Northwest Alaska Transportation Plan

Marine and Riverine Transportation: Conditions, Issues, and Trends

Draft Technical Memorandum

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Acronyms and Abbreviations

AML	Alaska Marine Lines
AVEC	Alaska Village Electric Cooperative
BSNC	Bering Straits Native Corporation
CLIA	Cruise Line International Association
DOLWD	Alaska Department of Labor and Workforce Development
DOT&PF	Alaska Department of Transportation and Public Facilities
MDA	Marine Domain Awareness
MLLW	Mean Lower Low Water
MXAK	Marine Exchange of Alaska
USACE	U.S. Army Corps of Engineers
USCG	U.S. Coast Guard

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1 Northwest Alaska Marine and Riverine Transportation Current Conditions

1.1 Introduction

This Technical Memorandum reflects the current conditions of marine and riverine transportation within the Northwest Area Transportation Plan's Study Area (

Figure 1~~Figure 1~~). This memorandum discusses:

- Issues affecting marine and riverine transportation
- Population and activity trends
- Arctic shipping trends
- Current maritime freight and fuel delivery operations
- Inventory of existing facilities and identified needs
- Proposed major marine transportation projects

The inventory of existing facilities and its proposed system improvements is based on information from interviews, adopted local comprehensive plans, long-range transportation plans, local economic development plans, and U.S. Army Corps of Engineers (USACE) cost-shared studies and maintenance assessments. The inventory and improvements section of this memorandum will be updated as new information is obtained until the completion of the Northwest Alaska Transportation Plan Update.

Figure 1. Northwest Alaska Transportation Plan Study Area

The majority of Northwest Alaska communities are dependent on marine and river transportation for the delivery of cargo and fuel during the short, ice-free months. These deliveries provide fuel and basic necessities to the remote communities in the region, often in bulk deliveries that help mitigate the high cost of living in the communities. Nenana, Nome, and Kotzebue continue to be the primary cargo and fuel hubs where bulk delivery occurs, and goods are then distributed to smaller communities.

There have been limited improvements relative to marine and river infrastructure since the 2004 Northwest Alaska Transportation Plan, except for the Port of Nome's addition of a third cargo dock, improvements to their barge landing, and several other upland improvements. Additionally, the Denali Commission and private barge operators have installed mooring points to facilitate barge landings in several Middle Yukon and Norton Sound Communities. The USACE has worked with a limited number of coastal and river communities to install beach and bank protection. The majority of communities are served by unimproved barge landing areas.

1.2 Marine and Riverine Transportation Issues and Trends

1.2.1 Issues Affecting Marine and Riverine Transportation

Fuel Delivery Methods

Crowley Maritime (Crowley) and Vitus Marine (Vitus) are the two main fuel suppliers to Northwest Alaska communities. Delta Western currently supports the Red Dog Mine Development outside of Kotzebue on a contract basis and supplies their oil field support facility at Prudhoe Bay. Both Crowley and Vitus provide fuel to Nome and Kotzebue tank farms for distribution locally and to nearby communities. The two providers have also initiated the practice of shopping the worldwide market for the best fuel prices and chartering a "mother ship" tanker to bring fuel to Northwest Alaska. These mother ships often originate in Asia. They remain offshore and transfer fuel directly to lightering barges that then deliver the fuel directly to coastal and river communities, reducing their dependence on landside fuel tank farms at hub communities. This option reduces the number of times the fuel is transferred and increases the efficiency of operations. This method helps keep transportation and handling/transfer costs in check and reduces the costs associated with local tariffs (O'Brien 2019b, 2019c, 2019d). There are, however, environmental concerns with ocean transfer of fuel.

Consolidation of Service Providers

There has been a consolidation of service providers, with Crowley and Vitus becoming the primary fuel providers to Northwest Alaska. Alaska Marine Lines (AML) and Alaska Logistics are the two primary carriers of cargo bound for communities. AML is expanding their service to the North Slope Borough in 2019, replacing Bowhead Transport, which is no longer in business. Such consolidations may improve service but may also limit competition (O'Brien 2019e, 2019f).

Climate

Warming weather trends in the Arctic are affecting numerous communities in Northwest Alaska. Several coastal communities are experiencing severe winter storms, erosion, and coastal flooding because of warming seas and changing weather patterns. These changes are reducing sea ice conditions that afforded natural winter shoreline protection in the past. Coastal erosion is a complex issue, is site-specific, and affects communities differently. Communities such as Shishmaref are at risk due to erosion and melting permafrost, and are looking at relocation as a solution. Kivalina and Shaktoolik have

experienced severe storms that eroded beaches, but their beaches are currently accreting. Solutions must be site-specific. Some communities are studying the possibility of moving to more stable areas, others are developing emergency evacuation routes, and still others such as Utqiaġvik are assessing shoreline protection structures. Historic barge landing areas may have eroded or accreted, requiring barge operators to be flexible in locating safe and useable landing areas. Retreating sea ice provides the benefit of a longer ice-free period that allows barge operations to start earlier and extend later into the season.

There is anecdotal evidence that, as a result of retreating sea ice, the seas off the North Slope are not as calm as they have been in the past. Historically, a barge could land in relatively calm sea conditions for 2 to 3 days to offload cargo to North Slope communities. The offshore sea ice helped flatten incoming swells. Now barge operators must deal with swell conditions and rougher seas that shorten the time they can be beached to offload cargo. These conditions may require multiple landings to safely offload cargo since the sea ice has retreated too far offshore to afford any protection from incoming swells and weather (O'Brien 2019f).

River communities are experiencing lower flows due to less winter snow accumulation. This is making the scheduling of barge deliveries less dependable, with operators timing their runs to take advantage of rain/flood events that raise river levels or delivering lighter loads to reduce draft, which requires more trips. River erosion has always been an issue affecting barge landing areas that requires river knowledge and flexibility to manage changing river and bank conditions.

Arctic cooperation and competition

The potential opening of arctic sea lanes to commercial vessel traffic, potential resource developments, and expanding arctic fisheries led to the creation of the Arctic Council in 1996 to facilitate communication and governance issues among the eight arctic nations: United States, Russian Federation, Canada, Denmark (Greenland), Iceland, Norway, Sweden, and Finland. The Arctic Council also includes six Indigenous People's organizations (Arctic Council 2015b). The Council has six Working Groups that conduct its activities. These groups focus on contaminants, monitoring and assessment, conservation, emergency prevention and response, marine protection, and sustainability of the Arctic. The State Department is the lead agency representing the United States on the Arctic Council. Homeland Security's U.S. Coast Guard (USCG) works closely with the State Department and cooperates with its Arctic Nations' counterparts to help ensure proper governance and protection of the Arctic, its people, its environment, and its resources, as well as implementing the cooperative agreements signed by the Arctic Council's member states (Arctic Council 2015a). Engagement with Alaska Native entities and communities also helps shape the USCG Arctic strategy (USCG 2019). Many nations are interested in the opening of the Arctic to shipping, fishing, tourism, and resource development. Cooperating nations may also be competitors. Various states have declared claim to the polar seabed and the resources it contains. China declared itself a "near Arctic State" and received observer status to the Arctic Council in 2013 a position that the US Department of State disputes (Reuters 2019). China's expressed interest in arctic policy is supported by their desire to establish arctic shipping routes for the delivery of goods from Asia to Europe. Russia and China are developing ice-capable fleets to facilitate their arctic agendas. In addition to the expansion of their icebreaker fleet, Russia has re-opened arctic region military bases and established a Northern Sea Route Administration to help coordinate the expansion of their shipping traffic in Arctic waters. The USCG is the lead agency to counter the interests of these and other

competitor states as well as to provide fishery enforcement, search and rescue services, environmental protection, aids to navigation, and water safety education within U.S. arctic waters. The USCG recognizes that its current capabilities and fleet are limited compared to those of other nations in regard to meeting its expanding arctic mission (USCG 2018a).

1.2.2 Population and Activity Trends

Population Trends

Population projections developed for this project by Northern Economics, Inc. (NEI), based on data from the Alaska Department of Labor and Work Force Development (DOLWD), show limited growth in the study area, with the Middle Yukon Census Sub-Area showing a decline in population over the next 30 years (Figure 2). Cargo and fuel volumes are tied directly to the study area's population and development activities. Cargo and fuel deliveries to communities are not anticipated to increase significantly during the plan's 30-year study horizon based strictly on community needs and changes in population. Current scheduled common-carrier deliveries, fuel deliveries, and charter barge deliveries are anticipated to meet demand over the next 30 years if population projections hold true. Cargo and fuel deliveries in support of any possible major resource developments would cause an increase in sailings and in fuel and cargo volumes to support these activities. There may be some benefits to communities in the form of reduced cargo and freight costs. It is difficult to project these benefits, as these resource projects take years to initiate development. Once development is initiated, the developer will likely charter barges to support operations, which may or may not be able to combine the project's cargo and fuel with community cargo and fuel.

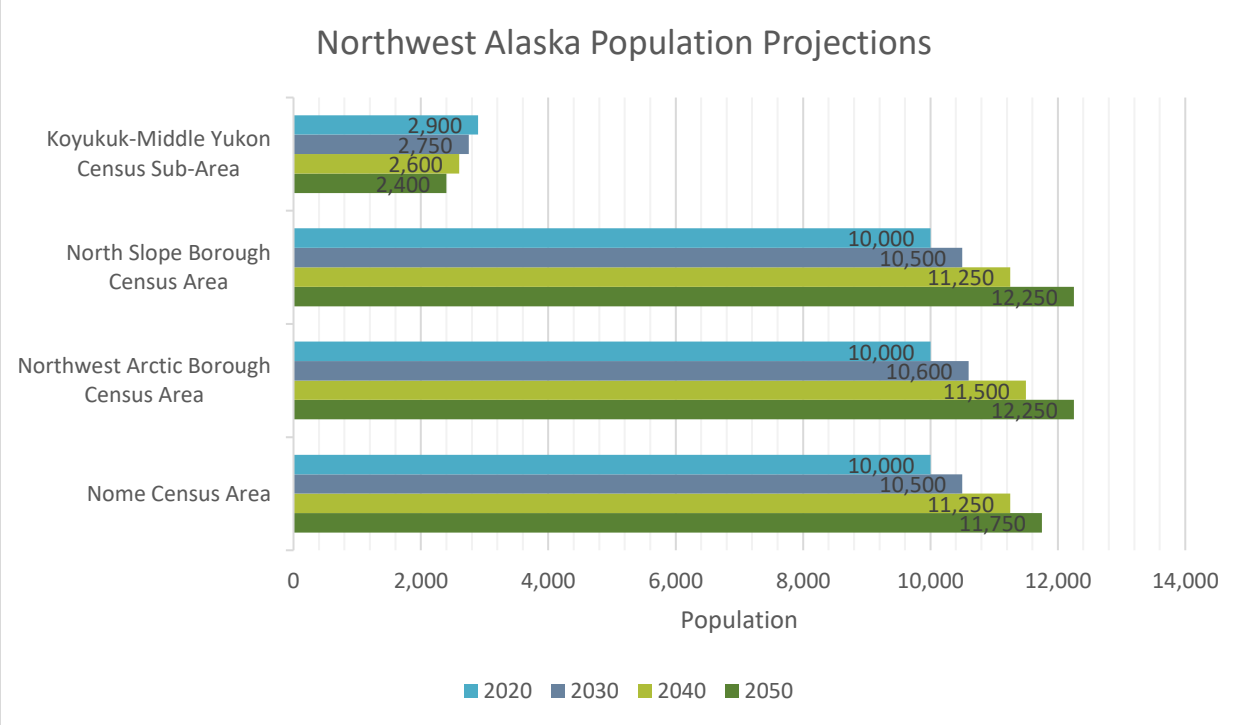

Figure 2. Northwest Alaska Population Projections (NEI 2019)

Activity Trends

For the purposes of this Technical Memorandum, it is assumed that cargo and fuel volumes to support the majority of residents and communities within the study area will remain stable. Population is not forecasted to increase significantly enough to require additional cargo and freight barge deliveries based on population trends over the next 30 years. If downward population forecasts hold true for Middle Yukon communities, there may be slightly less cargo and fuel required to support those communities. It is also assumed that impacts from any of the major resource developments would have only short-term benefits to nearby communities depending on the proximity of the community to the development and whether there is the opportunity to add non-development-related cargo or fuel to the barge. The Port of Nome will likely benefit from many of the resource developments, as it is the only public commercial port in the northwest region and may experience an increase in activity (O'Brien 2019a). Major resource developments may require the development of project-specific marine, roadway, and aviation transportation facilities to support their operations similar to those that exist at the Red Dog Mine development.

