitude	Longitude	Facility Value	Building Type	Facility Owner	Cryosphere	Earthquake	Flood	Erosion	Landslide	Severe Weather	Tsunami	Volcano	Wildfire	Radon
Utilities	0	200-gallon water tank		64°33'36"N	164°26'29"W	$10,000	PWTS	VOS	x	x	x	x		x	x		x	
	0	Well House and Pump		64°33'36"N	164°26'28"W	$300,000	W2	VOS	x	x	x	x		x	x		x	
	0	7kW rooftop Solar Panel System (on B&B w/ 10 li-ion batteries and solar ark inverter		64°33'35"N	164°26'32"W	$1,000,000	Solar	VOS	x	x				x			x	
	0	Generator house w/ 10 kW diesel aurora generator		64°33'35"N	164°26'33"W	$150,000	W2	VOS	x	x	x	x		x	x		x	
	0	Shovel Creek and Minala Creek – Solomon Native Corp material gravel site		64°35'46"N	164°23'35"W	$3,500,000	Gravel	SOA	x	x				x			x	
Community	4	Solomon Bed and Breakfast		64°33'35"N	164°26'32"W	$5,000,000	W2	VOS	x	x	x	x		x	x		x	
	0	Okitkon ER Shelter Cabin		64°33'34"N	164°26'40"W	$100,000	W2	VOS	x	x	x	x		x	x		x	
	0	Subsistence Camps x10		Multiple locations		$500,000	W2	Private	x	x	x	x		x	x			
	0	Cemetery		64°33'46"N	164°26'25"W	$1,000,000	N/A	SNC	x	x	x	x	x	x	x		x	
	0	Subsistence Lands/Water (Bonanza Channel, Solomon, Bonanza)		64°32'16"N	164°29'13"W	$10,000,000	N/A	SNC	x	x	x	x		x	x		x	
	0	Last Train to Nowhere		64°32'45"N	164°26'10"W	$1,000,000	N/A	SNC	x	x	x	x		x	x		x	
	2	Tiny Home on Wheels		64°33'36"N	164°26'32"W	$50,000	W2	SNC	x	x	x	x		x	x		x	
	0	Culturally Sacred or Significant Sites																
	0	Subsistence Camps																
Total :	6				**Total:**	$34,610,000												

Radon is a public health concern but is not anticipated to impact infrastructure.
The locations of culturally sacred sites and subsistence camps are sensitive. Contact the Tribal office if you need further information or assistance.

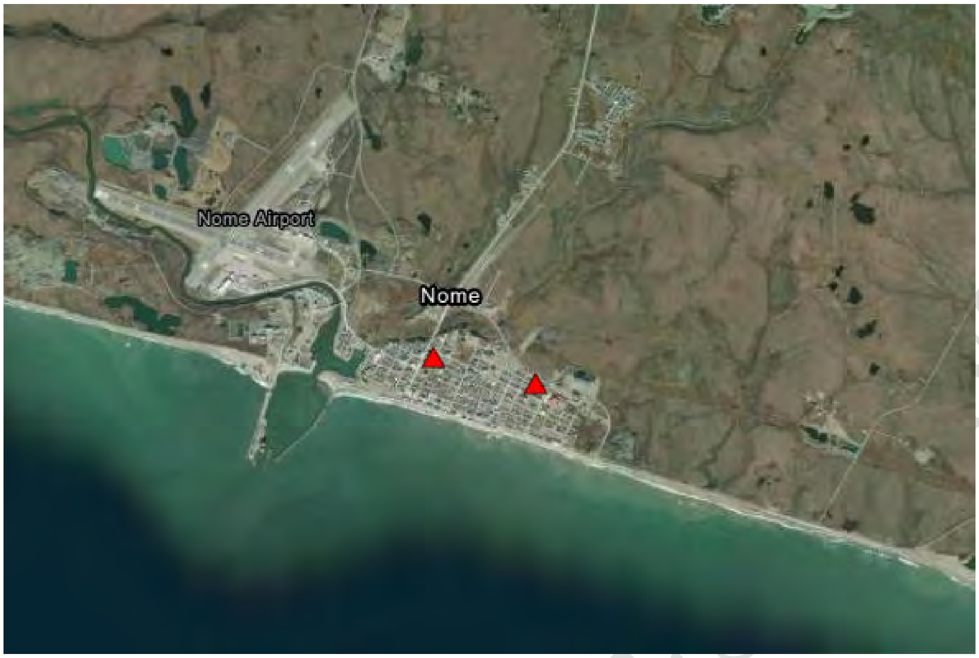


Figure 3-98 Map of Solomon's Critical Facilities in Nome

Figure 3-99 Map of Solomon's Critical Facilities in Solomon

3.4.6 Vulnerability Exposure Analysis

Table 3-24 summarizes the results of the vulnerability exposure analysis for loss estimations in Nome that each Tribe relies on.

