AlaskaNOR

Blue Maritime Transportation

Shipping and Maritime Transportation in Alaska and North Norway

AlaskaNor WORK PACKAGE IV

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The figures, estimates, forecasts, and recommendations contained in this report were primarily collected and devised prior to the global Covid-19 pandemic. Due to the global economic impact of the pandemic, some estimates and forecasts may no longer represent the most likely scenarios and timelines may have to be adjusted to reflect new economic realities.

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List of Abbreviations

AMHS	Alaska Marine Highway System
AML	Alaska Marine Lines
ARRC	Alaska Railroad Corporation
CMTS	U.S. Committee on the Marine Transportation System
km	Kilometers
LNG	liquified natural gas
MMSI	Maritime Mobile Service Identity
nm	Nautical miles
NSR	Northern Sea Route
NWP	Northwest Passage
TAPS	Trans-Alaska Pipeline System
TEU	Twenty-foot Equivalent Unit
TSR	Transpolar Sea Route
USCG	United States Coast Guard

A Blue Future for Alaska and North Norway

The Arctic, or the "High North," as this area is usually called in Norway, is one of the world's regions with the greatest prospects for economic value creation. With so much of the Arctic consisting of ocean, the area's potential is heavily dependent on the "blue economy," referring to the sustainable use of the ocean and its various resources for growth and improved livelihoods, in a way that preserves the health of the ecosystem.

The Arctic is changing, and it is changing fast, creating both new opportunities and responsibilities. So far, we know too little about these changes, which may be environmental, technological, and social in nature. Therefore, new knowledge must be created through serious and independent research focused on how to sustainably exploit the ocean's resources and ensure that residents of the region benefit equitably. We also need dialogue between the different Arctic stakeholders, openly sharing and discussing knowledge and experiences internationally.

The AlaskaNor Project aims to develop and communicate knowledge concerning the blue economy potential in Alaska and North Norway and make this knowledge available for relevant stakeholders and decision-makers. Alaska and North Norway are important regions in the Arctic and have extensive experiences and competence connected to business and societal challenges. Some of these experiences are held in common, such as commercial development of offshore oil and gas, management of commercial fisheries, support of operations in national and international defense activities as well as in maritime rescue and emergency preparedness activities. Others, such as approaches to fish farming, tourism, and indigenous stakeholder involvement in business ventures are unique in each jurisdiction. Until now, sharing of these experiences has not been done in a systematical way. AlaskaNor tries to develop platforms and networks for improving this.

For those like us living in the Arctic, the region is a natural treasure, supporting traditional resource utilization, developing new industries, and home to a diversity of fish and wildlife. And yet, we are increasingly faced with challenges connected to urbanization, demographic trends and climate change. There is a strong and growing need for more knowledge and sharing experiences where initiatives have worked well and where they have not. In particular, we need to understand how implementing management frameworks and policy formulation can help promote positive development and secure the potential for sustainable value creation and social development in the years ahead.

In the AlaskaNor Project, we focus primarily on four areas: offshore energy, fisheries and aquaculture, Arctic shipping and maritime transportation, and regional and international governance. Based on the studies and analyses of these areas, the aim is to give valuable input both for business activities and policy making, and strengthen cooperation within the blue economy between North Norway, Alaska, and the Arctic in general.

As highlighted in the last Business Index North (BIN) report, the spread of the Covid-19 virus and efforts to bring it under control, will most certainly affect activities and sustainability of the Arctic regions. The descriptions and analyses done in the AlaskaNor reports will also be valuable in analyzing the consequences of Covid-19 on the blue economy in the Arctic.

There are many who have been involved in drafting our four AlaskaNor reports, and we wish to thank each of them for this important work. We hope the reports will be of value for many in realizing value-creating opportunities in the blue economy, and strengthen cooperation between Alaska and North Norway.

BODØ (NORWAY) AND ANCHORAGE (UNITED STATES), MAY 2022

FRODE MELLEMVIK

Director, High North Center
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Institute of the North

Alaska and North Norway: At a Glance

The United States and Norway have been allies for over 70 years, enjoying bilateral diplomatic relations since 1905. Many Norwegians have cultural ties to the U.S. From 1825 until the early 20th century alone, approximately 800,000 Norwegians emigrated westwards and over the Atlantic Ocean. Today, nearly five million Americans claim Norwegian ancestry, supporting the two countries' close economic, political, and cultural relationship.

(Maps not to proportionate scale)

		Alaska	North Norway
GEOGRAPHY	**Coastline**	25,148 km	12,020 km
	Area	1,717,856 km^2	112,975 km^2
GOVERNMENT	**Organization**	State: 16 boroughs and unorganized region	2 counties (Nordland, and Troms and Finnmark) and 87 municipalities
	Capital	Juneau	Bodø (Nordland) Tromsø (Troms and Finnmark)
	Largest cities	Anchorage (291,845), Fairbanks (95,898), Juneau (31,986)	Tromsø (76,974), Bodø (52,357), Mo i Rana (26,184)
PEOPLE	**Population (2020)**	731,007	483,632 • 240,896 (Nordland) • 242,736 (Troms and Finnmark)
	Indigenous Groups	Aleut, Alutiiq, Athabascan, Eyak, Tlingit, Haida, Tsimshian, Inupiaq, Yup'ik, Cup'ik (15,6% of population)	Sámi (50,000-100,000)* *In Norway, there is no clear legal definition of who is Sámi. Therefore, exact numbers are not possible
ECONOMY	**GDP (2018)**	$54,61 billion (Alaska) $20,54 trillion (US)	$25,26 billion $359,299 billion (Norway)
	GDP/capita (2018)	$74,454 (Alaska) $62,639 (US)	$51,950 (North Norway) $67,640 (Norway)
	Major industries	Oil and gas production, mining, fisheries (incl. aquaculture), timber, tourism, agriculture	Oil and gas production, fisheries (incl. aquaculture), shipping (incl. ship building), pulp & paper products, metal, chemical, timber, mining
	Natural resources	Petroleum, natural gas, timber, zinc, gold, silver, fish, shellfish,	Petroleum, natural gas, iron ore, copper, lead, zinc, titanium, nickel, fish, timber, hydropower
	Unemployment rate (2020)	5,4% (Alaska) 6,6% (U.S.)	2,5% (Nordland) 2,7% (Troms & Finnmark) 3,5% (Norway)
	Main export commodities	Petroleum, zinc, seafood, lead, gold	Petroleum (and related products), seafood, machinery and equipment, metals
	Key values of export commodities (2019)	$5 billion	$5 billion (50,48 billion NOK)

SOURCES: Alaska State Department of Labor and Workforce Development, Business Index North, City Population, Norwegian Labour and Welfare Administration (NAV), OECD, Statistics Norway, U.S. Census Bureau, U.S. Department of Commerce Bureau of Economic Analysis

Preface:

WHAT IS THE BLUE ECONOMY?

Charles Colgan

The term “blue economy” has come into widespread use to denote an expansion of economic wealth derived from the oceans and coasts in such a way as to maintain or improve the natural systems upon which economic systems depend. The origin of the term is obscure; though some attribute it to the Rio +20 U.N. Conference in 2012, examples of the term can be found earlier. As a guide to policy, it has been used in quite different ways. Developed countries such as the United States or those in Europe have focused on a “blue technology” focused definition. Developing countries have paid particular attention to the challenges of over-and illegal fishing.

The blue economy does descend from decades of discussion about sustainability, which is also an imprecise term. The “blue economy” captures the definition of sustainability as meeting the needs of the present without sacrificing the ability to meet the needs of tomorrow. There are also links to the idea of sustainability as finding the right balance among the intersection of the economic, environmental, and social aspects of society.

Since these general ideas about sustainability were developed more than thirty years ago, much progress has been made in developing theoretically consistent and empirically viable ways to understand the complex socio-ecological interactions that define the blue economy. The result has been that the blue economy can be understood as something towards which changes can be directed and away from which changes are to be avoided. Two supporting ideas have also come to be essential: expanding the definition of capital and the emerging development of better data on both the physical ocean and the economy of the ocean.

Traditional economic development has focused on expanding investment in physical capital such as buildings, equipment, boats, etc. This capital is used to produce goods and services sold to customers; the income earned, including the income of the labor that uses the physical capital then is measured in national income and product accounts. These accounts are being expanded to take into account natural capital- the value of services created by appropriately functioning natural systems. The value of natural resources such as fisheries and minerals are now counted, as are the services provided by complete ecosystems. From this point of view a blue economy should increase the output of goods and services related to the ocean without reducing the ability of physical or natural capital to sustain growth.