Marine Exchange of Alaska: Bering Straits Transits

One of the core services of the Marine Exchange of Alaska (MXAK) is to assist in providing up-to-date information and communications to vessel operators and owners relative to the Marine Domain Awareness (MDA) program. To this end, MXAK provides vessel-tracking services, weather and current information, and navigation charts to aid in meeting their mission statement:

> *Provide information, communications and services, to promote safe, secure, efficient and environmentally responsible maritime operations.* [MXAK 2018]

One benefit from their vessel tracking program is their ability to focus on a given area and graphically show shipping activity. Figure 3~~Figure 3~~ shows vessel transits through the Bering Straits and into the Arctic during 2018. The warming Arctic, retreating sea ice, and thinning ice are making Arctic transits more viable. Many classes of vessels are represented on Figure 3~~Figure 3~~, from fishing vessels, to cargo and fuel barges, to tankers, cargo, military, and cruise ships entering the Arctic.

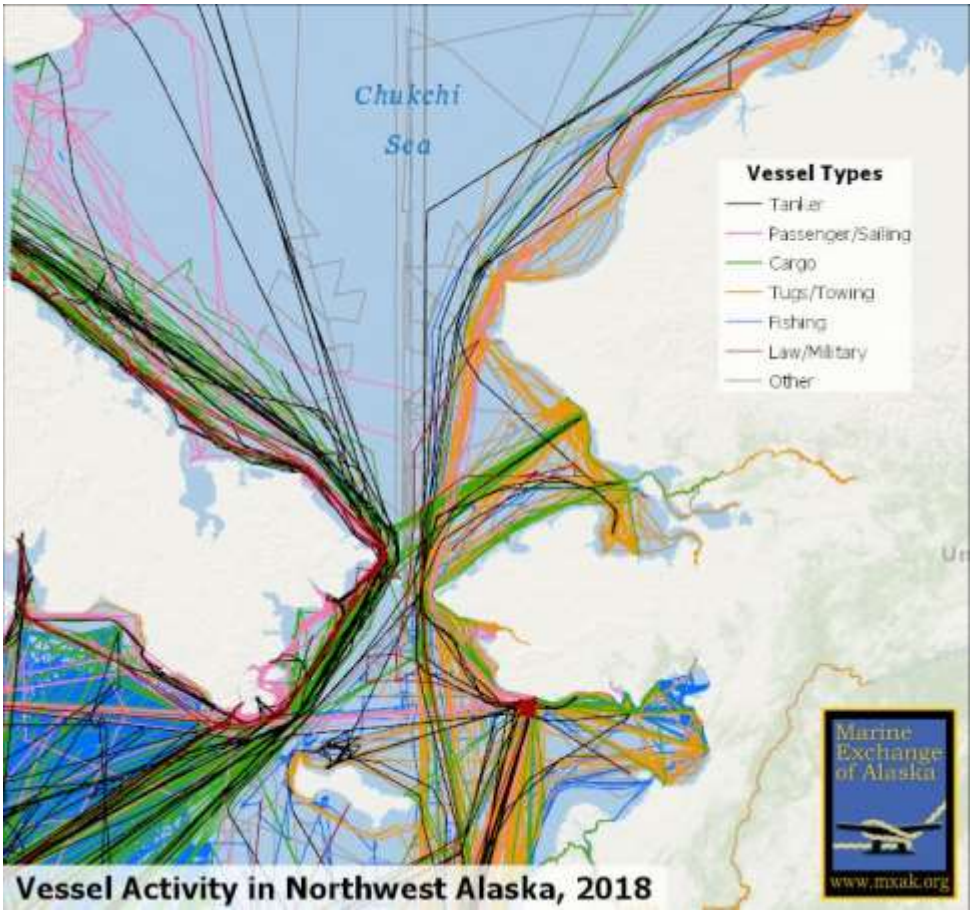

Figure 3. Vessel Activity in Northwest Alaska (MXAK 2019)

Figure 4 depicts Bering Straits' 2010–2018 transits of vessels monitored by the MXAK. Transits peaked in 2015 as a result of Shell Oil's exploration activities in the Chukchi Sea.

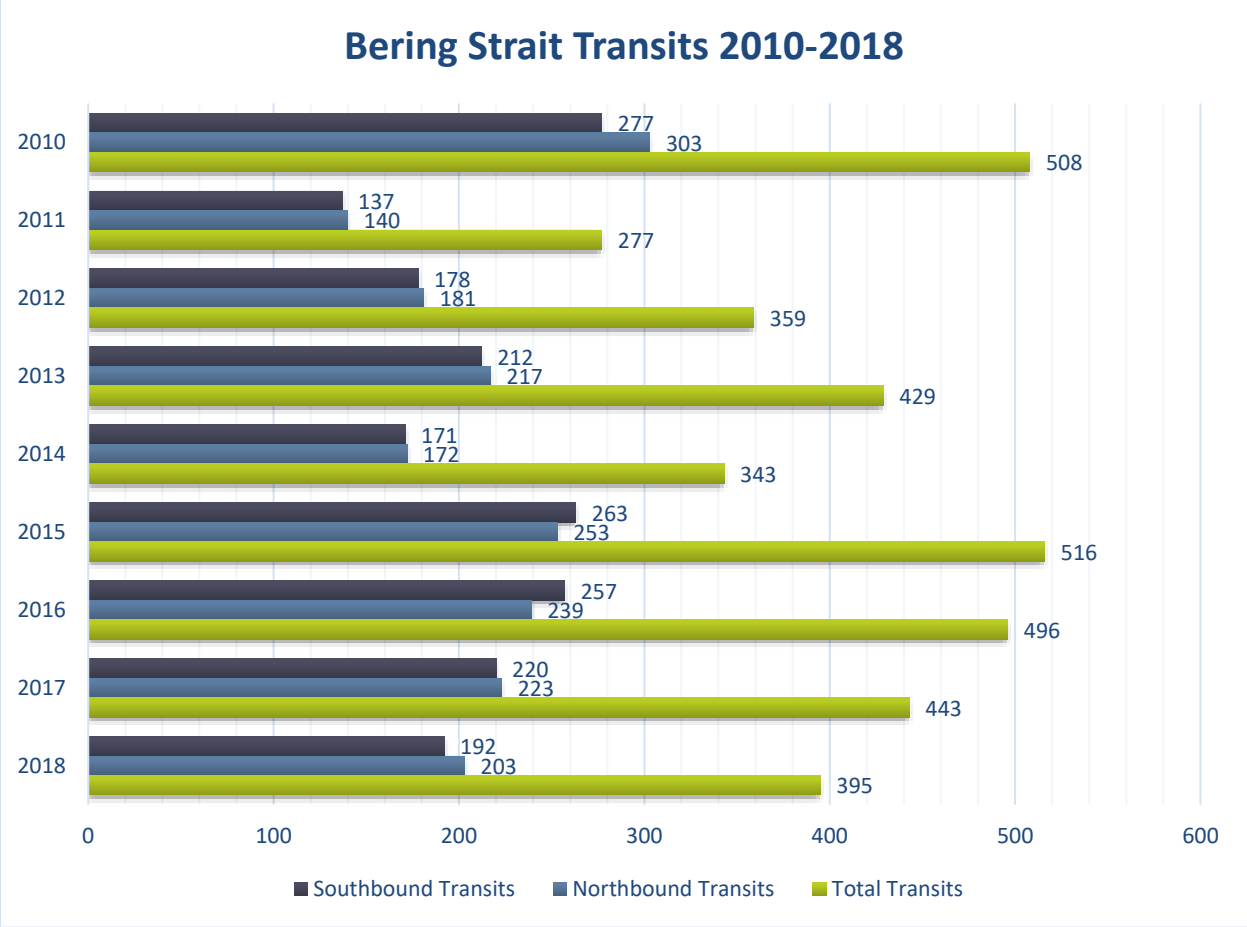

Figure 4. Bering Strait Transits 2010-2018 (MXAK 2019)

Arctic Shipping Trends

Retreating Arctic sea ice is opening up Arctic sea lanes to increase shipping activity from Asia to Europe through the Bering Strait and then either west using the Northern Sea Route along the Russian Federation's Arctic coast, or east via the Northwest Passage along Alaska's, Canada's, and Greenland's Arctic coastlines. Although retreating and thinning sea ice will likely be sufficient in the next 10 to 20 years to physically permit the navigation of these sea lanes with appropriate vessels on a more regular basis, it is questionable as to how soon these routes will become commercially viable. It is also uncertain what shoreside infrastructure will be needed to support these new trade routes. Actions needed to trigger the greater viability of the Arctic shipping include:

- Cost of new Polar Requirements for vessels
- Resolution of a variety of Arctic governance issues among the eight Arctic member states
- Installation of improved satellite navigation and communication systems
- Implementation of expanded Arctic search and rescue response capabilities
- Continued warming of the Arctic conditions and sea ice retreat

It is difficult to predict when the Arctic sea lanes will become major commercial shipping corridors for regularly scheduled container vessels due to their tight logistics and scheduling. The slightest delay caused by shifting ice or a breakdown in navigation systems could impact the vessel's ability to deliver

its cargo at its port or ports of destination on time for scheduled off-loading. A more likely near-term scenario will be bulk carrier operations supporting mineral development where timing and logistics are not as critical. These operations would be similar to the existing Red Dog Mine operation, where bulk metal ores and concentrates are stored at tidewater and shipped in bulk seasonally as weather and ice conditions allow (Monroe 2019).

Arctic Cruise Ship Trends

Tourism is a strong economic driver in Alaska. The Cruise Line International Association (CLIA), which represents 15 major cruise lines serving Alaska, projects more than 1.3 million cruise ship passengers debarking in Alaska ports in 2019. The majority of these passengers will be visiting Southeast Alaska, with a smaller percentage crossing the Gulf of Alaska to Whittier or Seward to visit Southcentral Alaska destinations.

There is an increasing trend in cruise lines visiting the Arctic ports of Nome and Utqiaġvik. They represent a relatively small but growing percentage of statewide cruise destinations. Most vessels that visit these ports are smaller, with passenger capacities in the hundreds, compared to the vessels accessing Southeast and Southcentral destinations, which have passenger capacities in the thousands. Arctic cruises tend to be longer in duration, occur later in the season to ensure ice-free conditions, and have fewer shore excursion opportunities. Even with these limitations, growth is occurring.

Factors controlling the increase in Arctic cruise ship activity include:

- Continued Arctic warming trends that lengthen ice-free periods
- Improved search and rescue capabilities and infrastructure
- Introduction of ice-capable cruise ships
- More shore excursion possibilities

Arctic cruises will likely develop along the model of Antarctica cruises, as more specialty/adventure cruise experiences on specialized ice-capable vessels (O'Brien 2019g).

Table 1. Northwest Alaska Arctic Voyages 2016–2019

Year	Number of Voyages	Average Passenger Capacity	Bering Strait Transits	Northwest Passages
2016	9	373	4	4
2017	8	373	3	3
2018	5	206	4	1
2019*	17	360	8	5

*2019 numbers are based on projected voyages (O'Brien 2019g).

Arctic Governance, Policies, and Activities

The Arctic Council is the primary international organization charged with facilitating Arctic governance. The Arctic Council's Working Groups have produced various assessments focusing on ecological and social impacts. These assessments are used regularly to help member states inform and direct local Arctic Policy. The Council has also helped inform and provide a platform for the negotiation of three agreements that encompass all eight Arctic member states and six Indigenous People's organizations.