Table 3-24 Vulnerability Exposure Analysis- Nome (shared assets not Tribally owned)

	Transportation & Equipment	Emergency Services	Medical Facilities	Education Facilities	Utilities	Shelters	Community Facilities
Earthquake	# of CFs: 10 Value: $409,068,798	# of CFs: 4 Value: $16,832,506	# of CFs: 1 Value: $1,000,000	# of CFs: 4 Value: $10,000,000	# of CFs: 3 Value: $171,748,241	# of CFs: 7 Value: $36,419,000	# of CFs: 30 Value: $150,422,281
Severe Weather	# of CFs: 10 Value: $409,068,798	# of CFs: 4 Value: $16,832,506	# of CFs: 1 Value: $1,000,000	# of CFs: 4 Value: $10,000,000	# of CFs: 3 Value: $171,748,241	# of CFs: 7 Value: $36,419,000	# of CFs: 30 Value: $150,422,281
Wildland/ Tundra Fire	# of CFs: 10 Value: $409,068,798	# of CFs: 4 Value: $16,832,506	# of CFs: 1 Value: $1,000,000	# of CFs: 4 Value: $10,000,000	# of CFs: 3 Value: $171,748,241	# of CFs: 7 Value: $36,419,000	# of CFs: 30 Value: $150,422,281
Changes in the Cryosphere	# of CFs: 10 Value: $409,068,798	# of CFs: 4 Value: $16,832,506	# of CFs: 1 Value: $1,000,000	# of CFs: 4 Value: $10,000,000	# of CFs: 3 Value: $171,748,241	# of CFs: 7 Value: $36,419,000	# of CFs: 30 Value: $150,422,281
Radon	Radon is a public health concern but is not anticipated to impact infrastructure.						
Flood	# of CFs: 4 Value: $185,120,668	-	-	-	# of CFs: 2 Value: $101,748,241	# of CFs: 2 Value: $5,000,000	# of CFs: 10 Value: $24,520,048
Tsunami	# of CFs: 4 Value: $185,120,668	-	-	-	# of CFs: 2 Value: $101,748,241	# of CFs: 2 Value: $5,000,000	# of CFs: 10 Value: $24,520,048
Erosion	-	-	-	-	-	-	-
Landslide	-	-	-	-	-	-	-

Table 3-25 summarizes the results of the vulnerability exposure analysis for loss estimations in Nome that the Nome Eskimo Community relies upon.

Table 3-25 Vulnerability Exposure Analysis- Nome Eskimo Community

	Assets in Nome
Earthquake	# of CFs: 2 Value: $1,100,000
Severe Weather	# of CFs: 2 Value: $1,100,000
Wildland/Tundra Fire	# of CFs: 2 Value: $1,100,000
Changes in the Cryosphere	# of CFs: 2 Value: $1,100,000
Radon	Radon is a public health concern but is not anticipated to impact infrastructure.
Flood	# of CFs: 1 Value: $100,000
Tsunami	# of CFs: 1 Value: $100,000
Erosion	-
Landslide	-

Table 3-26 summarizes the results of the vulnerability exposure analysis for loss estimations at King Island townsite and the Tribe's assets in Nome.

Table 3-26 Vulnerability Exposure Analysis- King Island Native Community

	Assets in Nome	Assets in King Island
Earthquake	# of CFs: 6 Value: $4,050,000	# of CFs: 3 Value: Unknown
Severe Weather	# of CFs: 6 Value: $4,050,000	# of CFs: 3 Value: Unknown
Wildland/Tundra Fire	# of CFs: 6 Value: $4,050,000	-
Changes in the Cryosphere	# of CFs: 6 Value: $4,050,000	# of CFs: 3 Value: Unknown
Radon	Radon is a public health concern but is not anticipated to impact infrastructure.	
Flood	-	-
Tsunami	-	-
Erosion	-	-
Landslide	-	# of CFs: 3 Value: Unknown

Table 3-27 summarizes the results of the vulnerability exposure analysis for loss estimations at Council townsite and the Tribe's assets in Nome.

