Coastal Flooding in Nome

Overview

Nome is a city of 3,700 people (2024 census) and a transportation and trade center of the Bering Strait region. The area's resilience has been tested by storms for over a century, with records of flooding and erosion as early as 1899. In response, the city has physically changed over the years with the construction of a seawall in 1950, gravel filling in the town center, and a more complex road system. Citizens now describe Nome as prepared and resilient during flooding events due to the successful combination of effective weather forecasting, community preparation, and infrastructure adaptation. The window of fall storms has also lengthened to include late fall and early winter months due to delayed sea ice freeze-up in the Bering Strait.

Front Street after 2022 ex-typhoon Merbok. Photo by Nils Hahn, Nome Nugget.

Nome harbor after 2011 Bering Sea Storm. Photo by David Dodman, KNOM Radio Mission.

Weather Woes

Nome sits on a south-facing coast on the western Seward Peninsula and is exposed to hundreds of miles of open water. When storms move south to north and pass to the west of Nome, winds with these storms act as a plow. Ocean water pushes northward over long distances, ultimately raising the level of the sea and pushing water onto what is usually dry land. Compounding the effect is the comparatively shallow slope of the sea floor in western Norton Sound. While only the most intense storms produce severe flooding, flooding of very low lying areas, such as the Nome-Council Road near the Safety area, is much more frequent.

ACCAP Alaska Center for Climate Assessment and Preparedness
A NOAA RISA team

International Arctic Research Center

UAF University of Alaska Fairbanks

Flooding through history

Photo credits: Jeremy Perkins

1900 **September 12-13, 1900**

- 1 fatality, all businesses on lower Front Street flooded, streets to the beach filled with debris, tents and homes east of Snake River mouth swept away, 500 people homeless, $750,000 in damages (1900 dollars)

1902 **September 12, 1902**

- 1 fatality, Snake River flooded up to River Street, Alaska Native encampments on sand spit near the current Port of Nome washed away

1902 **October 9-11, 1902**

- Snake River flooded up to River Street washing away all but one building, 4-5 cabins remained on the once highly populated sand spit, at least 11 businesses reported damage, trains stopped, $25,000-30,000 in damages (1902 dollars)

1913 **October 6, 1913**

- Damage concentrated on east end, River Street flooded and homes destroyed, Sesnon Wharf and Snake River bridge destroyed, several power outages reported, strong winds broke windows and blew household debris onto Front Street
- 13 businesses and 31 houses reported damage in the first 72 hours, Seattle Chamber of Commerce and Red Cross sent aid, $1.5 million in damages (1913 dollars)

1937 **November 8-9, 1937**

- Low pressure of 975 mb recorded (normal at sea level 1013 mb*)
- 90% of businesses and residential homes on Front Street collapsed, 11 other businesses damaged, hotel completely collapsed. Citizens call for steel breakwater (a protective coastal barrier) to protect businesses on Front Street. $200,000 in damages (1937 dollars)

1945 **October 27-29, 1945**

- 80 mph gusts reported
- Seawalls collapsed, phone service gone, power outages, basement pumps failed causing flooding on Front Street. Hotel and Miners Bank collapsed, clothing and drug stores flooded and products swept out to sea. Hundreds of oil barrels lost to sea, $500,000 in damages (1945 dollars)

1946 **October 25, 1946**

- 56 mph winds reported, very high water levels
- Front Street shops emptied their basements to avoid flood damage, Hotel fully collapsed and dialogues about relocating Nome began

1946 **November 17, 1946**

- Storm brought slush ice into Front Street buildings, ammonia line explosion filled convenience store with toxic fumes during the flood, destroying all merchandise. Food stocks significantly depleted, Army power plant used for backup electricity
- City Council calls on federal government to help Nome adjust to increased storm frequency and intensity

1974 **November 11-12, 1974**

- 55-80 mph winds, water 11.7 ft above MHHW*, storm surge broke up shorefast ice which caused further damage
- Seawall sank 2 ft, 45 houses and 18 businesses damaged, electric and sewer systems impacted, $12-15 million in damages in Nome (1974 dollars)

1992 **October 5-6, 1992**

- 5 inches of wet snow, 59 mph winds reported, water 6.9 ft above MHHW*
- Power outages, washed out roads, post office and air traffic shut down due to flooding

2004 **October 18-19, 2004**

- Low pressure of 941 mb reported 400 miles west of Nome, 50-80 mph winds, water 8.8 ft above MHHW*
- 45 individuals evacuated, 13 homes damaged, Nome-Council Road flooded at mile 22 isolating 10 residences, dock at Cape Nome Jetty washed away, $4.7 million in property damages (2004 dollars)

2005 **September 22-24, 2005**

- Low pressure 966 mb, 57 mph gusts recorded, water 8.0 feet above MHHW*
- Flooding on Belmont and Front Streets, sand erosion at New Harbor entrance, seven power poles knocked down at mile 3 of Nome-Council Road. KNOM radio building damaged.
- $56,848 in damages to City of Nome, $53,000 to Nome Joint Utilities, $2.2 million in damages across Western Alaska (2005 dollars)