The Council signed the Agreement on Cooperation on Aeronautical and Maritime Search and Rescue in Arctic in 2011. This legally binding agreement established a task force to coordinate collaborative arctic search and rescue operations. In 2013, the Council signed the Agreement on Cooperation on Marine Oil Pollution Preparedness and Response in the Arctic. This agreement aims to strengthen collaboration, coordination, and assistance for oil pollution response among the signing arctic member states. The Council signed the most recent agreement, the Agreement on Enhancing International Arctic Scientific Cooperation, in 2017. This agreement focuses on strengthening scientific research collaboration between the States (Arctic Council 2015b).

The Arctic Council held the 11th Ministerial Meeting in Rovaniemi, Finland, on May 7, 2019. The meeting reviewed Council activities that occurred under Finland's Chairmanship and transitioned the Council to the Icelandic Chairmanship, which will span 2 years. The Finland Chairmanship explored topics and focused on climate change and sustainability (Arctic Council 2019b). In 2019, the Arctic Council received the Global Award of the International Association for Impact Assessment for its work on sustainability and environmental protection (Arctic Council 2019a).

U.S. Military Arctic Activities

The opening of the Arctic due to shortened periods of ice coverage has expanded U.S. national defense interests and concerns regarding northern maritime activity. The decline in seasonal sea ice has prompted both the USCG and U.S. Navy to examine their current and future roles in arctic waters. Both agencies recently conducted research on the current status of arctic activity and established visions for their future roles and operations in the region.

U.S. Coast Guard

The USCG established Operation Arctic Shield in 2017 as part of its arctic strategy. Two MH-60T Jayhawk helicopters and crews were stationed in Kotzebue for their arctic operations in both 2017 and 2018 to serve as a forward operating base during the ice-free season. Operation Arctic Shield 2017 conducted a variety of activities in Northwest Alaska. The Cutter Maple was the first non-icebreaker cutter to voyage through the Northwest Passage since 1967. Additional highlights included the completion of regional search-and-rescue cases, water safety education of more than 4,000 children in remote villages, and exchanges and joint operations with the Royal Canadian Navy and Canadian Coast Guard (USCG 2018a).

Operation Arctic Shield 2018 also completed search-and-rescue operations, conducted vessel exams, and completed the first deployment of a small, unmanned aircraft system above the Arctic Circle. The Cutter Healy, a polar ice breaker, was used to complete a variety of scientific missions in the Arctic, including research for the Office of Naval Research, 300 miles northeast of Utqiaġvik. Multiple trainings such as the oil spill education and preparation exercise, Operation Arctic Guardian, were conducted in Utqiaġvik (USCG 2018b).

The USCG is planning to return to Kotzebue for 2019 operations from July through October. Additional activity for 2019 includes arctic safety missions, regional vessel inspections, and oil and hazardous material response. Currently, the USCG is facilitating the Arctic Waterways Safety Committee to implement best practices to support safety, efficiency, and predictability for arctic waterway users and operations now and into the future (O'Brien 2019h).

In February 2019, Congress passed a funding bill, which was signed into law, that included a total of $675 million for the PSC program—$655 million to fully fund the first PSC and $20 million for long-lead-time materials for a second PSC. The Department of Defense Contracting Office announced in April 2019 that VT Halter Marine, Inc., of Pascagoula, Mississippi, has been awarded the contract to build the nation's first new heavy PSC in more than 40 years (U.S. Senate 2019). Other arctic initiatives are finding Congressional support.

U.S. Navy

The U.S. Navy has assessed the significance of the opening of arctic waters and its effects on their operations. This research identified a potential need for an expanded presence in the region. The Northern Sea Route and the Northwest Passage have greater accessibility due to the reduction in ice and the resulting increase in maritime traffic. This has prompted the U.S. Navy to examine its role in the region. Their heightened interest in monitoring is also the result of pressure caused by increased Russian Federation activities in arctic waters and by economic interest in the Arctic from China and other Asian countries. Russia has strengthened restrictions for the use of its Northern Sea Route along their coasts by claiming extensive territorial waters. Their actions have prompted the U.S. Navy to consider a stronger presence to address freedom of navigation in what is considered international waters by many nations.

The U.S. Navy's capabilities and resources are not as developed as Russia's - a concern that has drawn attention from Congress and the Administration. In 2014, the U.S. Navy's Task Force Climate Change published its Arctic Roadmap: 2014-2030 (Roadmap), which examined its current and future capabilities in the Arctic. It noted that existing U.S. Navy resources are limited and inadequate for ongoing arctic operations. The Roadmap identified the need for expanded partnerships between various federal "Arctic" agencies and branches of the military. Weather conditions, sea ice, inaccessibility, and limitations in arctic infrastructure are the largest obstacles for current arctic activity (Kuersten 2015). The Roadmap cites continued monitoring of the Arctic as its primary objective and suggests that the U.S. Navy will play a supporting role in USCG operations.

In early May 2019, Secretary of the Navy Richard Spencer reported to Congress that the Navy is developing plans to conduct a Freedom of Navigation Exercise in the Arctic, possibly as early as 2019. According to KTOO's story on Secretary Spencer's report to Congress, the Navy is responding to increased international shipping activities in the Arctic. "As sea ice shrinks, countries are sending more and more ships through waters not previously considered navigable. The U.S. is particularly concerned about Russian and Chinese ambitions in the Far North" (Ruskin 2019). The Freedom of Navigation Exercise would demonstrate the United States' belief that much of the Arctic is international, not territorial, waters.

U.S. Air Force

In a January 9, 2019, opinion piece for the DefenseNews, Air Force Secretary Heather Wilson and U.S. Air Force Chief of Staff General David Goldfein provided an overview to the Air Forces Arctic Strategy (Wilson and Goldfein 2019). In their piece, they state that, "The Arctic has valuable natural resources including rare earth metals, fish proteins, and up to one-fifth of the world's oil and natural gas reserves. The U.S. is far from alone in seeing the region's value. Russia is securing its economic interests in the north, which makes up about 20 percent of its gross domestic product, and is rebuilding its military

presence in the region. China considers the Arctic as part of its Belt and Road Initiative and is establishing a presence through economic leverage with other arctic nations." The Air Force's strategy to counter these competitive interests includes partnering with arctic allies to improve radar and satellite surveillance systems and improve northern bases' capabilities. They specifically cited that by 2022, Alaska will be the home to more advanced fighter jets that any other place on earth.

1.3 Description of Marine/Riverine Cargo and Fuel Delivery to Northwest Alaska

1.3.1 Norton Sound, Northwest Arctic Borough, and North Slope Borough Communities

Table 2~~Table 2~~ provides a snapshot of scheduled cargo and fuel operations to the Norton Sound/Seward Peninsula, Kotzebue Sound, and North Slope Borough communities. It represents potential charter barge traffic in support of construction projects or resource developments.

Table 2. Generalized Annual Cargo and Fuel Barge Delivery Schedule, Nome, Kotzebue, and North Slope Borough Communities

Community	Alaska Logistics	Alaska Marine Lines	Crowley Marine Services	Vitus Marine
Nome	5 Sailings: May–September	5 Sailings: May–September	4-5 Sailings: June–September	1-3: Sailings As Needed
Nome Area Villages *	4 Sailings: June–September	2 Sailings May, August or September	2 Sailings: June or July and September	As Needed
Kotzebue	3 Sailings: June–August	2 Sailings: July and August	2-4 Sailings July and September	1-3 Sailings: As Needed
Kotzebue Area Villages *	2 Sailings: June and July	1 Sailing: July	1 Sailing: June–July	As Needed
Utqiaġvik	2 Sailings: June and July	1 Sailing: July or August	1 Sailing: August	n/a
North Slope Borough Villages *	2 Sailings: June and July	1 Sailing: July/August	1 Sailing: August	n/a

* Dependent on freight volume, need, weather, and river levels.

Source: O'Brien (2019b, 2019c, 2019d); AML/Lynden (2019); Alaska-Logistics (2019)

Cargo Delivery

Cargo is delivered to coastal communities in Norton Sound, along the Seward Peninsula, the Northwest Arctic Borough, and the North Slope Borough by large, ocean-going common carrier barges that transit the Gulf of Alaska from Seattle with stops in Anchorage or Seward. Common carriers have published tariffs and schedules. AML and Alaska Logistics provide the primary cargo services. These ocean-going barges deliver to the Port of Nome or to the privately owned Crowley or Drakes Construction dock facilities in Kotzebue, and then use shallow draft lightering vessels to deliver cargo to smaller communities. In some cases, ocean line barges offload directly to lightering vessels to deliver cargo to a smaller coastal community if volumes make it economical (O'Brien 2019e, 2019f).

AML is expanding service to the North Slope communities in 2019, taking over the area that was formerly served by Bowhead Transport (see Figure 5; O'Brien 2019e). Nome and Kotzebue serve as marine transportation hubs where cargo is transferred to smaller, shallower draft vessels for delivery to coastal or river communities. AML has its own fleet of shallow draft coastal and river barges to serve smaller communities. Alaska Logistics has its own lightering vessels, but often teams with charter barges to deliver freight to local communities, depending on volume and schedules. Village cargo is sometimes carried by local or chartered construction barge companies on a space-available basis if scheduling permits. Nome has the most developed public port and harbor system in the Northwest Alaska area, with cargo transshipped to up to 50 communities from the Yukon Delta to the North Slope Borough (Port of Nome 2016). The Port of Nome is described in detail in Section 1.4.

Figure 5. Cargo Delivery – Utqiaġvik, Alaska, Late July 2016. Sean Hochanadel.

Fuel Delivery

Historically, fuel was delivered to Northwest Alaska by barges originating from the Seattle area to shore facilities in Nome or Kotzebue for further distribution to smaller communities, or fuel was transferred from these barges, while anchored at sea, to lightering vessels for distribution to smaller communities. Today's service providers may also employ a chartered mother ship, from Asia or wherever the lowest cost fuel is available, to bring lower cost fuel to the Northwest Alaska area. These tankers anchor offshore to transfer fuel to barges that then lighter fuel to smaller communities, facilitating more direct delivery. Some delivery to shore facilities in Nome and Kotzebue still occurs, but fuel delivery to smaller communities is beginning to bypass these hubs, depending on volume. The goal is to limit the number of times the fuel is transferred, potentially stabilizing costs.

Crowley and Vitus have their own small, shallow-draft coastal tugs and barges for delivery to small coastal and river communities (see Figure 6). Crowley serves the entire northwest coastal area, while Vitus's service does not extend to the North Slope communities. Fuel transport and delivery services are highly regulated, which limits the number of providers. Additionally, Delta Western provides fuel delivery to the DeLong Mountain Terminal north of Kotzebue on a contract basis to support the Red Dog Mine operations and has its own fuel operations in Prudhoe Bay.

Figure 6. Crowley Maritime Barges Offloading Fuel at Utqiaġvik, North Slope Borough. Crowley Maritime

The cost of goods to communities is directly related to the number of times they are handled. At Kotzebue, for example, due to shallow water, large common-carrier barges moor 12–15 miles outside Kotzebue Sound and lighter to the private Crowley or Drake Construction docks and then to where the cargo is stored in one of two storage yards. The cargo is further broken down in the yards by destination and taken back to the docks for loading onto smaller vessels capable of navigating in shallow coastal waters or rivers that flow into Kotzebue Sound. These shallow-draft vessels then deliver the cargo to its final destination. A similar number of transfers occurs during fuel delivery operations, which impacts fuel costs (O'Brien 2019f).

The Denali Commission contracted with USACE to install a series of mooring ties at the Northwest Arctic Borough communities of Deering, Buckland, and Noorvik during summer 2017. These mooring ties should assist barge operators by improving stability during mooring operations. Improved stability increases safety and facilitates timely offloading of cargo and fuel (USACE 2017a). The Port of Nome has been aggressively improving their facilities with the addition of a third cargo dock along its causeway in its outer harbor and an improved barge landing facility and upland improvements in its inner harbor (Port of Nome 2016).