Table 3-27 Vulnerability Exposure Analysis- Native Village of Council

	Assets in Nome	Assets in Council	
		Utility/Transportation Facilities	Community Facilities
Earthquake	# of CFs: 1 Value: $300,000	# of CFs: 2 Value: $5,100,000	# of CFs: 4 Value: $950,000
Severe Weather	# of CFs: 1 Value: $300,000	# of CFs: 2 Value: $5,100,000	# of CFs: 4 Value: $950,000
Wildland/ Tundra Fire	# of CFs: 1 Value: $300,000	# of CFs: 2 Value: $5,100,000	# of CFs: 4 Value: $950,000
Changes in the Cryosphere	# of CFs: 1 Value: $300,000	# of CFs: 2 Value: $5,100,000	# of CFs: 4 Value: $950,000
Radon	Radon is a public health concern but is not anticipated to impact infrastructure.		
Flood	-	# of CFs: 1 Value: $100,000	# of CFs: 3 Value: $700,000
Tsunami	-	-	-
Erosion	-	# of CFs: 1 Value: $100,000	# of CFs: 3 Value: $700,000
Landslide	-	-	-

Table 3-28 summarizes the results of the vulnerability exposure analysis for loss estimations at Solomon townsite and the Tribe's assets in Nome.

Table 3-28 Vulnerability Exposure Analysis- Village of Solomon

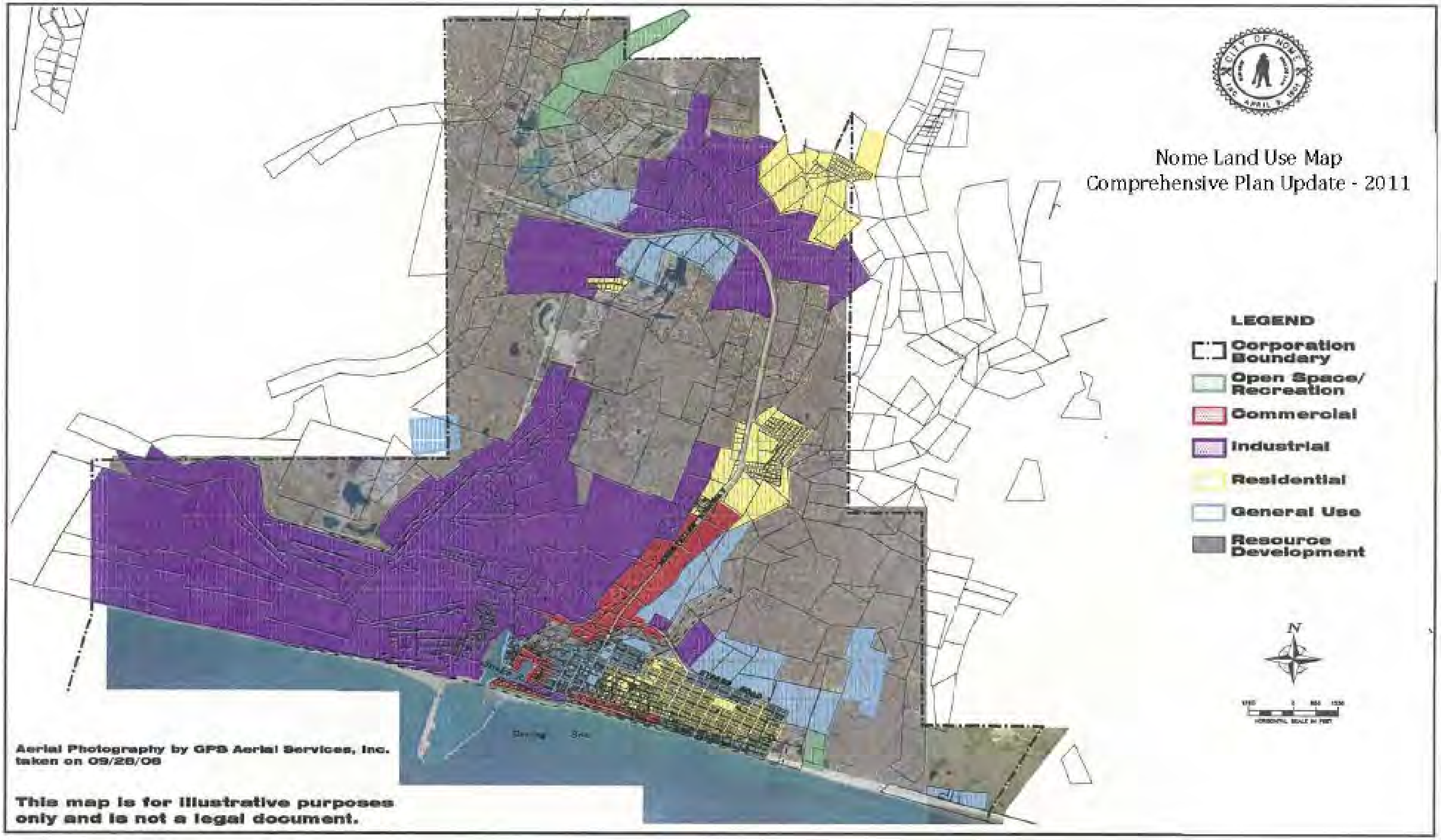