To see the blue economy in these terms also requires greatly improving information about how physical changes in economic and environmental resources are connected to changes in the value of these resources. With respect to the former, many countries are now developing "ocean satellite accounts" to track the contribution of oceans to the output of goods and services. With respect to the latter, expanded oceanographic research, such as that scheduled for the upcoming U.N. decade of ocean science and the expansion of the Global Integrated Ocean Observing Systems (IOOS) provide foundations for understanding the changes in the economic values of the environmental and ecosystem resources upon which the blue economy depends.

These features of a blue economy ultimately represent a much closer integration of the contributions to economic output with changes in the environment. In this sense the blue economy is not defined as a binary condition ("blue"/"not blue") but an ongoing process of seeing the oceans resources in new ways in order to set goals and measure progress towards those goals. This requires:

1. A means of accounting for the contribution to the regional and national economies from ocean related activities including output, employment, and wages.
2. Support of innovations in technologies and services that can yield gains in output and employment at reduced environmental costs. This tracking of innovation is key to tracking changes in capital.
3. Resource accounts for renewable and nonrenewable resources based on measures of changes in physical stocks (e.g. fish stocks, oil and gas reserves).

4. Ecosystem services inventory and processes for establishing values over time. The relevant ecosystems and their services vary by location, so an initial step is to inventory the relevant ecosystems, including what is known of their current conditions. The economic values of the ecosystem services are usually not known so plans to develop this information are needed.

5. There are two essential governance elements. The first is that there need to be processes to set and update the goals of the blue economy based on the information available.

6. The second is to create institutional structures that integrate consideration of economic and environmental dimensions at the operational levels of both public and private organizations. The standard organizational structures based on narrow definitions of expertise will not be capable of seeing the integrated physical/economic relationships.

Executive Summary

In the Arctic, focus is increasingly on the sustainable blue economy. This entails utilizing ocean-based resources to the benefit of the global population, Arctic states and local communities. Obvious lessons concerning resource utilization and local adaptation are, however, not shared between Arctic regions. Limited coordination of knowledge when it comes to challenges and opportunities that arise as the blue potential unfold should be explored. This is what this report – as part of the AlaskaNor-project – sets out to do, with a view to the current status quo and future potential of maritime transportation in the Arctic United States (Alaska) and North Norway.

Both regions share similar characteristics. Dependence on maritime industries and potential for the blue economy stand out. A key component here will be potential areas for expanded collaboration. What opportunities exist for cooperation and collaboration between Alaska and North Norway? Are there best practices and lessons that hold relevance across the regions?

Maritime transport throughout the Arctic region has undergone sustained, and in some parts, significant growth over the past decade. The continued decline of sea ice, the resulting improved access to natural resources, and new developments in ship technology are the primary drivers of increased shipping activity throughout the Arctic Ocean. In addition, geopolitical interests, improved infrastructure, and evolving regulatory frameworks continue to influence maritime activity in the region.

Natural resource developments along Russia's Arctic coastline, both onshore and offshore, are the primary driver of increasing Arctic shipping activity, not only along the country's Northern Sea Route, but increasingly also throughout Norway's Arctic coastal waterways and the Alaskan waters of the Bering Strait. While a lot of attention vis-a-vis future Arctic maritime transport focuses on this particular type of destinational shipping, questions arise how or if North Norway and Alaska can economically benefit from this destinational traffic passing through their waters and what shipping potential exists or can be developed locally.

In this report on blue maritime transportation, we will identify development opportunities for the shipping sector and present economically sound forecasts about future growth potential in the two regions. The report is the end-product of Work Package (WP) 4, titled 'Arctic Shipping and Maritime Transportation'. This is the full report with detailed statistics on ports in Alaska and North Norway. The WP has also published a more concise report of its findings. The explicit goal of this WP

is to 'examine the capacity surplus and demand concerning shipping to, from and within, the Arctic waters of the United States (Alaska) and Norway (North Norway)'. The following actors are involved in the WP:

THE ARCTIC INSTITUTE, WASHINGTON, D.C., United States

CENTRE FOR HIGH NORTH LOGISTICS, Kirkenes, Norway

INSTITUTE OF THE NORTH, Anchorage, United States

THE ARCTIC INSTITUTE
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INSTITUTE OF THE NORTH
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A Brief Comparison of Traffic in Alaska and North Norway

Malte Humpert

The maritime transport sector in Alaska and North Norway displays a number of noticeable similarities, including the dominance of bulk cargo as well as fishing and tourism. Overall cargo volume in the two regions, including the ratio of inbound and outbound cargo, bear a striking resemblance.

Ports in both regions handle in excess of 40 million tons per year, with more than 30 million tons of outbound shipments. Bulk cargo constitutes the vast majority of traffic, accounting for more than 35 million tons in both regions. In Alaska liquid bulk cargo in the form of crude oil and petroleum products accounts for around 75% of all cargo. Similarly, in North Norway dry bulk in the form of iron ore represents nearly 70% of total volume. Bulk cargo activity is primarily limited to two ports in each region. Dry bulk cargo passes through Kivalina and Narvik, while liquid bulk is handled by Valdez and Hammerfest. In both regions the vast majority of bulk cargo shipping is outbound.

The fishing industry is a significant contributor to both regions' economies and accounts for a substantial amount of shipping activity and cargo volume. Alaskan ports handle in excess of 2,5 million tons of fish each year, while North Norwegian ports see around 1 million tons. The busiest fishing ports are Dutch Harbor in Alaska and Tromsø in North Norway handling 350,000 and 250,000 tons of fish, respectively.

The maritime transport of containerized cargo differs widely between the two regions. Alaska's very limited railroad and roadway infrastructure requires the transport of a large share of containerized cargo via the sea. The region's ports handle more than 800,000 twenty-foot Equivalent Unit (TEU) per year. In contrast, excellent road infrastructure and two railroad connections from Bodø and Narvik to the southern part of Norway and neighboring Sweden allow roadways and railways to handle the majority of container traffic.

Cruise tourism represents an important and quickly expanding sector of the economy reliant on maritime transport. Alaska sees 1,2 million cruise passengers per year compared to around 200,000 in North Norway. While the busiest North Norwegian port, Tromsø, may see up to 100 cruise ship port calls per year carrying around 140,000 passengers, a number of Alaskan ports, including Juneau and Ketchikan, welcome in excess of 400 ships per year, carrying more than 1 million guests.

While south-east Alaska has long been a dominant cruise ship destination, Arctic Alaska has seen some cruise tourism activity over the past decade. North Norwegian ports have seen rapidly expanding cruise activity, including the archipelago of Svalbard. Nonetheless, the bulk of activity remains focused well below the Arctic circle in both Alaska and Norway.

Both regions are home to long-running coastal ferries that provide for the transport of passengers and motor-vehicles. Both services carry a mix of local passengers as well as long-distance cruise-style guests. The Alaska Marine Highway System (AMHS) carries in excess of 250,000 passengers and almost 100,000 motor vehicles per year. All of its activity is focused well below Arctic Alaska and two-thirds of traffic occurs in south-eastern Alaska. In Norway, Hurtigruten's coastal service provides means of transport for more than 300,000 passengers and 30,000 vehicles.[1] Both services have seen a decline in passenger volume over the past two decades, especially in the number of local passengers.

A direct comparison between ice-covered waters in the two regions, Arctic Alaska and Svalbard reveals substantial differences in their traffic patterns. With recent closures of coal mines on Svalbard the archipelago's traffic volume has decreased sharply. While the two regions saw similar bulk volumes a decade or so ago, today Arctic Alaska sees around five times as much cargo volume, primarily due the Red Dog ore mine located north of the Bering Strait.

While the waters around Svalbard are home to a substantial fishing fleet which operates – at least on a small scale – year-round, the Arctic Alaskan waters above the Bering Strait are not frequented by fishing vessels restricting fishing vessel traffic to the southern parts of Arctic waters. In either case, the vast majority of fish is not offloaded or handled by ports in the two regions ice-covered waters but shipped to ports further south.

In terms of cruise ship traffic, operations around Svalbard are at least a magnitude larger than the very limited number of cruise ships and passengers which over the past decade or so have begun to infrequently call at Arctic Alaskan ports. Cruise tourism in

[1] Total numbers for Norway. No regional data available

Svalbard rivals most coastal ports in coastal North Norway welcoming around 50,000 cruise passengers, with additional visitors from expedition cruise and day voyages. In contrast, the largest ports along Alaska's Arctic coastline, such as Nome and St. Paul, see far less than 5,000 in combined passenger figures.