1.3.2 Middle Yukon Communities

Middle Yukon communities are primarily served via river barges originating from the inland Port of Nenana on the Tanana River south of Fairbanks, with some cargo originating from Fairbanks or the Yukon River Bridge north of Fairbanks. Middle Yukon service differs from service to other study area communities in that one company provides both cargo and fuel service, utilizing vessels that haul both commodities as opposed to separate fuel and cargo barges. The Nenana Port Authority operates a sheet pile dock and storage yards that receive cargo either from the Alaska Railroad or commercial trucks via the Parks Highway. Ruby Marine provides combined cargo and fuel service to Middle Yukon communities from Nenana (see Figure 7), while Galena-based Yukon River and Road, LLC, provide chartered construction and cargo services with pickup services from Fairbanks or the Yukon River Bridge (O'Brien 2019i). Table 3~~Table 3~~ provides a typical summer service schedule by Middle Yukon barge operators.

Table 3. Generalized Annual Barge Delivery Schedule, Middle Yukon Sub-Region Communities

Community	Ruby Marine	Yukon River and Road Transport
Upper Yukon (Rampart)	3 Sailings	As Needed
Middle Yukon Communities		
Tanana to Galena	16 Sailings	As Needed
Galena to Kaltag	10 Sailings	As Needed
Koyukuk River Communities	2 Sailings	As Needed

Source: O'Brien (2019i, 2019k)

Figure 7. Cargo and Fuel Delivery, Ruby Alaska. Matt Sweetsir, Ruby Marine LLC

Delivery of fuel and cargo along the Koyukuk River beyond Hughes is difficult due to shallow water conditions. Ruby Marine intends to expand its service as far as Allakaket in 2019, timing its delivery to the springtime high water (O'Brien 2019i).

The Denali Commission, in concert with USACE, installed a series of mooring ties along the Yukon River communities from Kaltag to Tanana during summer 2017 (USACE 2017a). These mooring ties, combined with the installation of mooring ties by private barge operators at various Middle Yukon communities, help facilitate barge operations at these communities. One issue facing barge operators is that the best barge landings are often also the best locations to beach private river boats used for transportation and subsistence hunting and fishing activities. Barge operators may have to delay delivery of cargo and fuel until the small, private boats are moved (O'Brien 2019i).

1.4 Existing Marine/River Transportation Hubs

1.4.1 Port of Nome Existing Conditions

The Port of Nome (see Figure 8~~Figure 8~~**Error! Reference source not found.**~~.~~) serves as the primary port for Western Alaska and plays an integral role in the economic growth and development of Nome and surrounding communities (Port of Nome 2016; Business View Magazine 2016). The port is located on the Southern Seward Peninsula, southwest of the Bering Strait. Its development over the last century has established it as a critical maritime and multi-modal hub for Western Alaska and the surrounding Arctic region. The public port's importance is strengthened by its proximity to integral transportation

services such as Nome's surrounding road network, which connects to the surrounding regional communities, and the Nome Airport, which offers daily jet service to Anchorage. Nome also serves as the regional center for medical and governmental services.

Figure 8. Port of Nome Facilities

The Port of Nome serves diverse commercial and non-commercial uses, including subsistence and commercial fishing, mining, regional trans-shipment of fuel and cargo, tourism, research, law enforcement, USCG operations, and national security. As the regional hub for the fishing industry in the Norton Sound area, Nome has seen a steady increase in fishing activity and in fishing vessels utilizing the port. Nome also has a vibrant mining history that has supported regional mining development and actively relies on the port to sustain operations. Nome's mining district has produced Alaska's third-largest quantity of gold, and offshore gold dredges have increased in recent years as the industry continues to develop in the area. The Port of Nome will provide critical support to future mineral developments in the Norton Sound area.

The port allows the city of Nome to serve as a staging area for equipment and materials required for summer-season maritime and construction operations throughout the NWATP study and, conversely, act as the demobilization center for these operations in fall. Nome's surrounding road network consists of more than 230 miles and provides port access to the communities on this road system.

The Port of Nome is closed for roughly 6 months of the year when ice prohibits regional vessel operations. Because of this closure, port activity remains busy between June and December. It handles a wide range of cargo such as fuel, construction supplies, gravel (for export), non-perishable food, and

other goods and supplies that are distributed to communities across Northwest Alaska. The primary commercial shipments received by the port are cargo and fuel. Its primary exports are gravel, sand, and various sizes of armor rock needed for area construction projects or shoreline protection. The port also services the area's commercial fishing industry and the growing arctic cruise ship industry.

The Port of Nome's physical structure consists of a 3,000-foot causeway, three sheet pile docks, and a southern breakwater (see Figure 9~~Figure 9~~). The narrow tidal range at the port, approximately 1.5 feet, allows for nearly constant activity during half of the year when weather permits. During storm events, tidal surges can prevent ships from entering the port due to changes in water level. There are also storm conditions when wave exposure at the dock forces vessels to wait offshore. The port structure is comprised of an inner harbor and an outer harbor. The outer harbor consists of three docks located on the causeway. The three docks along the causeway have a depth of 22.5 feet at mean lower low water (MLLW), and there is an approximate 500-foot entrance channel between the causeway and south breakwater. These docks service a majority of the cargo, fuel, and equipment vessels that arrive in the port. They also service vessels at the port that need refueling and arrive for resupply. The 200-foot City Dock is used to unload cargo barges and is equipped with marine headers to receive bulk fuel deliveries. It is the primary dock for unloading mainline cargo barges. The Middle Dock was constructed in 2015, is 210 feet long, and is between the City Dock and West Gold Dock on the causeway. The Middle Dock is also used for unloading cargo. The 190-foot West Gold Dock is the primary dock for unloading gravel and equipment and conducting gravel operations.

Figure 9. Port of Nome Cargo Unloading

The inner harbor includes the Small Boat Harbor, which has a depth of 10 feet, multiple dock faces, and Snake River developments such as the 60-foot-wide launch ramp and roll-on/roll-off high ramp, which allow cargo and equipment to be reloaded to shallow draft landing craft and roll-on/roll-off barges to serve surrounding coastal and river communities (see Figure 10). Norton Sound Economic Development Corporation owns and operates a fish processing plant in the inner harbor area. The area also includes 2 acres for storage of vessels, gravel, equipment, and containers. The Port of Nome has approximately 50 acres of uplands, which are primarily used by commercial vessels and operations. These areas are used for vessel haulout and storage during winter. The port has purchased additional land for the increase in winter vessel storage demand.

The port is maintained by the City of Nome and the USACE. The City of Nome is responsible for dredging the berthing areas in front of the sheet pile docks, while the USACE is responsible for annual dredging of the navigation channels and maneuvering basins.

The increased demand for port use has created a number of operational constraints. The limited dock space requires ships waiting for port access to wait offshore. Deeper draft vessels are required to lighter the cargo in order to maintain approximately 10 feet of clearance under the keel. Weather changes can expose the dock to conditions that also require vessels to leave the dock and wait out storms offshore.

Figure 10. Port of Nome Inner Harbor

Table 4. Port of Nome Development Projects since the 2004 NWATP

Year Completed	Project
2005	60-foot Concrete Barge/Launch Ramp
2005	Outer Harbor Dredging (Basin Expansion)
2006	East Breakwater
2007	Small Boat Harbor South Dock (USACE Improvements)
2008	Small Boat Harbor East Dock (USACE Improvements)
2008	Small Boat Harbor Low Level Dock
2008	Inner Harbor Dredging (Deepen Basin)
2008	Small Boat Harbor East Floating Dock
2012	Causeway High Mast Lights
2013	Inner Harbor High Ramp Construction/Dredging
2013	New Snake River Bridge
2015	Middle Dock

Source: Port of Nome (2016)

Port of Nome Freight Flows

The primary sources of revenue for the port are from the transportation of cargo, gravel, and fuel (see Figure 11~~Figure 11~~, Figure 12~~Figure 12~~, and Figure 13~~Figure 13~~). Table 5 indicates that, between 2012 and 2018, the Port of Nome between transferred an average of over 36,400 tons of cargo, 53,000 tons of gravel, and 10.8 million gallons of fuel annually. The amount of gravel the port exports varies annually depending on construction activity in the region. The port also frequently ships out armor rock from the local Cape Nome quarry and sand that are used in projects around the region. Many of these shipments are for use in capital construction projects.

Figure 11. Port of Nome Docks

Source: Port of Nome

Cargo shipments have increased since the 1980s, supported by regional construction and development. Approximately 40 percent of all incoming freight is redistributed to other communities in the area.

Fuel is transported from the port to storage tanks through a city-owned pipeline. The pipeline also serves to load fuel barges and vessels. The storage tanks are owned by Crowley, Bonanza Fuel, and the Nome Joint Utility system. A majority of the stored fuel is used in Nome. Approximately one-third of all fuel products shipped into the port are used to fuel vessels or are redistributed to regional communities.

Table 5. Port of Nome Cargo Authority Commodity Volumes

Port of Nome Commodity Volumes									
Causeway									
	2012	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**Total**	**Average**
Cargo (t)	41,928	36,843	21,845	22,594	12,998	17,973	19,249	*173,430*	*24,775.74*
Fuel (gal.)	13,342,440	7,644,148	8,765,455	8,715,525	7,086,590	8,867,147	6,374,270	*60,795,575*	*8,685,082.10*
Gravel (t)	36,441	24,677	16,704	48,072	131,909	42,312	42,401	*342,516*	*48,930.92*
Harbor									
	2012	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**Total**	**Average**
Cargo (t)	21,398	11,635	8,788	8,550	9,920	11,382	9,867	*81,540*	*11,648.62*
Fuel (gal.)	3,340,510	2,556,219	1,626,881	1,831,368	1,683,821	2,142,720	2,219,087	*15,400,606*	*2,200,086.57*
Gravel (t)	400	1,773	4,583	2,241	4,049	13,596	2,627	*29,269*	*4,181.31*
Total Volume									
	2012	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**Total**	**Average**
Cargo (t)	63,326	48,478	30,633	31,144	22,918	29,355	29,117	*254,971*	*36,424.36*
Fuel (gal.)	16,682,950	10,200,367	10,392,336	10,546,893	8,770,411	11,009,867	8,593,357	*76,196,181*	*10,885,168.67*
Gravel (t)	36,841	26,450	21,287	50,313	135,958	55,908	45,029	*371,786*	*53,112.23*

Notes: t = tons; gal. = gallons

Source: O'Brien (2019d)