	Assets in Nome	Assets in Solomon		
		Transportation	Utilities	Community Facilities
Earthquake	# of CFs: 3 Value: $1,800,000	# of CFs: 7 Value: $12,000,000	# of CFs: 5 Value: $4,960,000	# of CFs: 16 Value: $17,650,000
Severe Weather	# of CFs: 3 Value: $1,800,000	# of CFs: 7 Value: $12,000,000	# of CFs: 5 Value: $4,960,000	# of CFs: 16 Value: $17,650,000
Wildland/ Tundra Fire	# of CFs: 3 Value: $1,800,000	# of CFs: 7 Value: $12,000,000	# of CFs: 5 Value: $4,960,000	# of CFs: 16 Value: $17,650,000
Changes in the Cryosphere	# of CFs: 3 Value: $1,800,000	# of CFs: 7 Value: $12,000,000	# of CFs: 5 Value: $4,960,000	# of CFs: 16 Value: $17,650,000
Radon	Radon is a public health concern but is not anticipated to impact infrastructure.			
Flood	-	# of CFs: 3 Value: $6,250,000	# of CFs: 3 Value: $460,000	# of CFs: 15 Value: $16,650,000
Tsunami	-	# of CFs: 3 Value: $6,250,000	# of CFs: 3 Value: $460,000	# of CFs: 15 Value: $16,650,000
Erosion	-	# of CFs: 3 Value: $6,250,000	# of CFs: 3 Value: $460,000	# of CFs: 16 Value: $17,650,000
Landslide	-	-	-	# of CFs: 1 Value: $1,000,000