2011 **November 8-9, 2011**

- Low pressure of 945 mb at Gulf of Anadyr, 61 mph peak gusts, water 8.3 feet above MHHW*
- Flooding on River Street, F Street, and Belmont Point, buildings damaged on East Front Street, periodic power and phone outages. Nome-Council Road mile 25 and beyond washed out (estimated $24 million in damages), $580,000 in damages to Cape Nome Jetty, Nome Joint Utility Services estimated $65,000 in damages (2011 dollars)

2020 **November 4-6, 2020**

- Blizzard conditions reported, 55mph gusts reported in Point Hope, 80 mph gusts in Wales, water 5.4 feet above MHHW*
- Washed away houses on Nome-Council Road and along the Nome River

2022 **September 16-18, 2022: Merbok**

- Low pressure of 937 mb (lowest pressure ever observed in Bering Sea in September), 56mph peak winds, Water levels 9 feet above MHHW*
- Seawall boulders rearranged. Snake River flooded and swept a house off its foundation. 30 miles of Nome-Council Road impassable. FEMA approved $6.68 million for individual assistance and $92 million for public assistance (in 2022 dollars)

**Millibars (mb) are units of air pressure. The lower the pressure the stronger the storm.*

**Mean Higher High Water (MHHW) is equivalent to "above the highest high tide line."*

The role of sea ice

A natural buffer

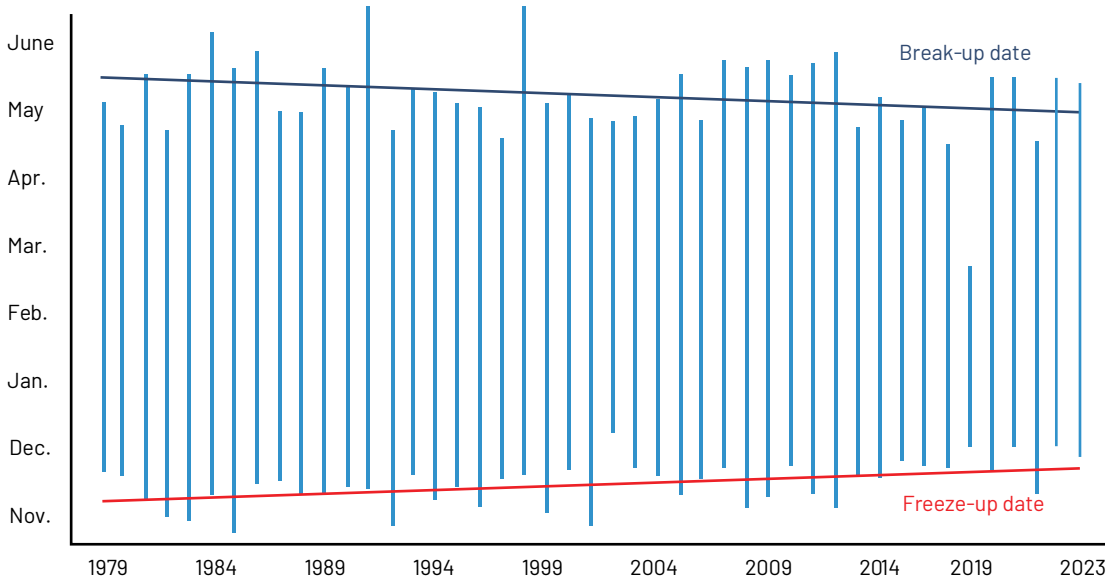
During storm events, wind traveling in a single direction transfers energy into the ocean and creates large waves which contribute to coastal flooding. Sea ice interrupts this path and "buffers" the coastline by preventing the transfer of wind energy and subsequent waves, thus lowering storm surge. In extreme cases, storm winds are strong enough to break up sea ice and wash hazardous chunks ashore (like in 1974 storm).

Shorter ice season

Since the 1970's, freeze-up dates have gotten **later** and break-up dates have gotten **earlier**, creating a **shorter ice season** and exposing Nome to coastal flooding risks for more of the year

Adapted from Kettle et. al 2025.

Sea ice season in Nome from 1979-80 to 2023-24



Late Freeze-Up

Historically, Nome experienced freeze-up in early November and break-up in June. However, sea ice coverage has decreased by 26% per decade since 1980 in the Bering Sea alone. A group of climate models predicts freeze-up in January rather than November by the end of this century: that marks a 2 month delay! An increase in ice-free conditions exposes Nome to more storm events and coastal flooding risks later in the year. A recent study by Kettle et al. stated that late freeze-up in Nome increases the likelihood of a fall storm contributing to socioeconomic impacts like flooding, power outages, property damage, washed out roads, and erosion.

Explore other extreme events at **uaf-accap.org/projects/extreme-events-library**

Sources: Gales 2024: "The Old Nome Spirit", Nome Nugget, NOAA Storm Data Reports, FEMA Disaster Declaration, NOAA Tides and Currents, Nome Tribal Climate Adaptation Plan, USDA Northwest Climate Hub, USGS report: Arctic sea ice decline, Kettle et al. 2025: Sea ice and socio-economic impacts from extreme events in Nome, Alaska

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