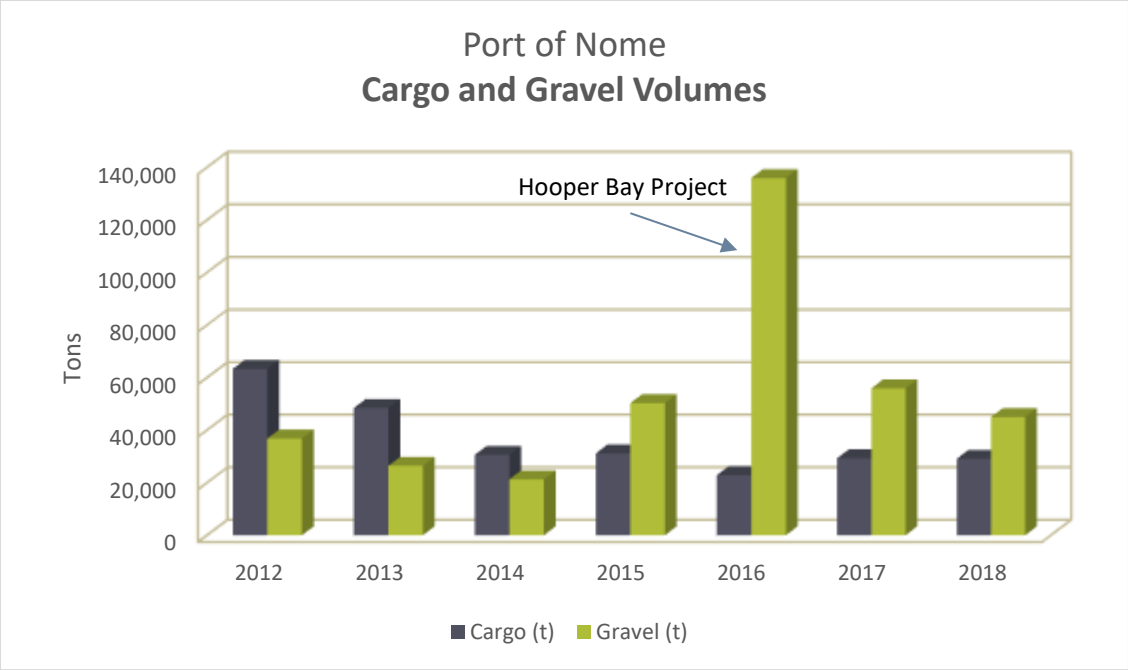

Figure 12. Port of Nome Cargo and Gravel Volumes

Source: Port of Nome

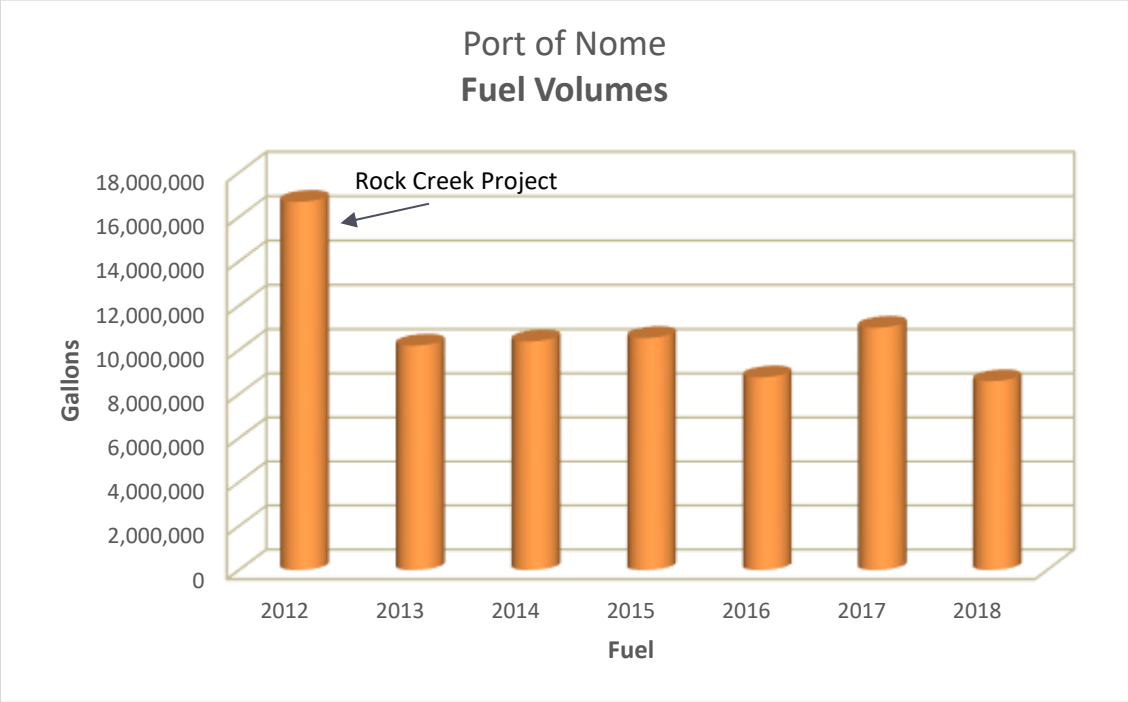

Figure 13. Port of Nome Fuel Volumes

Source: Port of Nome

Port of Nome Issues and Needs

The Port of Nome faces a variety of challenges from its unique geographic location, port capacity limitations, and financial barriers. Because of its northern location, the port can operate for roughly only 6 months, as ice prevents operations during winter. This results in increased activity during summer, as regional maritime activity is condensed into half a year, causing the port to remain busy during these months. The current size of the port places limitations on the size and quantity of the vessels it can accommodate. Area storm conditions also affect port operations. The port continues to explore the feasibility of an expansion project that would allow it to become a deep-draft port and accommodate more and larger vessels. Due to Nome's small population, funding for port expansion and improvement projects is limited. While the port services communities across Northwest Alaska, the City of Nome, State of Alaska, and USACE are its primary sources of funding (Port of Nome 2016).

1.4.2 Port of Kotzebue Existing Conditions

The Port of Kotzebue is located in the city of Kotzebue in the Northwest Arctic Borough of Alaska. The port is made up of the Kotzebue Wharf and the Port of Kotzebue Dock. The Kotzebue Wharf is owned by Crowley Marine Services, Inc., and receives and ships containerized and conventional general cargo and petroleum products. The Port of Kotzebue Dock is owned by Drake Construction, Inc., and is jointly operated with Crowley Marine Services, Inc. The dock receives cargo and provides an area for maintenance of vessels.

The Kotzebue Sound is shallow and subject to winds and water-level fluctuations. To use the existing Kotzebue docks, ships must anchor about 12 to 15 miles offshore due to shallow water depths and shifting sandbars, and lighter fuel or cargo in smaller, shallower-draft vessels for delivery to Kotzebue. Freight is then loaded/offloaded from local river barges to the dock. Often, barging freight and fuel along the Kobuk River are unsuccessful because of shallow river levels; such shipments are instead flown to the appropriate communities, causing a significant increase in the prices of goods and supplies (City of Kotzebue 2013).

1.4.3 Red Dog Port Existing Conditions

The Red Dog Port, built with funding from the Alaska Industrial Development and Export Authority, supports the operations of the Red Dog Mine, one of the world's largest zinc mines. Teck Alaska, Inc., operates the port. Port facilities include a shallow water dock and small staging area. Shipping is seasonal, typically from July to October, and requires the lightering of ore to ships anchored offshore in deeper water. The port ships out approximately 1 million tons of zinc ore and approximately 200,000 tons of lead ore. It is also used for importing equipment, fuel, and other cargo (Letient 2017). Fuel and cargo also must be lightered to shore in shallow-draft vessels.

1.4.4 Nenana Port Existing Conditions

The Port of Nenana is an inland port built along the Tanana River (see **Error! Reference source not found.**~~Figure 14~~). The Nenana Port Authority is responsible for the dry cargo loading and unloading facilities, dock, bulkhead, and warehouse. The Tanana River has a maximum draft of 4.5 feet for barges. There is also a public boat launch with a recreational area. The Port of Nenana uses the Tanana River as its gateway to the Yukon River communities. All of the Middle Yukon communities within the NWATP study area and Koyukuk River communities from Koyukuk to Hughes are served from Nenana (Tanana

Chiefs 2013). The local barge company is planning to extend barge service to Allakaket in 2019 (O'Brien 2019i).

Figure 14. Port of Nenana, City of Nenana, Alaska 2018.

1.5 Barge Landing Facilities

The majority of communities within the NWATP study area do not have formal barge landing infrastructure. Most deliveries are made to beach or riverbank locations as near to the villages as possible. Cargo is offloaded by forklifts if roll-on/roll-off operations are viable, or by cranes mounted on the barge or, in some cases, owned by the community. Soft beaches or muddy riverbanks can be problematic to cargo transfer, so operators often place mats to create a firmer surface for equipment operations. Knowledge and flexibility are key in landing successfully at coastal and river communities, as tides, swells, erosion, and floods can change conditions at the landing areas annually.

Fuel barges often have to float hoses to shore to deliver fuel, and often must deliver to several locations in a community. Permanent coastal or river infrastructure is expensive and, unless well-protected, may become obsolete in a relatively short period due to changing conditions.

Opinions differ as to whether or not permanent barge landings, docks, or consolidated fuel farms would benefit communities due to their high capital costs, their need for ongoing maintenance, and the potential for rapid changes in conditions. Maintaining flexibility to accommodate changing conditions is important when considering capital investments in locations where permanent facilities could be

rendered obsolete soon after construction due to coastal erosion or accretion, or changing river patterns (O'Brien 2019f, 2019i).

To help determine changes in conditions since the completion of the 2004 Northwest Area Plan, HDR reviewed local economic development plans, community comprehensive plans, and state and federal plans, and conducted interviews with barge operators and residents. A Denali Commission-funded study inventorying barge landing facilities throughout Northwest, Southwest, and Cook Inlet areas of Alaska was particularly useful in establishing a baseline inventory of barge landing and marine facilities. In 2009, the Denali Commission entered into an agreement with the USACE to prepare a study of barge landing needs in many regions of the state, including most communities within the study area. The 2009 Alaska Barge Landing System Design Data Gathering Study and Preliminary Design Planning Various Locations, Statewide, Alaska Phase 1, prepared by USACE and URS (formerly Tryck, Nyman, and Hayes)**,** provides a baseline to establish current conditions for both marine and riverine barge landing facilities within the study area. This baseline information will become part of the foundation used to make regional recommendations for transportation improvements and intermodal connections.

The following tables provides a sub-region inventory, describes current conditions relative to barge landings and marine facilities in the study area, and identifies capital improvement needs to improve marine and riverine barge facilities and services. Capital Improvement Program (CIP) projects identified through review of the most recently completed local plans (where available) are shown in **bold** in Table 6 through

Table 9~~Table 9~~. Those needs and projects not shown in bold are recommendations from the USACE 2009 report (USACE and URS 2009). Communities where "n/a" is indicated in the Source Plan or Assessment column signifies that no marine- or riverine-related CIP needs were identified through the review of existing local plans.

Table 6. North Slope Borough Sub-Region: Barge Landing Facilities by Community

Community	Facility Description*	Ownership	Improvements Since 2004	Comments, Issues, CIP Projects	Source Plan or Assessment
Anaktuvuk Pass	Inland community.	n/a	n/a	Fuel and cargo flown in. Seasonal use of ice road connection to the Dalton Highway.	n/a
Atqasuk	Inland support camp for National Petroleum Reserve-Alaska exploration activities. Airport access.	n/a	n/a	n/a	n/a
Deadhorse/ Prudhoe Bay	Private facilities.	Private	Unknown	Summer freight and fuel deliveries available to support oil-field-related activities, including sea lifts of large oil field modules.	n/a
Kaktovik	No formal facilities; beach landings only.	n/a	None	Fuel is offloaded at a marine header. The barge operators indicated strong winds and currents are common at the landing at Kaktovik and mooring points are needed. Polar bears are an issue in the landing area. **Community identified need for new haulout area near deeper water. Need for new boat launch and upland storage facility for locals.**	Kaktovik Comprehensive Development Plan (2015)
Nuiqsut	Inland community not accessible by barge.	n/a	n/a	Freight and fuel can be delivered year-round by aircraft. Winter ice road access to the Dalton Highway allows bulk freight and fuel deliveries.	n/a
Point Hope	No dedicated barge landing facility exists. Beach landing only.	n/a	None	Barge companies in 2009 recommended no fixed improvements to allow flexibility in choosing landing locations. Suggested movable landing mats to support equipment on soft sections of beaches. **Community identified need to address cruise passengers who now land on the beach in small inflatables.**	Point Hope Comprehensive Plan (2017)
Point Lay	No dedicated barge landing facility exists. Barrier islands make	n/a	New floating fuel line in use makes fuel	Offloading cargo is a three-step process. Line barge to landing craft. Landing craft to barrier island. Traverse barrier island to shallow draft push boats	Point Lay Comprehensive Plan (2017)

Community	Facility Description*	Ownership	Improvements Since 2004	Comments, Issues, CIP Projects	Source Plan or Assessment
	access difficult for large barges.		more efficient, removing the need to offload fuel onto small barges.	to cross lagoon to community. **Community identified need to dredge channel between barrier islands. Potential deep water port at Cape Sabine.**	
Utqiaġvik	Beach landings. No fixed barge landing facilities.	n/a	None	Freight operators tend to land at a location north of town, near Stevenson Street and Dewline Road, where the landing tends to be suitable unless weather conditions make this area unusable. . If so, they can go around Point Barrow to Elefson Lagoon for protection to wait out the storm. **Community is working with USACE to develop a Shoreline Protection Project beach erosion and to protect public facilities and drinking water sources.**	USACE Alaska Baseline Erosion Assessment, Erosion Information Paper - Barrow, Alaska (September 14, 2007)
Wainwright	Beach landings requiring multiple transfers to smaller vessels to reach the community.	n/a	None	Fuel barges no longer have direct access to fuel headers. Moor offshore and float lines to the tank farms. Freight delivery requires a multi-step approach similar to Point Lay. 2009 recommendation for road from community to near the lagoon inlet. **Community identified need for a bulkhead dock near inlet's entrance and improved road to community from landing.**	Wainwright Comprehensive Plan (February 2014)

*USACE and URS (2009).