3.4.7 LAND USE

3.4.7.1 Nome

In Nome, land use is comprised of the following categories:

- **General Use Districts:** The General Use Districts are intended to allow a wide range of commercial and residential uses and to exclude industrial and mining uses.
- **Residential Districts**: The Residential Districts are intended to facilitate the development of a neighborhood which is predominately residential and includes a variety of housing types, as well as service related commercial uses and recreational uses.
- **Commercial Districts**: The Commercial Districts are intended to provide for a mixture of commercial uses that will strengthen and expand the core community.
- **Industrial Districts**: The Industrial Districts are intended to provide a location for a variety of employment opportunities such as manufacturing, warehousing, and distributing, indoor and outdoor storage, and a wide range of primarily industrial operations. Locations for the industrial zone require access to major arterial streets and adequate water, sewer, and power.
- **Resource Development Districts**: It is the purpose of the resource development district to allow natural resources development and associated uses and to allow other unrestricted uses.
- **Open Space/Recreational District**: The open space/recreation district is established to preserve public land for public parks and areas for their recreational, scenic, and open space values.
- **Flood Overlay Zone**: The purpose of the flood hazard overlay district is to provide adequate safeguards to protect life and property from flood hazards.



Source: Nome Comprehensive Plan 2012-2020

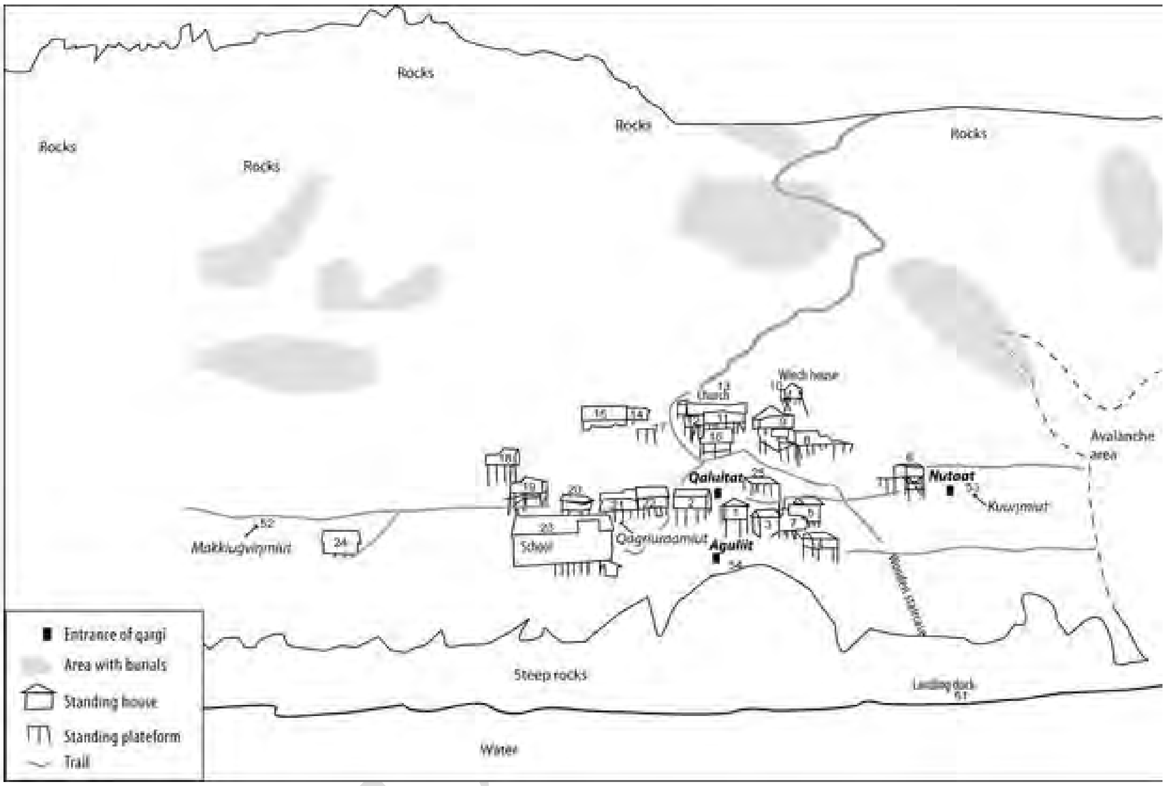
Figure 3-100 Nome Land Use Map

Source: Nome Comprehensive Plan 2012-2020

Figure 3-101 Nome Downtown Area Land Use Map

3.4.7.2 King Island

Figure 3-102 shows a map of the village with locations of qagrit ("club houses") (names in italics) sketched from a photo by Matt Ganley (Former Vice President of Land and Resources at the Bering Straits Native Corporation and Co-Principal Investigator for the project). The houses were randomly numbered for a structural assessment by Matt Ganley and the King Island Native Community.