TABLE 1: Shipping in Alaska and North Norway Quick Facts

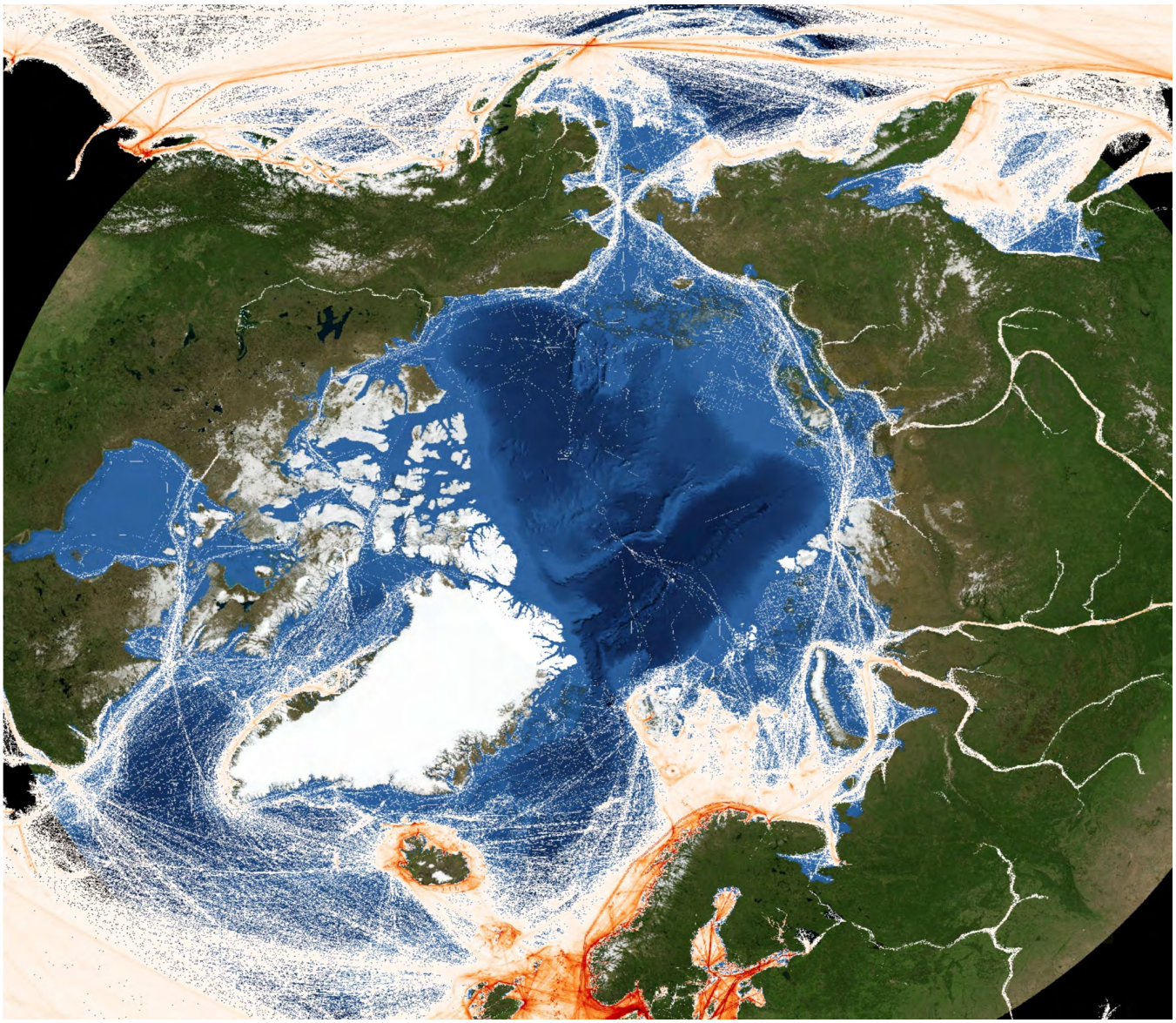
	Alaska (2017)	**North Norway (2018)**
Total Cargo Volume (tons)	**42,2 million**	**45 million**
• Inbound	9,3 million	8,8 million
• Outbound	33 million	36,2 million
Bulk Cargo (tons)	**35,9 million**	**38,5 million**
• Inbound	6,1 million	6.3 million
• Outbound	29,8 million	32,2 million
Dry Bulk	3,3 million	30,9 million
• Inbound	0,4 million	4,2 million
• Outbound	2,9 million	26,8 million
Liquid Bulk	32,6 million	7,6 million
• Inbound	5,7 million	2,1 million
• Outbound	26,8 million	5,5 million
Containerized Cargo (TEU)	**800,929**	**< 30,000**
Fish	**2,7 million**	**1 million**
Cruise Tourism (passengers)	**1,2 million (2018)**	**~ 200,000**
• AMHS vs. Hurtigruten (passengers)	251,099 (2018)	~ 300,000[2]
• AMHS vs. Hurtigruten (vehicles)	99,797	30,000
Largest Port (tons)	Valdez (25,4 million)	Narvik (20,3 million)
Largest Bulk Port	Valdez (25,4 million)	Narvik (20,2 million)
Largest Fishing Port	Dutch Harbor (348,812)	Tromsø (245,581)
Largest Container Port (TEU)	Anchorage (274,062)	Helgeland (12,853)
Largest Cruise Port (passengers)	Juneau (1,1 million)	Tromsø (142,348)
	Arctic Alaska	**Svalbard**
Cargo Volume (tons)	2,7 million	~ 0,4 million
Cruise Tourism (passengers)[3]	<5,000	49,899
Largest Port (tons)	Kivalina (2,5 million)	Longyearbyen (196,848)

[2] No regional data available. Based on embarkation and disembarkation data. Same for number on vessels

[3] Excluding Expedition Cruises

FIGURE 1: Arctic maritime traffic 2016-2017

Map showing all Arctic traffic mid-2016-mid-2017. Noticeable is the almost complete lack of traffic in the Alaskan Arctic, except for ~250 vessels passing through the Bering Strait. In contrast, there is substantial traffic all along North Norway and around Svalbard. Source: Norwegian Coastal Administration



Shipping and Maritime Transportation in Alaska

Malte Humpert, Germain Therre and Natalie Kiley-Bergen

The Alaskan Arctic is relatively remote with a handful of larger population hubs scattered along the northern coast. The State of Alaska is resource rich and heavily dependent on oil exports, fishing products, and mineral development.

Sea ice coverage in the Arctic Ocean is rapidly declining and exposing seasonal shipping routes along the Russian and Canadian coastlines that funnel through the Bering Strait between the United States (Alaska) and Russia. These shipping routes include the Northern Sea Route (NSR), Northwest Passage (NWP), and the Transpolar Sea Route (TSR). The Bering Strait is a narrow passage that functions as the only connection between the Arctic Ocean and the Pacific Ocean.

Alaska's economy is shaped by and highly dependent on maritime transport. With more than 53,000 kilometers (km) (34,175 miles) of coastline and more than 2,700 islands - more than the rest of the U.S. combined - the State's 125 ports provide a vital transportation link to the rest of the U.S., its neighbor Canada, as well as other countries. The state's three major economic sectors, the extractive industries, fisheries, and tourism, which together account for 95% of private sector jobs, all rely heavily on maritime transport.[4]

In 2017, Alaskan ports handled 42,2 million tons of cargo, of which 9,3 million tons were inbound and 32,9 million were outbound. Alaska's shipping activity occurs almost exclusively below the Arctic Circle.

The state's five largest ports by cargo volume are Valdez, Nikiski, Anchorage, Kivalina, and Dutch Harbor. Cargo volume at each port is dominated by a single commodity: crude oil (Valdez), refined petroleum products (Nikiski), consumer products (Anchorage), zinc and lead ores Kivalina, and fish (Dutch Harbor). Together these five ports account for 36,5 million tons of cargo representing 86% of Alaska's total.