Table 7. Northwest Arctic Borough Sub-Region: Barge Landing Facilities by Community

Community	Facility Description*	Ownership	Improvements Since 2004	Comments, Issues, CIP Projects	Source Plan or Assessment
Kotzebue	Alluvial deposition restricts access to the community. Deep-draft vessels anchor 12 miles offshore. Cargo is lightered to shore and warehoused. Shallow draft barges transfer cargo and fuel to area villages.	Crowley Marine owns a sheet pile dock at Kotzebue that supports their fuel delivery activities. This dock is also used by most of the major freight barge companies. Drake Construction also owns a dock that can be used to trans-ship cargo to smaller communities.	None	**Community identified need to dredge an entrance and channel to Kotzebue and/or to develop a port at Cape Blossom to accommodate common carrier barges with a 10-mile road access to Kotzebue**. **This project would eliminate the need to lighter fuel and cargo to Kotzebue.**	Kotzebue Long Range Transportation Plan (March 2013)
Ambler	Freight landing is at a beach near the community, while fuel is delivered to a downriver location at a marine header.	n/a	None	Low water often prevents barge delivery, restricting successful landings to every other year. Ambler Road may facilitate overland deliveries. **Community identified need for mooring points at the two landings.**	Ambler Long Range Transportation Plan (2010)
Buckland	Barge landings are at high tide only. Fuel barges land upstream and float the fuel hose to the header.	n/a	The Denali Commission, working with the USACE, installed 4 mooring points in 2017 to assist barges from shifting in the currents.	Large rocks in the water require local pilots to help navigate around them. The area floods each spring. Small boats beached in the barge landing area cause delays until they are moved. **Community identified need for new gravel staging area to receive cargo.**	Buckland Comprehensive Community Development Plan (2016)

Community	Facility Description*	Ownership	Improvements Since 2004	Comments, Issues, CIP Projects	Source Plan or Assessment
Candle		n/a	n/a	n/a	n/a
Deering	The barge landing is on the beach of Kotzebue Sound fronting the community. The beach is sandy with few obstructions. No significant issues associated with storm surges and flooding, and erosion is slow.	n/a	2017 inspection of USACE/local Native Corporation 1997 Deering Streambank Protection project shows the two rock revetments totaling 1,380 feet are in good condition, with some downstream erosion occurring below revetment 2 near the airport (USACE 2017c). Sand bar was from upstream of revetment 1 along the airport road.	Barge landings occur on high tide and sometimes must wait until the next high tide to depart, depending on the amount of cargo. There is no central fuel tank farm, making fuel delivery inefficient and impossible to complete on one high tide. **Community identified that the beach landing areas are eroding. Potential need for additional shoreline protection.**	Deering Comprehensive Community Development Plan (2016)

Community	Facility Description*	Ownership	Improvements Since 2004	Comments, Issues, CIP Projects	Source Plan or Assessment
Kiana	One freight landing is on the main channel of the Kobuk River at its intersection with the Squirrel River, a small fork of the Kobuk River. Fuel is delivered at this location and one farther down river at a small landing.	n/a	The Denali Commission, working with the USACE, installed several mooring points in 2017 to facilitate barge landings.	Shallow waters and narrow channels sometimes make it impossible for a barge to reach Kiana. The community is located on a bluff above the river with poor road access, making it difficult to offload supplies. **Community/barge operators identified need for improved road access to landing beaches.**	Kiana, Alaska: IRR Long-Range Transportation Planning (2010)
Kivalina	Barges deliver goods from Kotzebue during July and August. Due to severe erosion and various unsuccessful attempts at shoreline protection resulting in obstacles, beach landings are difficult and often require a local pilot.	n/a	USACE constructed 1,600 feet of coastal beach revetment in 2009 and 2010 (USACE 2017b).	Kivalina has experienced severe coastal erosion and storm events due to retreating sea ice protection. Community is working with DOT&PF to develop an emergency evacuation route to the new school location. **Community identified near-term capital need for a new barge cargo staging area to improve cargo offloading.**	Kivalina Comprehensive Community Development Plan (2016)

Community	Facility Description*	Ownership	Improvements Since 2004	Comments, Issues, CIP Projects	Source Plan or Assessment
Kobuk	The primary barge landing area is on the up-river end of the community, where the airport road comes into town. Another landing area is on the wide beach, about 1,000 feet down-river of the main landing site.	n/a	none	Shallow draft barges deliver freight and fuel during high water in spring or fall. Kobuk Valley Electric Co-op provides power from AVEC over the Kobuk- Shungnak intertie. **Community identified mooring ties and improved shoreside staging area.**	Kobuk Comprehensive Community Development Plan (2016)
Noatak	Shallow water prevents barge deliveries.	n/a	n/a	Noatak has no barge service due to the shallowness of the Noatak River. Fuel and freight are flown into the community. **Community identified the need to build road to connect to the DeLong Mountain Red Dog Mine Road to provide access to Red Dog fuel storage and dock facilities.**	Economic Assessment of Noatak Road and Airport Development Alternatives (May 2005)
Noorvik	Barge access to Noorvik is considered good, due to favorable water levels in this channel of the Kobuk River. There is a large beach that provides several barge landing opportunities.	n/a	The Denali Commission, working with the USACE, installed several mooring points in 2017 to facilitate barge landings.	There are several tank farms, requiring fuel barges to make multiple stops. Consolidating the fuel farms should be considered. **Community identified need for new gravel staging area to receive cargo**.	Noorvik Comprehensive Community Development Plan (2016)

Community	Facility Description*	Ownership	Improvements Since 2004	Comments, Issues, CIP Projects	Source Plan or Assessment
Selawik	Freight and fuel are lightered from Kotzebue to the formal barge landing area on the Selawik River. The river is shallow at the mouth, but sufficiently deep in the main part of the river. The primary barge landing area consists of a gravel access road that leads to the river and a 60-foot-wide beach landing area.	Community-owned barge landing.	None	Mooring posts are buried in the ground with cables and eyes attached at each end of the barge landing. There is a fuel header under the bridge near the school.	n/a

Community	Facility Description*	Ownership	Improvements Since 2004	Comments, Issues, CIP Projects	Source Plan or Assessment
Shungnak	Shungnak is located on a high 70-foot bluff, except at the barge landing where there is a 10-foot bench that leads to the barge landing. There is a marine fuel header at the up-river end of the bench that marks the primary barge landing area. Often takes 3 trips to offload sufficient fuel to last the winter.	n/a	None	Shallow river conditions make barge deliveries unpredictable. Fuel barges must lighten their loads to navigate shallow waters, often requiring 3 trips to deliver all fuel orders. **Community identified need for mooring ties to stabilize offloading of freight.**	Shungnak, Alaska Long-Range Transportation Plan (2008 Update)

*USACE and URS (2009).

AVEC = Alaska Village Electric Cooperative

Table 8. Seward Peninsula/Norton Sound Sub-Region Barge Landing Facilities by Community

Community	Facility Description*	Ownership	Improvements Since 2004	Comments, Issues, CIP Projects	Source Plan
Nome	City has protected port and harbor facilities, including docks at 22.5 feet MLLW. Nome is the only protected publicly owned port and harbor in the NWATP Study. USACE identified Nome as the best location for an arctic deep-draft port to serve increased arctic shipping.	City	City built third dock along the causeway and improved a barge landing in the inner harbor area to facilitate cargo transfer to smaller communities. USACE 2017 inspection of Nome's 3,750-foot seawall confirmed good condition with some minor gaps on armor stone around culverts (USACE 2017d). 2017 USACE inspection of Nome Harbor found only minor deficiencies. Annual dredging removed 82,250 yards of material (USACE 2017e). Since 2004, the City has completed 12 development projects: 60-foot concrete barge launch ramp (2005), outer harbor dredging (2005), east breakwater (2006), small boat harbor south dock (2007), small boat harbor east dock (2008), inner harbor dredging (2008) small boat harbor east floating dock (2008), causeway high mast lights (2012), inner harbor high ramp construction/dredging (2013), new Snake River Bridge (2013), and middle dock (2015).	**City is working to expand the outer harbor/port area to provide depth of 30 to 40 feet at MLLW to serve larger vessels and to be in a better position to address increased arctic shipping. Additional dock space, upland areas, and marine lifts are among several projects contained in their Strategic Port Development Plan.**	Port of Nome Strategic Development Plan (January 2016)

Community	Facility Description*	Ownership	Improvements Since 2004	Comments, Issues, CIP Projects	Source Plan
Brevig Mission	A centralized tank farm and marine header was built in the late 2000s at Brevig Mission, consolidating fuel barge landing areas to one beach area near the header. The freight barges can land on any accessible part of the beach, which is satisfactory, according to barge operators.	n/a	None	Mooring points may be helpful in serving both the fuel barge landing area by the fuel header and the freight barge location east of the community and west of the airport. **Community identified the need for a ferry connecting Brevig Mission to Teller to foster vehicle access to Nome via the Teller Road.**	Brevig Mission Local Economic Development Plan (2013)
Council	Inland community connected to Nome via the Council Road.	n/a	n/a	n/a	n/a
Diomede	Fuel and freight deliveries are made during the summer ice-free season. There are two designated landing areas, one on each side of a breakwater at the southern point of the island.	State-owned breakwater/helipad	None	Poor weather, fog, swells, and strong tides hamper deliveries, causing up to 2-week delays. Conditions dictate which landing area is ultimate used. **Community identified a small boat harbor, barge landing, and ferry service to Wales and Nome as needs. USACE is awaiting the Congressional appropriation to initiate the design of the Little Diomede Small Boat Harbor.**	Diomede Long Range Transportation Plan (March 2007)

Community	Facility Description*	Ownership	Improvements Since 2004	Comments, Issues, CIP Projects	Source Plan
Elim	Fuel barges land at the header location near the south end of the community. Cargo is offloaded near a small stream outfall along the beach in front of the community.	n/a	None	Due to rocks offshore, fuel lines are floated to the marine header location. Cargo offloaded onto the beach is difficult to get up the steep bank in some areas. In addition, the bridge in town is too small to cross with large trucks. **Community identified the need for a protected small boat harbor, dock, and barge landing. USACE has initiated a feasibility study for a harbor at Elim.**	Elim Long Range Transportation Plan (March 2011)

Community	Facility Description*	Ownership	Improvements Since 2004	Comments, Issues, CIP Projects	Source Plan
Gambell	Fuel is primarily delivered to the north beach and trucked to several locations in the community. Freight barges land on the west beach near the airport.	n/a	None	All deliveries are weather- and ice-dependent. The west beach material makes for safe barge landings, but transferring cargo up the beach is difficult due to the softness of the beach. Landing mats would help get the freight off the beach more efficiently. **Community identified a need for a small boat harbor as the retreating sea requires traveling greater distance for subsistence activities, making the use of existing small boats dangerous. Barge loading dock would facilitate cargo operations. A road to Savoonga is needed for emergencies, as sometimes the other community's airport is open while their airport is closed.**	Gambell Long Range Transportation Plan (March 2011) (O'Brien 2019l)
Golovin	Fuel and freight barge operators use beach landing areas. These areas are protected and work well.	n/a	None	Beach erosion is an issue and some shore protection may be required. **Community identified the need for a protected small boat harbor, dock, and barge landing.**	Golovin Local Economic Development Plan (2014)