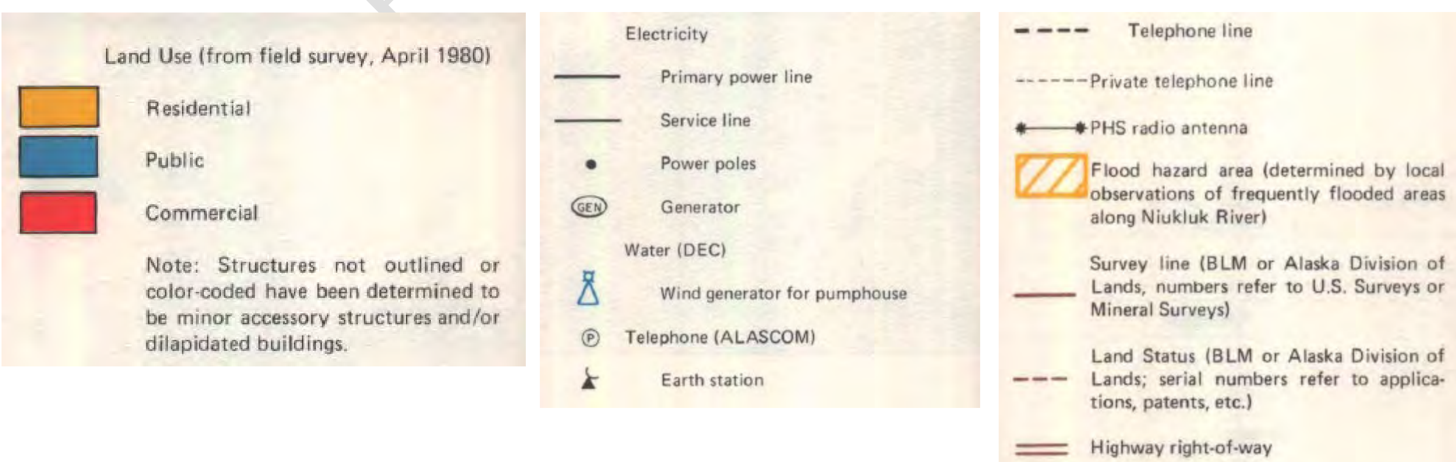


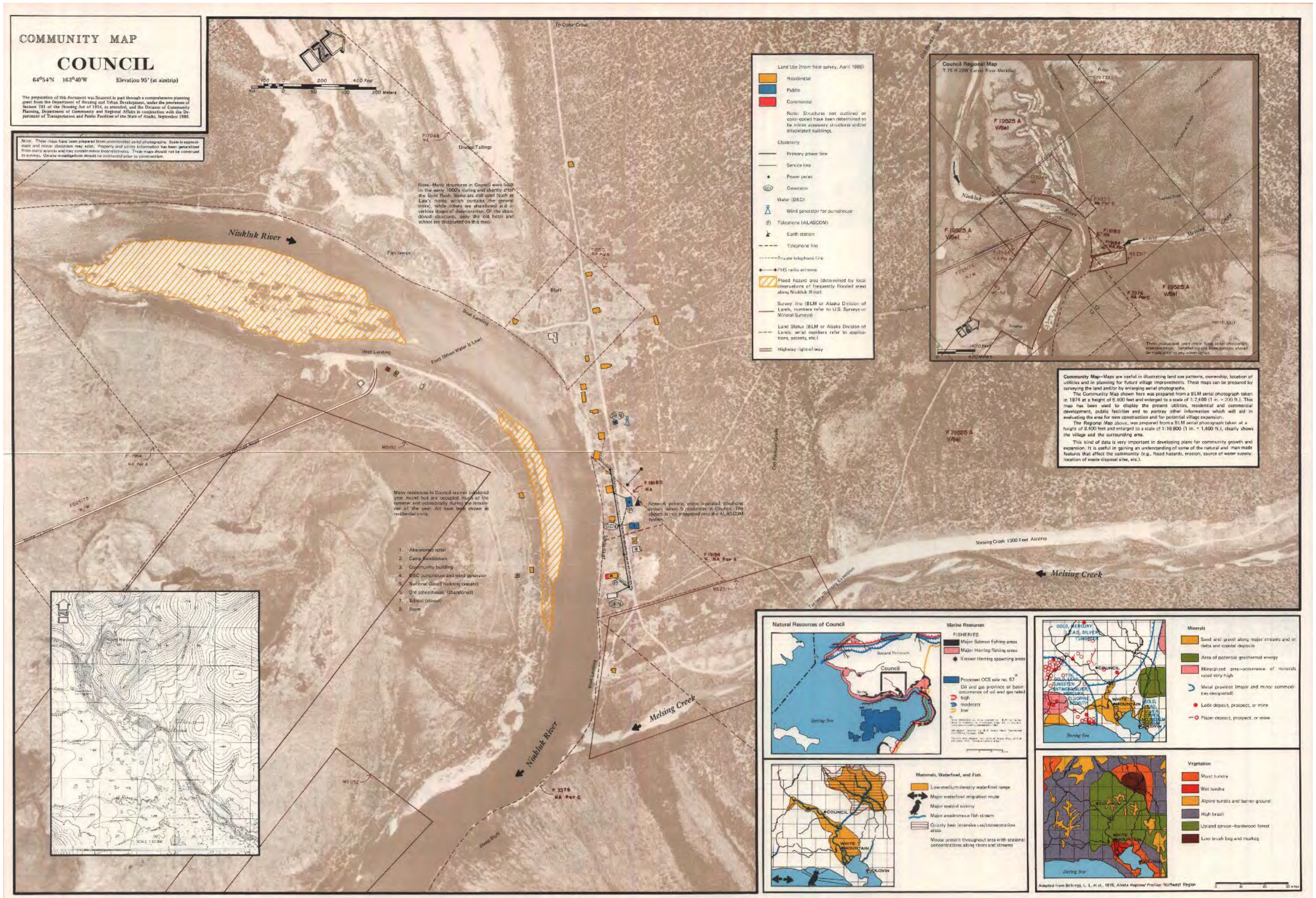
Source: Alix 2012

Figure 3-102 Map of King Island

3.4.7.3 Council

Figure 3-103 shows the 1980 DCRA community profile map of Council. The legend for this map is below.