[4] Alaska Seafood Marketing Institute (ASMI) (2015). The Economic Value of Alaska's Seafood Industry, December 2015. Retrieved January 3, 2019 from https://ebooks.alaskaseafood.org/ASMI_Seafood_Impacts_Dec2015/pubData/source/ASMI%20Alaska%20Seafood%20Impacts%20Final%20Dec2015%20-%20low%20res.pdf

FIGURE 2: Maritime Traffic in Alaska 2016-2017

Alaska traffic density mid-2016-mid 2017 shows substantial traffic along Alaska's south-eastern coastline, throughout Alaska's southwest islands of the Aleutians, as well as the "great circle" route for Trans-Pacific traffic passing through Adak. Very limited traffic exists above the 60° N latitude. Source: Norwegian Coastal Administration

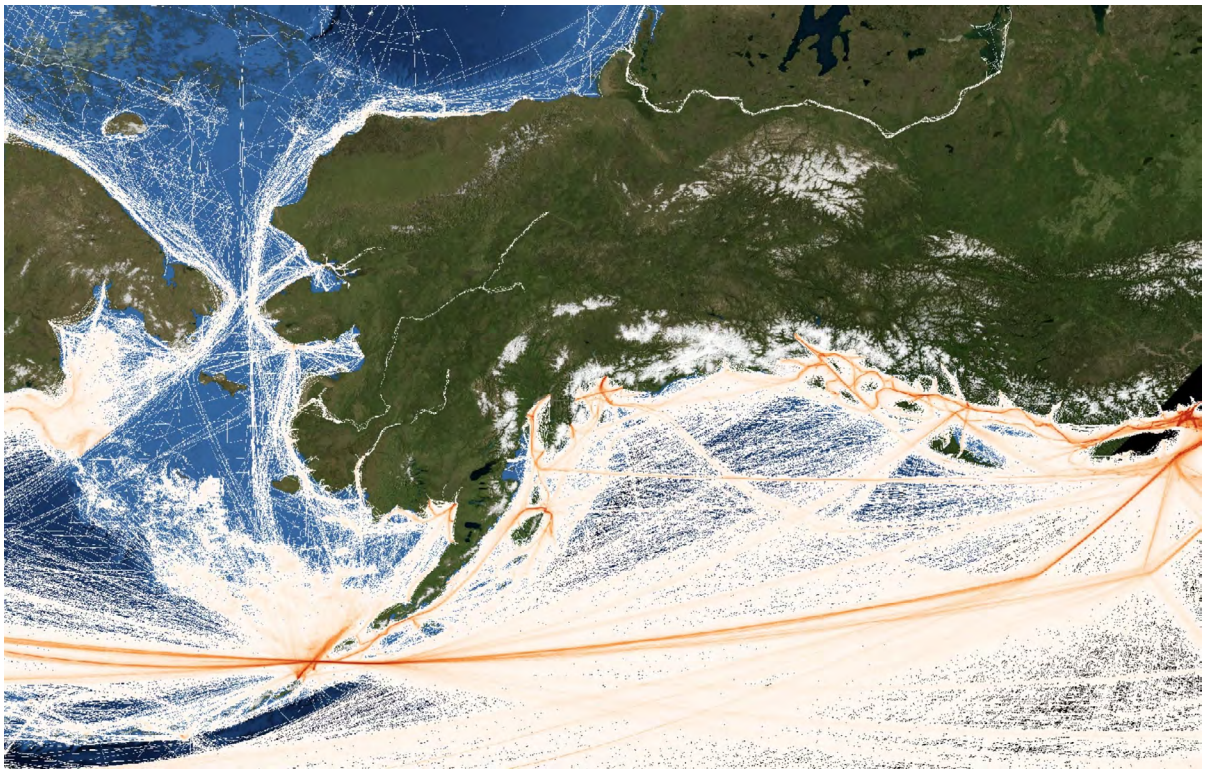


TABLE 2: Total Cargo in Tons Handled by Alaskan Ports, 2013-2017[5]

	2013	2014	2015	2016	2017
Total	42,937,301	41,621,933	42,713,300	42,082,926	42,224,003
Inbound	8,875,542	9,286,667	9,470,024	9,194,425	9,302,593
Outbound	34,061,759	32,335,266	33,243,275	32,888,501	32,921,411

[5] US Army Corps of Engineers, Institute for Water Resources (2018). Ports and Waterways Page, Region 4 – Pacific Coast, Alaska and, Hawaii. Retrieved 19 August 2019 from http://cwbi-ndc-nav.s3-website-us-east-1.amazonaws.com/files/wcsc/webpub/#/?year=2017&regionId=4

TABLE 3: Largest Ports in Alaska by Cargo in tons, 2017[6]

Valdez	Nikiski	Anchorage	Kivalina[7]	Dutch Harbor
25,375,540	4,235,407	2,991739	2,301,758	1,648,130

Bulk Shipping

Most of the Alaskan cargo volume comes in the form of bulk cargo, both dry and liquid bulk, such as crude oil, refined petroleum products, and mined ores. In 2017, Alaskan ports handled 35,9 million tons of bulk cargo, representing 85% of all cargo shipped by the region's ports. Bulk cargo was outbound with 29,8 million tons compared to 6,1 million tons inbound. Outbound liquid bulk cargo, largely in the form of crude oil and petroleum products, constitutes around 75% of total bulk cargo.

Natural resource development is a key sector of Alaskan economy, centered around oil production in Prudhoe Bay in particular. The lion's share of bulk cargo comes from crude oil and petroleum products, which account for 32,5 million tons, with 5,7 million tons of inbound cargo and 26,8 million tons of outbound cargo. Prudhoe Bay, often referred to as the North Slope, is a large oil field in northern Alaska, along the Arctic Ocean. Oil production has taken place along the North Slope for over 40 years and most of the North Slope crude is transported via the Trans-Alaska Pipeline System (TAPS). The oil industry in Alaska is responsible for one-third of jobs in the State and more than half of the State's revenue.[8] Alaska's oil and gas industry is the State's largest private sector employer accounting for more than 100,000 jobs and $6,5 billion in labor income.[9]

TAPS brings oil from northern Alaska over land to processing facilities in the south-central region of the State where oil is loaded onto oil tankers. A key transit point for Alaskan oil is in Prince William Sound at the southern terminus of TAPS. Crude oil transported from northern Alaska via TAPS is shipped from the Port of Valdez. Part of the crude oil production is transported to the refinery at Nikiski and subsequently shipped again as refined petroleum products, primarily for the regional market. Valdez and Nikisi account for 25,2 million tons and 4,2 million tons, respectively.

[6] US Army Corps of Engineers, Institute for Water Resources (2018). Ports and Waterways Page, Region 4 – Pacific Coast, Alaska and, Hawaii. Retrieved 19 August 2019 from http://cwbi-ndc-nav.s3-website-us-east-1.amazonaws.com/files/wcsc/webpub/#/?year=2017&regionId=4

[7] Includes all traffic from the DeLong Mountain Terminal of the Red Dog Mine.

[8] Resource Development Council for Alaska. Alaska's Oil and Gas Industry. Retrieved from https://www.akrdc.org/oil-and-gas

[9] Alaska Seafood Marketing Institute (ASMI) (2015). The Economic Value of Alaska's Seafood Industry, December 2015. Retrieved 3 January 2019 from https://ebooks.alaskaseafood.org/ASMI_Seafood_Impacts_Dec2015/pubData/source/ASMI%20Alaska%20Seafood%20Impacts%20Final%20Dec2015%20-%20low%20res.pdf

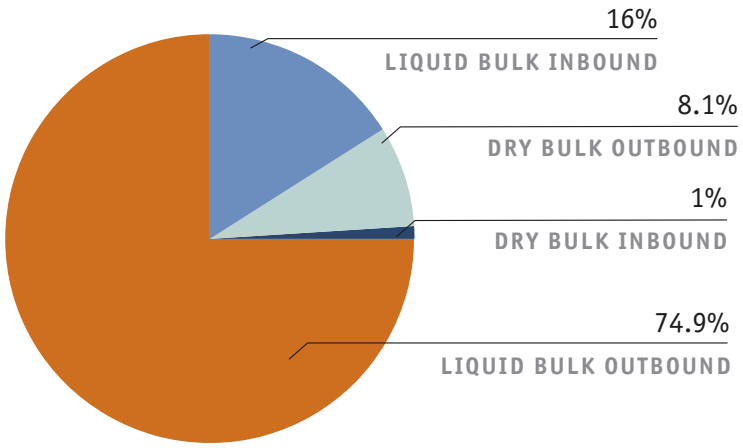
In addition to the transport of crude oil and petroleum products, exploration efforts, such as Shell's activity on the Outer Continental Shelf contributes to maritime activity. Even limited exploration activities result in a spike in traffic throughout the Bering and Chukchi Sea. Shell's efforts relied on a fleet of around 20 support vessels, including United States Coast Guard ships, utilizing the region's ports including Kodiak, Dutch Harbor, and Nome.[10]

Dry bulk cargo, mostly mined ores and other crude materials, account for 3,3 million tons, of which 375,875 tons are received and 2,9 million tons are shipped out. The vast majority of mined ores come from the Red Dog mine via the Port of Kivalina, accounting for around 2,4 million tons annually.