Community	Facility Description*	Ownership	Improvements Since 2004	Comments, Issues, CIP Projects	Source Plan
Koyuk	Barges require high-tide crossing of shallow tidal flats fronting Koyuk. The fuel barge landing is in west Koyuk at the marine header location. Freight barges land 1 mile east of the community.	n/a	None	Freight operation requires landing cargo on the beach and transferring 1 mile to town along a route that is often in poor condition due to erosion. **Community identified need for protected harbor, barge landings, and port facilities.**	Koyuk Long Range Transportation Plan (March 2007)
Savoonga	Fuel barges double-anchor offshore and float the hoses to shore to a centralized tank farm. Freight barges land in Koolangeeluk Bay, over 2 miles west of the community, and fuel is trucked to its final destination.	n/a	None	There are no low-cost solutions to improve landings at either the village or Kookangeeluk Bay. Storms and sea ice shift boulders and sea bottoms annually. **Community identified need for sheet pile docks to facilitate cargo operations, a small harbor, and a consolidated fuel farm.**	Savoonga Long Range Transportation Plan (2011)

Community	Facility Description*	Ownership	Improvements Since 2004	Comments, Issues, CIP Projects	Source Plan
Shaktoolik	Several beach landing areas front the community. Freight is lightered from Nome in shallower draft vessels.	n/a	None	Fuel barges float fuel lines to two tank farms due to shallow water offshore. Consolidating fuel tank farms or installing a header and pipeline system may make fuel delivery more effective. **Community identified need for protected harbor, dock, and barge landings.**	Shaktoolik Local Economic Development Plan (2013)
Shishmaref	Freight barges land near the landfill at the southwest end of the island and truck cargo into town. Fuel barges provide irregular service because of the difficult landing conditions at the tank farm/header locations caused by the armor stone protection in this area. Delivery is weather-dependent with fuel hose floated to shore.	n/a	USACE Shishmaref Coastal Erosion project was completed in cooperation with the City. Coastal protection history: 2003 Kawerak, Inc. constructed 230 feet of revetment; 2005 USACE built 230 feet and the City built 350 feet of rock revetment; 2007-2008 USACE built 625 feet of rock revetment; 2009 USACE constructed 750 feet of rock revetment (USACE 2017f).	Shishmaref is on the leading edge of climate change and suffers from coastal erosion during major winter storm events. The community can no longer depend on sea ice to provide protection during these storm events and is considering relocating to avoid the erosion threat. **Community identified the need for a barge landing and small boat harbor at new townsite location.**	Shishmaref Long Range Transportation Plan (March 2007)

Community	Facility Description*	Ownership	Improvements Since 2004	Comments, Issues, CIP Projects	Source Plan
Solomon	Connected to Nome via the Council Road.	n/a Check with Joy	n/a	n/a	n/a
St. Michael	Crowley owns a dock that consists of a sunken barge on the south beach near the west end of the community and is used by construction and freight barges. An adjacent concrete ramp with tie-off east of this facility is used by small barges or landing craft at the tie-off points available. Freight barges also land at various locations along the beach.	Crowley	None	There are 3 fuel delivery locations, requiring fuel lines to be floated to shore due to rocks. Consolidated tank farms or a fuel header and pipeline system may make delivery easier. **Community has identified protected small boat harbor, barge landings, and dock as needs.**	Saint Michael Long Range Transportation Plan (March 2007)

Community	Facility Description*	Ownership	Improvements Since 2004	Comments, Issues, CIP Projects	Source Plan
Stebbins	Several beach landing locations that front community. Landing site west of Cape Stephens to access material and armor rock source. Landing site east of Cape Stephens with a 1.5-mile access road to community.	n/a	None	Fuel delivery is weather dependent. Due to offshore rocks, barges float a fuel line to 3 different fuel headers serving different community organizations. Stebbins is connected to St. Michaels by a 10-mile road. **Community identified need for protected boat harbor, barge landings, and port facilities.**	Stebbins Long Range Transportation Plan (March 2007)
Teller	Barges access Teller through an entrance from Port Clarence to Grantley Harbor. There are several barge landing sites along the coast of Grantley Harbor, which is protected and very calm.	n/a	None	Teller has deep water access to both Port Clarence and Grantley Harbor, allowing efficient barge operations including ocean-going line barges. Teller is seasonally connected to Nome via the Teller Road. **City and USACE determined that there is a potential federal interest in developing a small boat harbor at Teller. Teller needs to enter into a cost sharing agreement with the USACE to initiate a formal feasibility study.**	Teller Long Range Transportation Plan (March 2007)

Community	Facility Description*	Ownership	Improvements Since 2004	Comments, Issues, CIP Projects	Source Plan
Unalakleet	Barge operators enter the Unalakleet River to access the protected shoreline of Kouwegok Slough on the east side of the community. There is one fuel header located on the slough. The Native Corporation owns a dock and ramp near the mouth of the river used by small, shallow draft boats.	Native Corporation	USACE in 2010 constructed 675-foot rock revetment as Phase 1 of the Unalakleet Coastal Protection project; Phase 2 450-foot rock revetment completed in 2014; Phase 3 350-foot sheet pile revetment completed in 2017 (USACE 2017g).	Deeper draft barges sometimes dock on the Norton Sound side north of the community to avoid the shallow water of the slough. Such beach landings are weather dependent. **Community identified need for seawall by river mouth, protected small boat harbor, barge landing facilities, and a Norton Sound ferry service.**	Unalakleet Long Range Transportation Plan (March 2007)
Wales	Freight is delivered to Tin City and trucked to Wales. Fuel deliveries are made directly to Wales (and fuel barge operators also truck fuel from Wales to Tin City).	n/a	None	Weather, ice, and shoals in this area present a challenge when landing fuel at Wales. Three stops are required to offload fuel at the various tank farms in the community. **Community identified the need for a seawall and small boat harbor.**	Wales Local Economic Development Plan (2011)

Community	Facility Description*	Ownership	Improvements Since 2004	Comments, Issues, CIP Projects	Source Plan
White Mountain	Barge deliveries limited to early spring and often employ a guide boat due to Fish River's shallow water and shifting channels.	n/a	None	White Mountain is 8 miles upriver from coastal Golovin. Barge access is limited by shallow water. **The community supports a road to Golovin to improve access to freight and fuel. There is a need for improved barge landing at the community**.	White Mountain Long Range Transportation Plan (March 2007)

Table 9. Middle Yukon River Basin Sub-Region: Barge Landing Facilities by Community

Community	Facility Description*	Ownership	Improvements Since 2004	Comments, Issues, CIP Projects	Source Plan
Nenana	Long sheet pile dock with both highway and rail access on north side of community.	Nenana Port Authority	None	Major trans-shipment point with barges receiving freight and fuel via the Parks Highway and Alaska Railroad for shipment to Lower, Middle, and Upper Yukon communities.	n/a
Alatna	Beach landing area for small boats.	n/a	none	Shallow water makes barge landings difficult. Ruby Marine will attempt delivery in spring/summer 2019.	O'Brien 2019i
Allakaket		n/a	n/a	Shallow water makes barge landings difficult. Ruby Marine will attempt delivery in spring/summer 2019.	O'Brien 2019i
Bettles/Evansville		n/a	n/a	Shallow water prevents barge landings. Winter road access via trail to Dalton Highway.	n/a
Coldfoot	Accessible to Dalton Highway.	n/a	n/a	n/a	n/a
Galena	Fuel is delivered to the old town tank farm, near the downriver end of town where the fuel header. A freight barge landing site is located near the downstream end of the runway, near the center of the shoreline that fronts the community.	Community owns boat launch and boat landing area.	The Denali Commission, working with the USACE, installed 3 mooring points in 2017 to facilitate barge landings. Mooring points also installed by private barge operator. 2017 USACE inspection report of City of Galena/USACE 3,600-foot rock streambank erosion protection along the New Town area found it to be in good condition (USACE 2017h). Some upstream erosion noted.	Debris fronting the fuel barge landing location is problematic.	n/a

Community	Facility Description*	Ownership	Improvements Since 2004	Comments, Issues, CIP Projects	Source Plan
Hughes	Beach landing area for barges.	n/a	Mooring points also installed by private barge operators.	Shallow water makes barge access difficult and unreliable.	n/a
Huslia	Barge landing at sandy beach with road access to community.	n/a	Mooring points also installed by private barge operators.	Shallow water affects deliveries. **Community identified need to improve both the barge landing and the access road that connects it to the community, due to erosion.**	Long-Range Transportation Plan, Huslia, Alaska (February 2011)
Kaltag	Freight landing and main fuel header are at one landing site, near the north end of the community.	n/a	The Denali Commission, working with the USACE, installed several (need to confirm the number) mooring points in 2017 to facilitate barge landings. Mooring points also installed by private barge operator.	Low water conditions makes docking difficult. **Community identified need for dock and barge landing facility.**	Kaltag Tribe 20 Year Long Range Transportation Plan (2016)
Koyukuk	There is little current at the landing area, but there is a lot of silt and mud. Three mooring points are needed at the main fuel and freight landing site. Mooring points would help stabilize offloading activities.	n/a	Mooring points also installed by private barge operator.	The landing area at this community can be problematic for barge landings because there is a lot of erosion. The bluff that leads down to the landing area is caving in and the road up the bank is steep and rutted.	n/a

Community	Facility Description*	Ownership	Improvements Since 2004	Comments, Issues, CIP Projects	Source Plan
Manley Hot Springs	Road-accessible community.	n/a	n/a	Manley does receive intermittent barge service from Nenana. Severe erosion hampers barge landings. **Community identified need for an improved barge landing.**	The Native Village of Manley Hot Springs Long Range Transportation Plan (2008)
Minto	Road-accessible community.	n/a	n/a	n/a	n/a
Nulato	Dedicated barge landing area as the community built up the main fuel and freight landing site and staging area with gravel, angled a rock/gravel slip into the water, and added erosion protection.	Community	The Denali Commission, working with the USACE, installed several (need to confirm the number) mooring points in 2017 to facilitate barge landings. Mooring points also installed by private barge operator.	Village is moving to upland location. Mooring ties would help barge operations. Fuel is also delivered to the school every other year and annually to the AVEC site. **Improved barge landing facility is a community priority.**	Nulato Long Range Transportation Plan (2010)
Rampart	Barges deliver freight or fuel 2 or 3 times during summer.	n/a	Mooring points installed by private barge operator.	Beach landing area only.	n/a
Ruby	Two barge landing areas at Ruby, both on a long gravelly beach. The fuel landing site is at the upriver end of the community, near the tank farm. The freight landing includes a small staging area and is at the downriver end of town.	n/a	The Denali Commission, working with the USACE, installed several (need to confirm the number) mooring points in 2017 to facilitate barge landings. Mooring points also installed by private barge operator.	Consolidating the landing areas would allow more efficient operations as the fuel barge often hauls freight.	Ruby Tribal Council Long Range Transportation Plan (2009)

Community	Facility Description*	Ownership	Improvements Since 2004	Comments, Issues, CIP Projects	Source Plan
Tanana	The City operates a dock on the river; barged goods can be offloaded at a staging and storage area.	City	The Denali Commission, working with the USACE, installed several (need to confirm the number) mooring points in 2017 to facilitate barge landings. Mooring points also installed by private barge operator.	The State recently extended the "Road to Tanana" from Manley Hot Springs. The road ends on the opposite bank of the Yukon River from the community. This recent change may have some benefit in facilitating lower cost delivery of freight and fuel. It is too recent to have any data to support this possibility.	Tanana Tribal Council Long Range Transportation Plan (2009)
Wiseman	Accessible to Dalton Highway for freight and fuel.	n/a	n/a	n/a	n/a

*USACE and URS (2009).

2 Proposed Marine Development

2.1 Summary

The USACE and DOT&PF have played historic roles and have been partners in developing harbors and navigation improvements throughout Alaska. The USACE has been instrumental in the development of the Nome Port and Harbor, which is the only publically managed port in the NWATP study area. The USACE has constructed several erosion protection projects in the study area, including the Nome Seawall, Unalakleet Erosion Control, Deering Streambank Protection, Galena Emergency Streambank Stabilization, Kivalina Coastal Erosion, and the Shishmaref Coastal Protection.