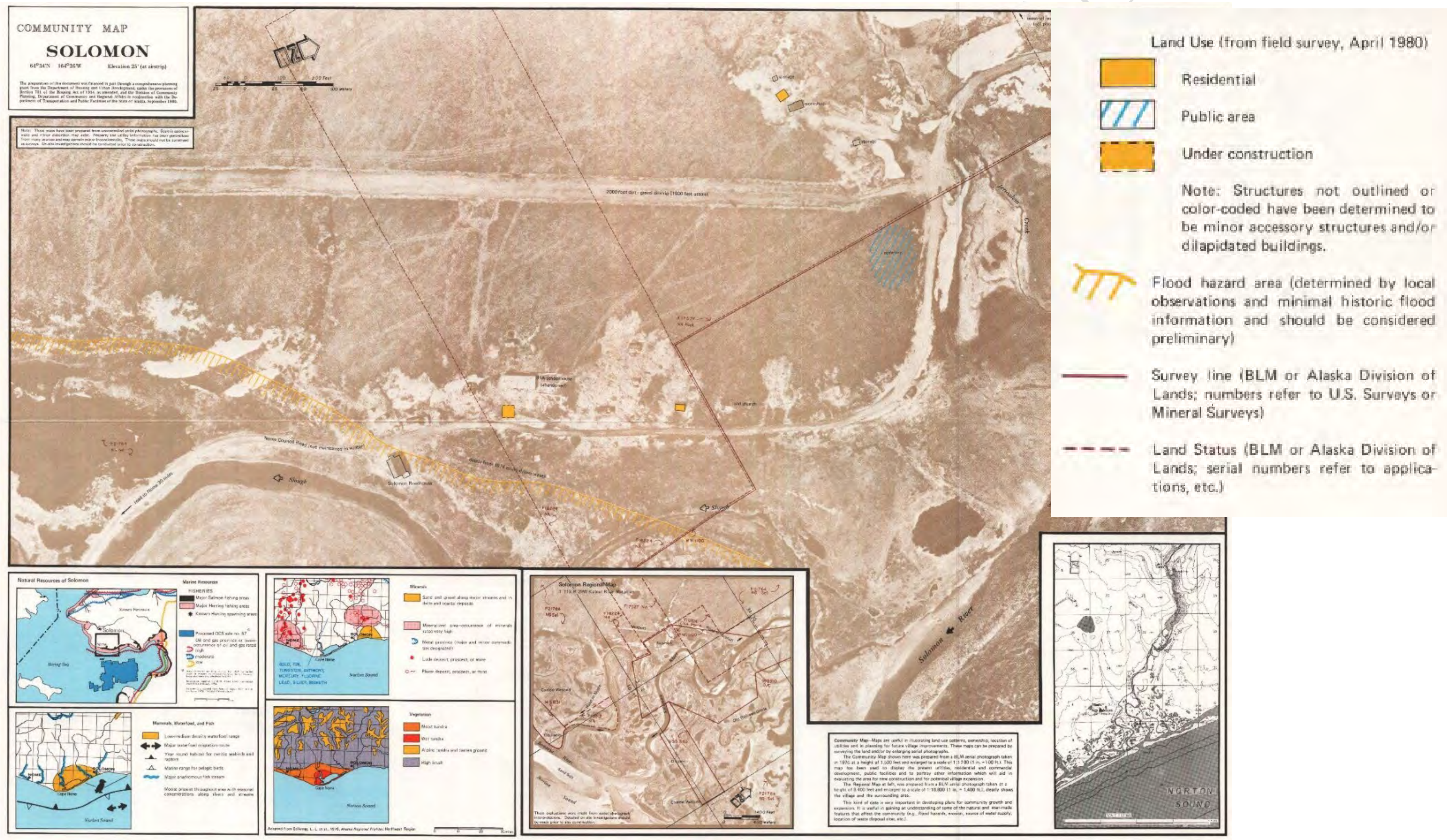


Source: DCRA 1980a

Figure 3-103 Council Community Map (1980)

3.4.7.4 Solomon

Figure 3-104 shows the 1980 DCRA community profile map of Solomon. The legend for this map is below.