TABLE 4: Bulk Cargo Volume in Alaska 2017, in tons[11]

Total Bulk	Total Inbound	Total Outbound	**Total Dry Bulk**	Dry Bulk Inbound	Dry Bulk Outbound	**Total Liquid Bulk**	Liquid Bulk Inbound	Liquid Bulk Outbound
35,913,164	6,104,393	29,808,771	3,301,549	375,875	2,925,674	32,611,615	5,728,519	26,883,097

FIGURE 3: Share of Bulk Cargo in Alaska Volume 2017[12]



[10] Alaska Department of Commerce, Community & Economic Development (2014). Trends and Opportunities in the Alaska Maritime Industrial Support Sector, September 2014. Retrieved 19 August 2019 from https://www.mcdowellgroup.net/wp-content/uploads/2015/02/Trends-and-Opportunities-in-the-Alaska-Maritime-Industrial-Support-Sector.pdf

[11] US Army Corps of Engineers, Institute for Water Resources (2018). Ports and Waterways Page, Region 4 – Pacific Coast, Alaska and, Hawaii. Retrieved 18 August 2019 from http://cwbi-ndc-nav.s3-website-us-east-1.amazonaws.com/files/wcsc/webpub/#/?year=2017&regionId=4

[12] US Army Corps of Engineers, Institute for Water Resources (2018). Ports and Waterways Page, Region 4 – Pacific Coast, Alaska and, Hawaii. Retrieved 19 August 2019 from http://cwbi-ndc-nav.s3-website-us-east-1.amazonaws.com/files/wcsc/webpub/#/?year=2017&regionId=4

TABLE 5: Largest Dry and Liquid Bulk Cargo Ports in Alaska[13]

DRY BULK

Kivalina	Rest of Alaska
2,241,506	1,060,043

LIQUID BULK

Valdez	Rest of Alaska
25,369,368	7,242,247

Fisheries

Six of the U.S.' ten largest fishing ports are located in Alaska and Dutch Harbor has been the country's largest in terms of volume for much of the past three decades. If Alaska were its own country, it'd be the sixth-largest fishing nation in the world. The state's approximately 32,000 fishermen work on 5,300 commercial fishing vessels[14] and land around 2,7 million tons of fish product each year valued at around $2 billion.[15]

TABLE 6: Total fish landings Alaska and the rest of the U.S., 2016-2017[16]

	2016	2017
Alaska	2,540,117	2,721,554
Rest of U.S.	1,814,369	1,769,010
Total	4,354,486	4,490,564

[13] US Army Corps of Engineers, Institute for Water Resources (2018). Ports and Waterways Page, Region 4 – Pacific Coast, Alaska and, Hawaii. Retrieved 19 August 2019 from http://cwbi-ndc-nav.s3-website-us-east-1.amazonaws.com/files/wcsc/webpub/#/?year=2017&regionId=4

[14] Alaska Department of Commerce, Community & Economic Development (2014). Trends and Opportunities in the Alaska Maritime Industrial Support Sector, September 2014. Retrieved 19 August 2019 from https://www.mcdowellgroup.net/wp-content/uploads/2015/02/Trends-and-Opportunities-in-the-Alaska-Maritime-Industrial-Support-Sector.pdf and Alaska Seafood Marketing Institute (ASMI) (2015). The Economic Value of Alaska's Seafood Industry, December 2015. Retrieved 3 January 2019 from https://ebooks.alaskaseafood.org/ASMI_Seafood_Impacts_Dec2015/pubData/source/ASMI%20Alaska%20Seafood%20Impacts%20Final%20Dec2015%20-%20low%20res.pdf

[15] Alaska Seafood Marketing Institute (ASMI) (2015). The Economic Value of Alaska's Seafood Industry, December 2015. Retrieved 3 January 2019 from https://ebooks.alaskaseafood.org/ASMI_Seafood_Impacts_Dec2015/pubData/source/ASMI%20Alaska%20Seafood%20Impacts%20Final%20Dec2015%20-%20low%20res.pdf

[16] National Marine Fisheries Service (2017), Fisheries of the United States, 2016. U.S. Department of Commerce, NOAA Current Fishery Statistics No. 2016. Retrieved 19 August 2019 from https://www.fisheries.noaa.gov/national/sustainable-fisheries/fisheries-united-states

FIGURE 4: Total fish landings Alaska and the rest of the U.S., 2016-2017

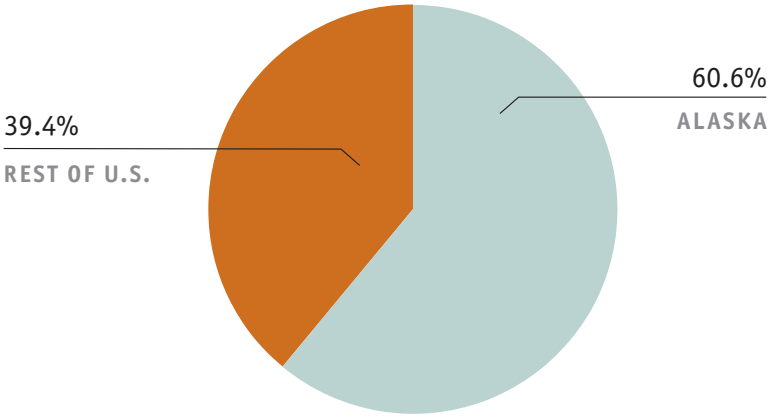


TABLE 7: Commercial Fishery Landings at Top 5 Alaskan Ports (in tons)[17]

Dutch Harbor	Aleutian Islands (excl. Dutch Harbor)	Kodiak	Alaska Peninsula	Naknek
348,812	250,382	240,403	121,562	84,821

The fishing industry is a key contributor to Alaska's economy accounting for more around 60,000[18] or 30% of the state's private sector jobs. Alaska's seafood industry generates $1,6 billion in annual labor income and contributes $5,9 billion to the state's economy.[19]

[17] National Marine Fisheries Service (2018) Fisheries of the United States, 2017. U.S. Department of Commerce, NOAA Current Fishery Statistics No. 2017. Retrieved 19 August 2019 from https://www.fisheries.noaa.gov/national/sustainable-fisheries/fisheries-united-states

[18] This figure includes fishermen as well as workers in on-shore and off-shore fish processing industry.

[19] Alaska Seafood Marketing Institute (ASMI) (2015). The Economic Value of Alaska's Seafood Industry, December 2015. Retrieved 3 January 2019 from https://ebooks.alaskaseafood.org/ASMI_Seafood_Impacts_Dec2015/pubData/source/ASMI%20Alaska%20Seafood%20Impacts%20Final%20Dec2015%20-%20low%20res.pdf

TABLE 8: Seafood Industry Impact on Alaska's Economy[20]

Direct Impacts	Number of Workers	Labor Income (million US$)	Total Impacts	
Commercial Fishing	31,580	$920	**Full-Time Jobs**	41,200
Processing	25,055	$460	**Labor Income**	$2,1 billion
Management / Hatcheries/Others	2,904	$204	**Economic Output**	$5,9 billion
Total	59,539	$1,584		

The majority of fishing traffic is located well south of the Arctic. Out of 6,609 registered fishing vessels, both commercial and recreational fishing vessels, less than a third, or 1926, are registered in western and northern Alaska, and less than 15%, or 725, are registered in Arctic Alaska.[21]

Containerized Cargo

With limited road and no rail infrastructure connecting Alaska to other parts of the U.S. and foreign countries, maritime transport is responsible for virtually all inbound and outbound containerized cargo. In 2017, 800,929 loaded TEU passed through Alaskan ports.[22] The vast majority of this volume, around 94% came from domestic inbound and outbound shipping.

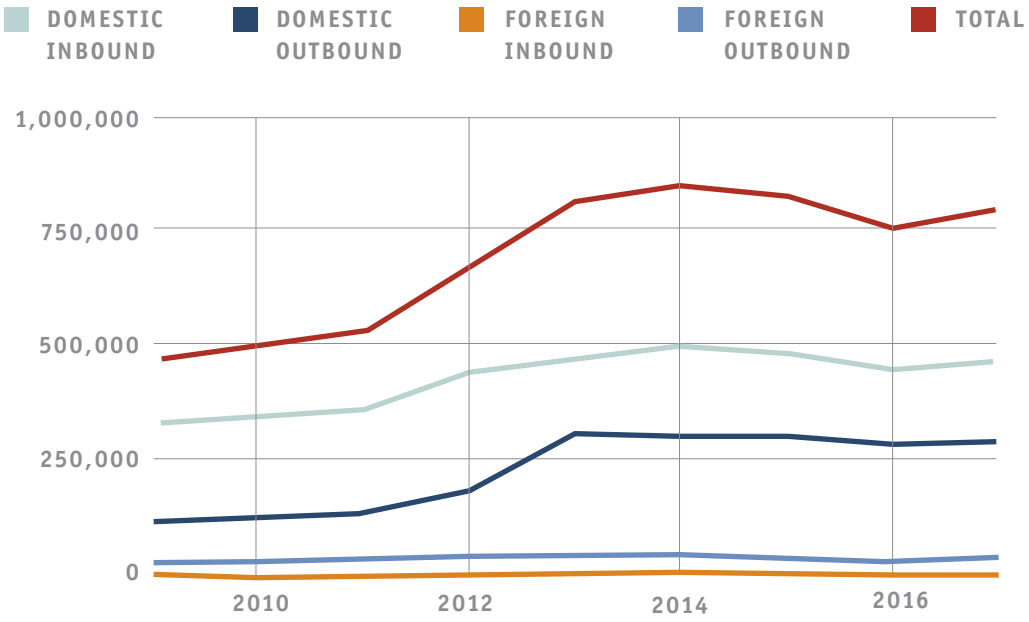
Containerized cargo has steadily increased over the past decade experiencing a total growth of 71% between 2009 and 2017. In totaal loaded container volume increased from 465,845 TEU in 2009 to 800,929 TEU in 2017. The largest increase comes from domestic outbound cargo recording a 150% increase, growing from 115,863 TEU to 290,112 TEU.