The USACE currently has congressional authorization for four feasibility studies and authority to initiate one design project within the study area (O'Brien 2019j); see Table 10. The State of Alaska or local governments have provided matching contributions for these projects, which are summarized below; greater project detail is provided later in this section.

Table 10. USACE Design Projects in Study Area

Project Name	Project Purpose
Arctic Deep Draft Arctic Port Study (Nome Harbor)	The USACE and the City of Nome are determining the feasibility of expanding the Nome Port and Harbor to allow deep draft vessel access. They are currently looking at the benefits of extending breakwaters to the depth between 30 and 40 feet MLLW.
Kotzebue Harbor Feasibility Study: Navigation Improvements at Cape Blossom, Kotzebue Alaska	The USACE and the City of Kotzebue are assessing the feasibility of developing a deep water port at Cape Blossom, 10 road miles south of Kotzebue. The concept is to accommodate ocean-going barges at a dock with a depth of 20 to 25 feet MLLW. The DOT&PF is studying the feasibility of extending a road to Cape Blossom. This would eliminate the need to lighter cargo and fuel to Kotzebue.
Barrow (Utqiaġvik) Storm Damage Feasibility Study	The USACE and the City of Utqiaġvik are assessing the feasibility of constructing coastal revetments to reduce erosion caused by more frequent and severe storms.
Elim Alaska Navigation Improvements Feasibility Study	USACE has initiated a feasibility study to determine if there are sufficient economic benefits to develop a small boat harbor to support area commercial and subsistence fishing activities.
Little Diomede Navigation Improvements Design	The USACE has the authority to initiate the design of a small boat harbor at Little Diomede to improve vessel safety. They are awaiting appropriation of funds to start the design.

The Bering Sea Native Corporation, building on the USACE's Deep Draft Arctic Port Study, is pursuing the development of marine facilities at Port Clarence. Their efforts are described in Section 2.2.6.

2.2 Past Projects and Current Studies

2.2.1 Port of Nome Deep Draft Expansion Project

The Port of Nome, in conjunction with the USACE, has been working toward an expansion project that would:

- extend the existing causeway by 3,484 feet
- remove the east breakwater and replace it with a new 3,900-foot causeway
- Deepen the existing outer basin to 28 feet below MLLW
- Create a Deep Water Basin to 30 to 40 feet below MLLW
- Construct five new docks

An increase in port traffic and the lack of a deep-draft port in the region has made this project a priority for the Port of Nome. The project would be funded by the USACE and the City of Nome. This would be the first deep-draft port in the U.S. Arctic (Schreiber 2018; Port of Nome 2016).

Research into a site location for a deep-draft port in the U.S. Arctic began in 2008. The Alaska Deep Draft Arctic Port System Study began in 2012. In 2015, USACE and the DOT&PF identified Nome as the preferred site for this development. The study was put on hold in 2015 when Shell announced its decision to suspend exploration in the Arctic, as much of the benefits from the expansion rely on resource development. The study resumed in 2018 when USACE and the City of Nome agreed to finance the study.

The draft concept proposed in 2015 would extend the causeway by 2,150 feet and includes the addition of a 450-foot dock. Dredging would extend up to 40 feet MLLW and allow larger vessels to use the port. The USACE and City entered into a cost-share agreement in February 2018 for a 2-year feasibility study; upon signature of the Chief's Report, Water Resources Development Act 2018 legislation will allow for the project to be expedited into the design phase. Funding for the project is being investigated, as USACE would be responsible for funding breakwaters and dredging (partially cost-shared by the City), while the City would be 100 percent responsible for the docks, roads, and utilities. Additional funding for the project is anticipated to be secured through public-private partnerships. Figure 15~~Figure 15~~ shows a 2015 conceptual rendering of an expanded Port of Nome. New concepts are currently under development as the latest study progresses (O'Brien 2019d).

Figure 15. 2015 Concept Rendering of Deep-Draft Port (Courtesy of the Port of Nome)

As proposed, a deep-draft port in Nome would accommodate future marine transportation growth and industry development in the area while reducing operating costs, which may have positive economic impacts on the region (see Figure 15~~Figure 15~~). The deep-draft port would also provide opportunities for local and regional economic growth by supporting potential offshore oil and gas exploration and development and expanded dock capacity for the fishing industry, and would support the growing tourist industry by servicing larger cruise ships. In addition, the port expansion would allow for additional safety and emergency vehicle access and presence. As the presence of foreign interests in the Arctic region increase, a deep-draft port could provide critical refueling and resupply infrastructure needs for expanded national security efforts in the Arctic region.

2.2.2 Kotzebue to Cape Blossom Road

The DOT&PF has conducted an environmental analysis on a proposed road from Kotzebue to Cape Blossom (see **Error! Reference source not found.**~~Figure 16~~). The road would provide access to a potential barge landing and potential port site at Cape Blossom and improve access to the Baldwin Peninsula shoreline. The proposed project includes upgrades to the existing Air Force Road, upgrades to the Kotzebue Electric Association Wind Farm access, and construction of a two-lane gravel road from the wind farm to a beach access ramp at Cape Blossom (DOT&PF, Kotzebue to Cape Blossom Road project website).

The USACE is conducting a Feasibility Study to determine the viability of a barge landing facility at Cape Blossom. The concept would be to develop a dock that extends to 20 to 25 feet MLLW to accommodate ocean-going fuel and cargo barges. This project would eliminate the current lightering operation that requires ocean-going barges to anchor 12 to 15 miles offshore and transfer fuel and cargo to shallower draft vessels for delivery to the private docks at Kotzebue. This would result in more economical, environmentally sound, and safer delivery of fuel and cargo to Kotzebue and the surrounding communities.

The construction of the road and barge landing would help overcome the current limitations of the Kotzebue Port and allow for greater regional access and support. The barge landing would provide greater cargo access to the community and consequently help address the high costs of shipping in this area by reducing the need for additional barge lightering services. The landing area is anticipated to provide additional access for spill response and national maritime security monitoring vessels.

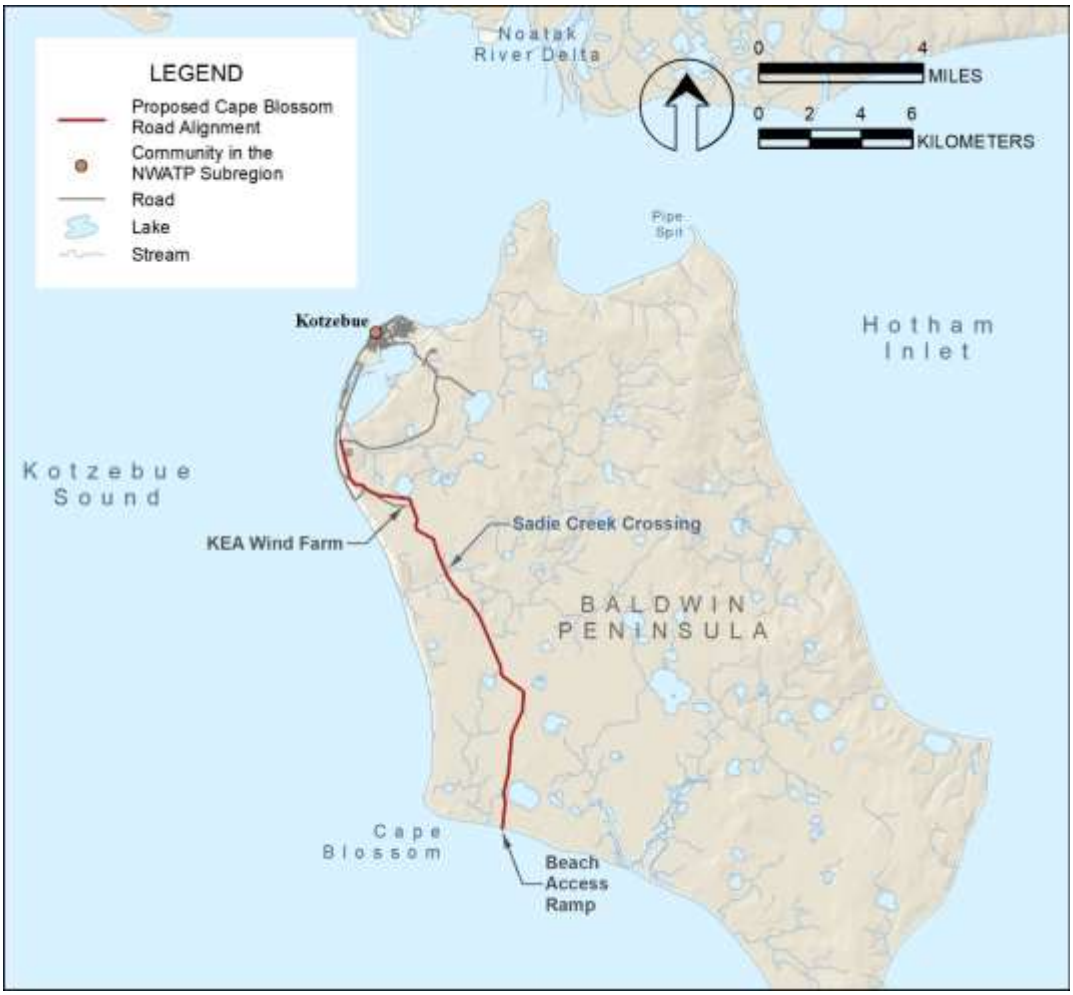

Figure 16. Cape Blossom Road Route

Source: DOT&PF

2.2.3 Utqiaġvik (Barrow) Storm Damage Reduction

The USACE is working with Utqiaġvik and the North Slope Borough to prepare a feasibility study to assess shoreline protection options for the community. Recent storms have nearly breached the community's freshwater supply and other public facilities. Beach erosion has accelerated in recent years, due in part to retreating sea ice, more severe storms, and changing climate. Engineered solutions including rock revetments are being considered.

2.2.4 Elim Navigation Improvements

The USACE is working with the community of Elim to study the need for a protected harbor. The harbor would serve both commercial fishing and subsistence fishing and hunting activities. It would also facilitate cargo and fuel deliveries and provide a harbor of refuge in this area of Norton Sound.

2.2.5 Little Diomede Navigation Improvement

The USACE has congressional authorization to initiate the design of a small boat harbor at Little Diomede. Project initiation is pending the actual appropriation of design funds by Congress. The harbor would provide protected moorage for subsistence activities and should help facilitate cargo and fuel deliveries to this remote island community.

2.2.6 Port Clarence Deep Water Port

In 2013, USACE completed a Deep Draft Arctic Port Study that examined locations in the region with potential for development. The study determined that the Port of Nome and Port Clarence have the greatest feasibility for development. In 2014, the Bering Straits Native Corporation (BSNC) completed an Economic Feasibility Study of a Deep Water Port at Port Clarence. The BSNC study determined that port development at Port Clarence is viable if the development secures financial support from private investment. The location has naturally deep water, and so development would require limited dredging and marine disturbance, and no maintenance dredging, which would reduce project costs. The port has potential to serve as a staging area for regional oil and gas exploration. Many of the federal holdings at Port Clarence were transferred to BSNC and the State of Alaska via House Resolution 4188, with the USGG retaining its station to support its arctic marine and aviation operations (BSNC 2014, 2016; Brehmer 2014).

3 Regional Maritime Challenges and Opportunities

Northwest Alaska faces a diverse set of maritime challenges and opportunities. Overcoming the challenges and capitalizing on the opportunities can stimulate regional economic development. Regional challenges can serve as a platform for encouraging enhancement and expansion of maritime improvements.

The increase in maritime traffic in the Bering Strait and the Arctic can be seen as both a challenge and opportunity. The increase in vessels transiting the area will require improved SAR operations. Continued interest in the Arctic by the Russian Federation and China requires increased monitoring by the U.S. military and appropriate federal agencies. New potential for offshore oil and gas and mineral development in the Alaskan and Canadian Arctic provides the opportunity to expand public-private partnerships to assist in the development of shoreside facilities to support these resource developments. This increase in activity may provide regional economic stimulus as port activity increases and may offer new opportunities for local development as port improvements ease access to the region.

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