Source: DCRA 1980b

Figure 3-104 Solomon Community Map (1980)

3.4.8 FUTURE DEVELOPMENT

Nome Eskimo Community

The Nome Eskimo Community's top priority projects identified in their 2009-2013 Strategic Plan include:

1. Address high housing energy/fuel costs.
2. Research and/or collaborate to develop alternative energy resources.
3. Help with renewable energy for office buildings and homes.
4. Provide housing opportunities to all members.
5. Research and/or collaborate to provide a homeless shelter.
6. Research and/or collaborate to provide an inpatient substance abuse treatment center.
7. Acquire a new tribal office building /hall/tribal court.
8. Research feasibility to provide internship opportunities.
9. Expand ANCSA curriculum at NPS. Including the difference between tribes, villages, and regional corporations.
10. Develop the 2 Eskimo Boys Project – completed

King Island Native Community

The King Island Native Community's top priority projects identified in their 2019-2019 Local Economic Development Plan (LEDP) include:

1. Community Hall
2. King Island Grant Writer
3. More Housing and Housing Improvements
4. Continue Road Project
5. Elders and Youth Services
6. Strengthen Cultural Activities
7. Encourage Technical and Trade Schools
8. General Assistance
9. Relocate Cape Wooley Camps
10. Transportation Services for Community Members

Native Village of Council

The Native Village of Council's top priority projects identified in their 2010-2015 Local Economic Development Plan (LEDP) include:

1. Land Planning
2. Environmental Protection
3. Education, business training, and economic development
4. Energy programs
5. Elders, youth, and cultural activities
6. Dumpsite improvements
7. Road improvements
8. Fire safety and training/creating firebreaks
9. Community cooperation
10. Cemetery renovations
11. Equipment storage building

Village of Solomon

The Village of Solomon's top priority projects identified in their 2021-2026 Local Economic Development Plan (LEDP) include:

1. Increase connection to the Tribe (Holding youth camp regularly)
2. Establish & maintain affordable housing (including logistics like water, sewer, electricity)
3. Establish and maintain a Tribal Court (children's cases, civil diversion agreements, and culturally appropriate sentencing)
4. Protect and maintain the environment, protecting watershed habitats including protection from mining
5. Increased focus on health and well-being of Tribal members
6. Teach youth about our gatherings, food, hunting, and preserving our language

3.4.9 SUBSISTENCE AND FOOD SOVEREIGNTY IN RURAL ALASKA

Food sovereignty and climate change are two of Alaska's most daunting challenges. Alaska is warming twice as fast as the global average, which affects the ability to access traditional hunting, fishing, and gathering areas. Between 2000 and 2010, over 30% of Alaska Natives were consistently food insecure and were twice as likely to be food insecure when compared to white populations (Alaska Food Systems 2023).

Alaskans import 95% of their store-bought food, which is shipped through long supply chains. In rural Alaska, once supplies enter the state, they are flown into the villages and deliveries are weather-dependant. Extreme weather events and seasonality make rural communities, far beyond the end of the road, susceptible to weeks without food delivery, and the food that arrives often has a high spoilage rate due to long travel time and poor storage conditions (UAF AFPC 2023).

Alaska's supply chain is vulnerable and in turn, food supply is unstable- this was most recently highlighted by the 2018 earthquake in Southcentral Alaska that disrupted air traffic and the COVID-19 global pandemic with its associated supply chain breakdowns. The Port of Alaska in Anchorage is the state's primary inbound cargo-handling facility and nearly 80% of the goods entering the state comes through the Port of Alaska.

On February 9, 2022, Alaska Governor Mike Dunleavy issued Administrative Order 3311 establishing the Alaska Food Security and Independence Task Force. The task force was charged with being "responsible for recommendations on how to increase all types of food production and harvesting in Alaska, and to identify any statutory or regulatory barriers preventing our state from achieving greater food security (UAF AFPC 2023). A subsequent report was drafted over three months by the University of Alaska Fairbanks and the Alaska Food Policy Council (AFPC) on behalf of the Alaska Food Security and Independence Task Force and was released in March 2023. The report discussed the food insecurity issues in Alaska and provided recommendations for improving Alaska's food security and independence which draw a roadmap for the State administration, legislators, and Alaska's food producers to make Alaska more food secure the next time the supply chain is disrupted (UAF AFPC 2023).

Climate change in impacting the quality and quantity of many berry species that Alaskans rely on. A shifting climate has led to many changes that could influence berry species, including rising temperatures, longer growing seasons, shorter snow-covered seasons, and altered precipitation patterns. It can also lead to changes in the pollinators that the berry plants depend on, and in the populations of the animals and microbes that consume or protect the plants. The effects of those changes are complicated, and the overall impact can be positive or negative (Mulder et al. 2023).

In Nome, King Island, Council, and Solomon, the quantity and quality of berries and marine/land animals that the Tribes rely on for subsistence and food sovereignty have been severely impacted by climate change.

In order to increase food sovereignty in the communities, the Planning Team plans to apply for funding for a community garden or greenhouses, drying racks, seed catalogs, or other resources to allow the Tribes to grow their own food.