[20] Alaska Seafood Marketing Institute (ASMI) (2015). The Economic Value of Alaska's Seafood Industry, December 2015. Retrieved 3 January 2019 from https://ebooks.alaskaseafood.org/ASMI_Seafood_Impacts_Dec2015/pubData/source/ASMI%20Alaska%20Seafood%20Impacts%20Final%20Dec2015%20-%20low%20res.pdf

[21] Alaska Seafood Marketing Institute (ASMI) (2015). The Economic Value of Alaska's Seafood Industry, December 2015. Retrieved January 3, 2019 from https://ebooks.alaskaseafood.org/ASMI_Seafood_Impacts_Dec2015/pubData/source/ASMI%20Alaska%20Seafood%20Impacts%20Final%20Dec2015%20-%20low%20res.pdf

[22] US Army Corps of Engineers (2018). Waterborne container traffic: U.S. waterborne container traffic by port/waterway in 2017. Retrieved 19 August 2019 from https://usace.contentdm.oclc.org/digital/collection/p16021coll2/id/3003/

FIGURE 5: Domestic and Foreign Container Volume in Alaska, 2009-2017 in TEU[23]



Throughout the last decade domestic inbound and outbound containerized cargo has continuously accounted for between 94-95% of container volume, with foreign inbound and outbound container traffic representing the rest. The share of outbound domestic volume increased from 24%in 2009 to 36% in 2017.

The six largest container ports in Alaska account for 81% of container traffic in the State. Anchorage is by far the largest container port with 274,062 TEU passing through the facility in 2017, representing 34% of the total. The Port of Anchorage accounts for 85% of the consumer goods imports for Alaska.[24] The closest major port to Alaska's Arctic waters is the Bering Sea port of Dutch Harbor, which saw 85,194 TEU in 2017.

[23] US Army Corps of Engineers (2018). Waterborne container traffic: U.S. waterborne container traffic by port/waterway in 2017. Retrieved 19 August 2019 from https://usace.contentdm.oclc.org/digital/collection/p16021coll2/id/3003/

[24] American Infrastructure Report Card. 2017 Alaska Infrastructure Report Card. Retrieved 19 August 2019 from https://www.infrastructurereportcard.org/state-item/alaska/

FIGURE 6: Share of Domestic and Foreign Container Volume in Alaska, 2009-2017[25]

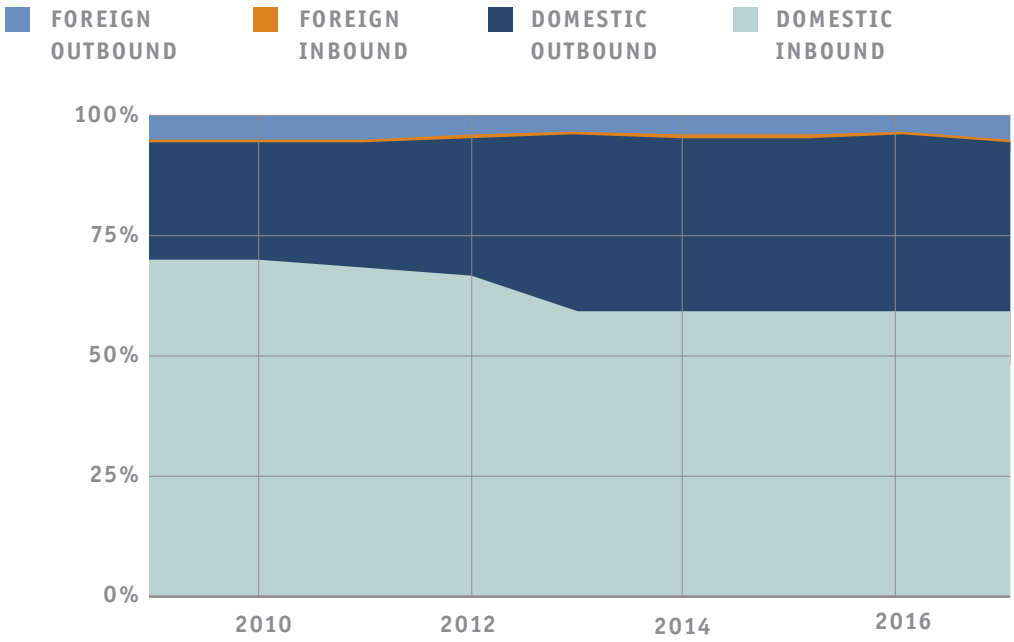


TABLE 9: Largest container ports in Alaska by TEU, 2017[26]

	Anchorage	Juneau	Ketchikan	Dutch Harbor[27]	Petersburg	Whittier
2017	274,062	90,965	86,977	85194	76,203	35,989

Container volume has remained relatively stable at the port of Anchorage, while all other five ports experienced substantial growth. The largest absolute growth comes from the port of Juneau, which experienced a growth of 260% from 35,066 to 90,965 TEU. Ketchikan underwent a similar expansion from 31,512 TEU to 86,977 TEU equal to a 276% growth. Noteworthy is also Dutch Harbor's growth, which can in part be attributed to a growing share of locally caught fish being processed on site ready for containerized shipping. Over the past decade, Dutch Harbor has accounted for between 97-99% of foreign outbound container cargo, shipping its fish products to markets in Asia.

[25] US Army Corps of Engineers (2018). Waterborne container traffic: U.S. waterborne container traffic by port/waterway in 2017. Retrieved 19 August 2019 from https://usace.contentdm.oclc.org/digital/collection/p16021coll2/id/3003/

[26] US Army Corps of Engineers (2018). Waterborne container traffic: U.S. waterborne container traffic by port/waterway in 2017. Retrieved 19 August 2019 from https://usace.contentdm.oclc.org/digital/collection/p16021coll2/id/3003/

[27] Includes TEU for neighboring Iliuliuk Harbor.

FIGURE 7: Largest Container Ports in Alaska by Share of Total Volume, 2017[28]

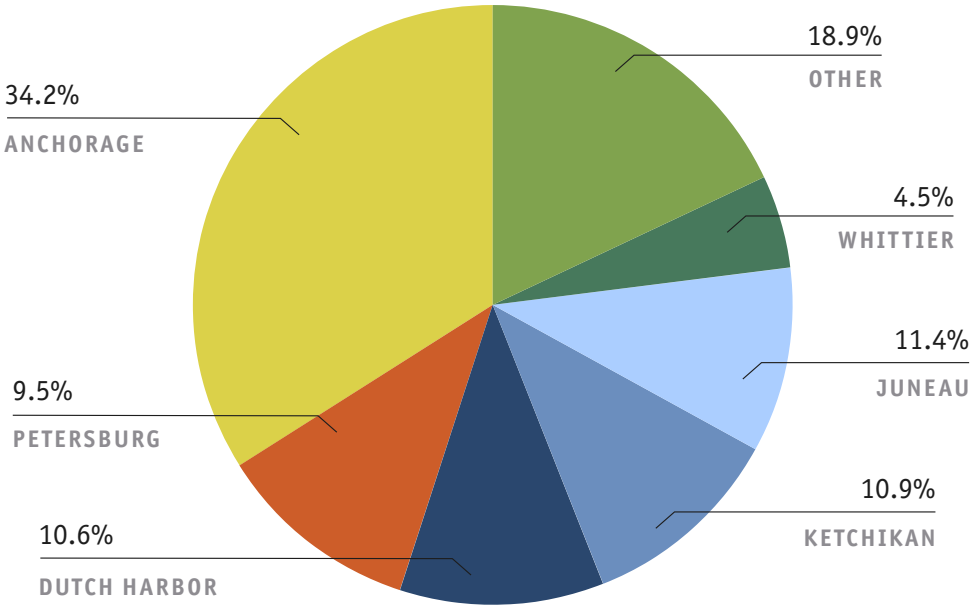
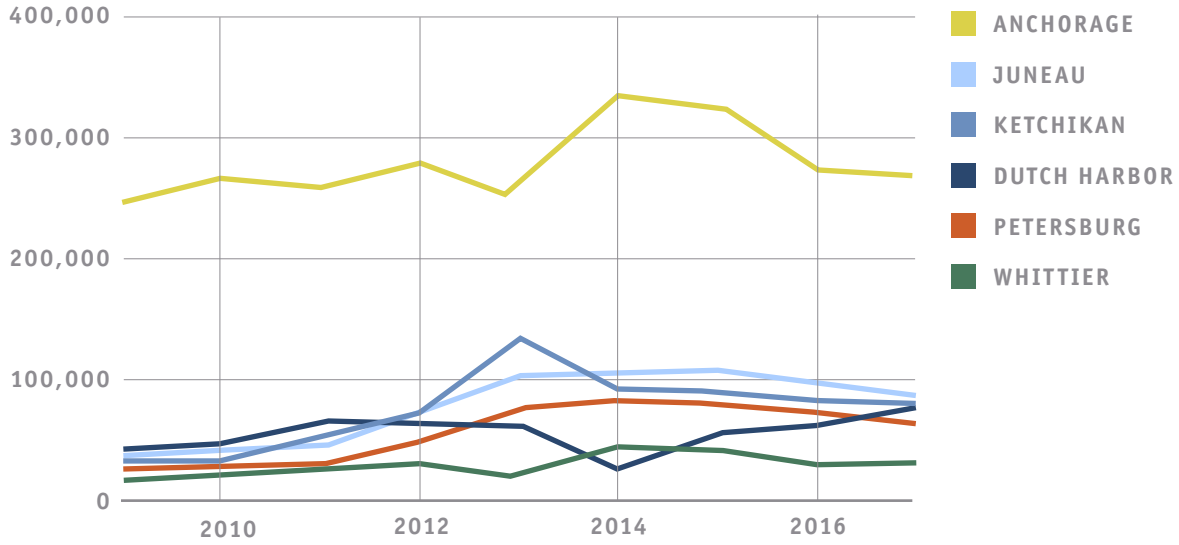


FIGURE 8: Largest container ports in Alaska by TEU, 2009-2017[29]



[28] US Army Corps of Engineers (2018). Waterborne container traffic: U.S. waterborne container traffic by port/waterway in 2017. Retrieved 19 August 2019 from https://usace.contentdm.oclc.org/digital/collection/p16021coll2/id/3003/

[29] US Army Corps of Engineers (2018). Waterborne container traffic: U.S. waterborne container traffic by port/waterway in 2017. Retrieved 19 August 2019 from https://usace.contentdm.oclc.org/digital/collection/p16021coll2/id/3003/

The port of Nome, Alaska's largest harbor located near or above the Arctic Circle, has also seen growing container traffic. Container volume increased from 1,396 TEU in 2009 to 4,499 TEU by 2017.

TABLE 10: Container Volume Port of Nome, TEU, 2009-2017[30]

2009	2010	2011	2012[31]	2013	2014	2015	2016	2017
1,396	2,007	1,472	n/a	n/a	1,379	n/a	n/a	4,499

Cruise Ship Tourism

Cruise ship traffic is a major contributor to the Alaskan economy accounting for around 55% of all the State's out-of-state visitors.[32] In 2018, Alaska saw 1,17 million passengers with 1,31 million expected for 2019. Cruise tourism contributes around $1 billion in statewide spending[33] and contributes $82,9 million in municipal revenues and $104,8 million in state revenues.[34] The tourism industry as a whole, largely dominated by cruise ship tourism, represents the third-largest employer in Alaska accounting for around 40,000 jobs, around 23% of the total.[35]

TABLE 11: Cruise Ship Passengers in Alaska, 2009-2019[36]

2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
878,000	883,000	937,000	999,600	967,500	999,600	1,025,900	1,089,700	1,169,000	1,310,000

[30] US Army Corps of Engineers (2018). Waterborne container traffic: U.S. waterborne container traffic by port/waterway in 2017. Retrieved 19 August 2019 from https://usace.contentdm.oclc.org/digital/collection/p16021coll2/id/3003/

[31] No data available for 2012, 2013, 2015, 2016

[32] Cruise Lines International Association (2018). Cruise Visitor Outlook Is Regional Planning Important? February 14, 2018. Southeast Conference Mid-Session Summit. Retrieved 19 August 2019 from http://www.seconference.org/sites/default/files/mss2018/Southeast%20Conference%20Feb%202018%20v%202-13-18.pdf

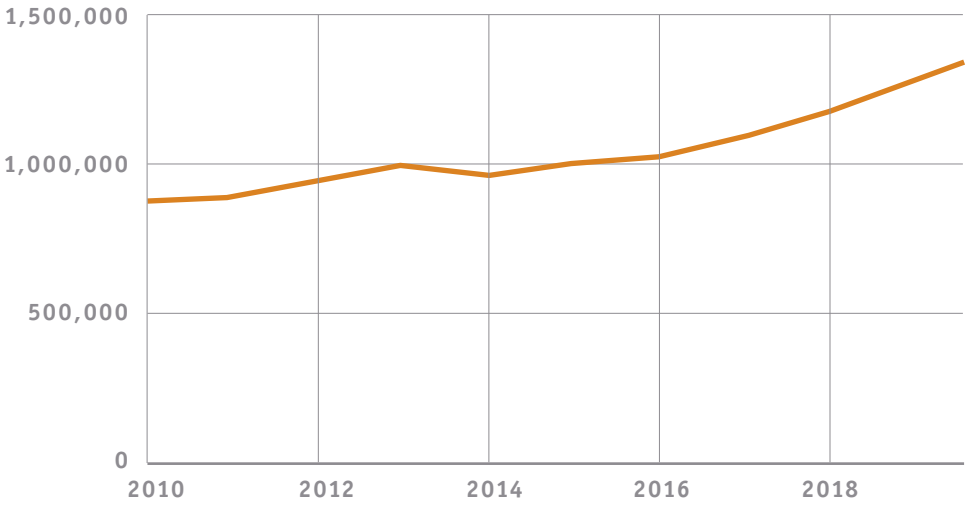
[33] Joint spending by passengers, crew and cruise lines.

[34] Cruise Lines International Association (2018). Cruise Visitor Outlook Is Regional Planning Important? February 14, 2018 Southeast Conference Mid-Session Summit. Retrieved 19 August 2019 from http://www.seconference.org/sites/default/files/mss2018/Southeast%20Conference%20Feb%202018%20v%202-13-18.pdf

[35] Alaska Seafood Marketing Institute (ASMI) (2015). The Economic Value of Alaska's Seafood Industry, December 2015. Retrieved 3 January 2019 from https://ebooks.alaskaseafood.org/ASMI_Seafood_Impacts_Dec2015/pubData/source/ASMI%20Alaska%20Seafood%20Impacts%20Final%20Dec2015%20-%20low%20res.pdf

[36] Alaska Department of Commerce, Community, and Economic Development (2019). Alaska Visitor Volume Report, Summer 2018. Retrieved 19 August 2019 from https://www.alaskatia.org/Research/Visitor%20Volume%20Summer%202018%20Report%202_15_19.pdf

FIGURE 9: Cruise Ship Passengers in Alaska, 2009-2019[37]



The State's largest ports by passenger volume are Juneau, Ketchikan, and Skagway, followed by Seward, Hoonah, Whittier, and Sitka.[38]

Cruise ship activity is in large parts focused in Southeast Alaska with the top three busiest cruise traffic ports, Juneau, Ketchikan and Skagway all located along the Alaskan Inland Passage. During peak season from April through the end of September a continuous stream of cruise ships ensures at least one port call every single day at each of the region's ports. Activity it is driven by dramatic mountain and glacial scenery, density of marine mammals, and deep channels.

[37] Alaska Department of Commerce, Community, and Economic Development (2019). Alaska Visitor Volume Report, Summer 2018. Retrieved 19 August 2019 from https://www.alaskatia.org/Research/Visitor%20Volume%20Summer%202018%20Report%202_15_19.pdf

[38] Alaska Department of Commerce, Community, and Economic Development (2017). Commercial Passenger Vessel Excise Tax 2006-2017. Retrieved 30 September 2020 from http://dot.alaska.gov/stwddes/desbridge/assets/grant/seward/seward_visitor_07_16.pdf; State of Alaska, Department of Commerce, Community, and Economic Development (2017). Commercial Passenger Vessel Excise Tax: Community Needs, Priorities, Shared Revenue, and Expenditures, Fiscal Years 2007 to 2016. Retrieved 19 August 2019 from https://www.commerce.alaska.gov/web/Portals/6/pub/TourismResearch/00%20FULL%20CPV%20RPT%2016%202017.pdf?ver=2017-03-23-160339-903; Hohenstatt B. (2019). More tourists are coming. Juneau Empire, 22 February 2019. Retrieved 19 August 2019 from https://www.juneauempire.com/news/more-tourists-are-coming/; McCarthy, A. (2019). Number of cruise visitors expected to leap in 2019. Juneau Empire, 21 February 2018. Retrieved 15 August 2019 from https://www.juneauempire.com/news/number-of-cruise-visitors-expected-to-leap-in-2019/; Municipality of Skagway Borough. Annual Visitor Statistics. Retrieved 15 August 2019 from https://www.skagway.org/cvb/page/annual-visitor-statistics and Woolsey, R. (2018). As Sitka's cruise numbers rebound, port manager says city's not ready for uptick. KCAW-Sitka, 16 May 2018. Retrieved 12 August 2019 from https://www.ktoo.org/2018/05/16/as-sitkas-cruise-numbers-rebound-port-manager-says-citys-not-ready-for-uptick/.

TABLE 12: Largest Cruise Tourism Ports in Alaska by Visitors, 2018[39]

Juneau	Ketchikan	Skagway	Seward	Whittier
1,117,000	1,073,923	910,176	208,308	188,000

TABLE 13: Largest by Port Calls, 2017[40]

Juneau	Ketchikan	Skagway	Sitka	Seward
461	457	374	99	62

While ship traffic is increasing throughout central, western, and northern Alaska as a result of declining seasonal ice coverage and technical advances in cruise ship design, it is unlikely that large-scale cruise ship traffic will routinely expand northward as the region's most popular scenery and attractions are located in southeast Alaska. Nonetheless, due to limited port infrastructure in western Alaska, even a small number of cruise ship visits present significant challenges. In 2016, the *Crystal Serenity* became the first large-size cruise ships traveling through Canada's Northwest Passage and calling in Kodiak, Dutch Harbor, and Nome.[41]

While cruise ship tourism has long been a staple of maritime activity across many Alaskan ports, larger vessels and more frequent port calls now represent a challenge for smaller ports. Limited berthing infrastructure increasingly required "hot berthing" systems, where vessels cycle through the docks or lightering, where passengers are transferred to shore with smaller tender vessels.

[39] McCarthy, A. (2019). Number of cruise visitors expected to leap in 2019. Juneau Empire, 21 February 2018. Retrieved 15 August 2019 from https://www.juneauempire.com/news/number-of-cruise-visitors-expected-to-leap-in-2019/; Municipality of Skagway Borough. Annual Visitor Statistics. Retrieved 15 August 2019 from https://www.skagway.org/cvb/page/annual-visitor-statistics; Cruise Lines International Association Alaska (2018). Cruise News May 2018. Retrieved 19 August 2019 from https://akcruise.org/cruise-news-may-2018/; Visit Ketchikan Alaska. Retrieved 12 August 2019 from https://www.visitketchikan.com/en/Membership/Visitor-Statistics; and Email correspondence with Christy Terry, Seward Port Manager Alaska Railroad Corporation, 15 August 2019

[40] Alaska Department of Commerce, Community, and Economic Development (2017). Commercial Passenger Vessel Excise Tax 2006-2017. Retrieved 30 September 2020 from http://dot.alaska.gov/stwddes/desbridge/assets/grant/seward/seward_visitor_07_16.pdf and Crew Center (2017). Analysis: Alaska Cruise Statistics by Ports in 2017. Retrieved 12 August 2019 from http://crew-center.com/analysis-alaska-cruise-statistics-ports-2017

[41] Alaska Seafood Marketing Institute (ASMI) (2015). The Economic Value of Alaska's Seafood Industry, December 2015. Retrieved 3 January 2019 from https://ebooks.alaskaseafood.org/ASMI_Seafood_Impacts_Dec2015/pubData/source/ASMI%20Alaska%20Seafood%20Impacts%20Final%20Dec2015%20-%20low%20res.pdf

TABLE 14: Western and Northern Alaska Cruise Traffic, 2015[42]

Adak	90	1
Attu	90	1
Dutch Harbor/ Unalaska	4,112	8
Kodiak	13,559	12
Nome	640	5
Point Barrow	120	1
St. Matthew	477	3
St. Paul	305	2

In line with most tourism-related activity, cruise ship traffic rises and falls in direct relation to overall economic performance. Thus, Alaskan cruise ship traffic has experienced a rapid growth over the past decade since the end of the last recession. Total passenger numbers increased from a low of 878,000 in 2010 to 1,17 million passengers in 2018, a growth of 34%, with another 16,5% increase expected for 2019.[43]

Vessel size has continuously increased over the past decade. Average vessel size increased 9% between 2016 and 2019 with ships now carrying almost 2,900 passengers and crew. The largest ships now carry in excess of 6,100 people compared to 4,600 three years ago, an increase of 32%.[44]

The cruise ship and oil tanker sector, which together represent more than 90% of total gross tonnage of all vessels in Alaska, is dominated by a small number of large vessels. Just 43 large cruise ships and oil tankers account for 83%of the state's total gross tonnage.[45]

[42] Alaska Department of Commerce, Community, and Economic Development (2019). Alaska Visitor Volume Report, Summer 2018. Retrieved 12 August 2019 from https://www.alaskatia.org/Research/Visitor%20Volume%20Summer%202018%20Report%202_15_19.pdf

[43] Alaska Department of Commerce, Community, and Economic Development (2019). Alaska Visitor Volume Report, Summer 2018. Retrieved 12 August 2019 from https://www.alaskatia.org/Research/Visitor%20Volume%20Summer%202018%20Report%202_15_19.pdf

[44] Municipality of Skagway (2019). A Review: 2019 Cruise Ship Presence Skagway, Alaska. Retrieved 12 August 2019 from https://www.skagway.org/sites/default/files/fileattachments/clerk039s_office/page/28411/2019_skg_cpv_update_2019_04_08_1.pdf

[45] Alaska Seafood Marketing Institute (ASMI) (2015). The Economic Value of Alaska's Seafood Industry, December 2015. Retrieved January 3, 2019 from https://ebooks.alaskaseafood.org/ASMI_Seafood_Impacts_Dec2015/pubData/source/ASMI%20Alaska%20Seafood%20Impacts%20Final%20Dec2015%20-%20low%20res.pdf

In addition to large-sized cruise ships, the state's small and expedition-type cruise tourism with capacities of less than 250 passengers is also experiencing growth. Passenger numbers grew by 38% from 13,900 in 2017 to 19,300 in 2018.[46]

Alaska Maritime Highway System

The AMHS provides year-round ferry service to 33 Alaskan ports – it also connects to Prince Rupert, British Columbia and Bellingham, Washington – transporting both passengers and motor vehicles along a coastal route. AMHS operations are split into a Southeastern and Southwestern system as well as inter-system service connecting the two areas.[47] The Southwest service area reaches from Bellingham in the south to Yakutat in the north, while the Southwest system reaches from Dutch Harbor in the west to Cordova in the east. Service is provided by eleven vessels, of which seven are assigned to the Southeast, and four to the Southwest region. The marine highway provides vital connectivity to coastal communities that cannot or only with difficulty be reached via roadways and connects the communities to other parts of Alaska and the Lower 48. Out of 33 ports that the AMHS serves, 28 have no road connection.[48] The system's precursor began operating in 1948 and the AMHS in its current form and name came about in 1963.

In addition to passengers and passenger vehicles, the AMHS also transports container vans carrying large amounts of goods, such as fresh produce, meat and dairy to food distributors, local grocery stores, and hospitality businesses. In the opposite direction vans are loaded with frozen fish or fish products destined for markets in the Lower 48.

The system has seen a decrease in ridership over the past decade, in part due to budget constraints which resulted in a reduction of service. Figures have declined around 25% from a recent peak of 337,774 passengers in 2012 to 251,099 in 2018.[49] The absolute peak was recorded in 1992 when 420,436 passengers used the system. Vehicle traffic also decreased, albeit at a lower rate from 115,448 in 2012 to 99,797 in 2018.

[46] Alaska Department of Commerce, Community, and Economic Development (2019). Alaska Visitor Volume Report, Summer 2018. Retrieved 12 August 2019 from https://www.alaskatia.org/Research/Visitor%20Volume%20Summer%202018%20Report%202_15_19.pdf

[47] Alaska Marine Highway System (2015). 2015 Annual Traffic Volume Report. Retrieved 12 August 2019 from http://dot.alaska.gov/amhs/reports.shtml

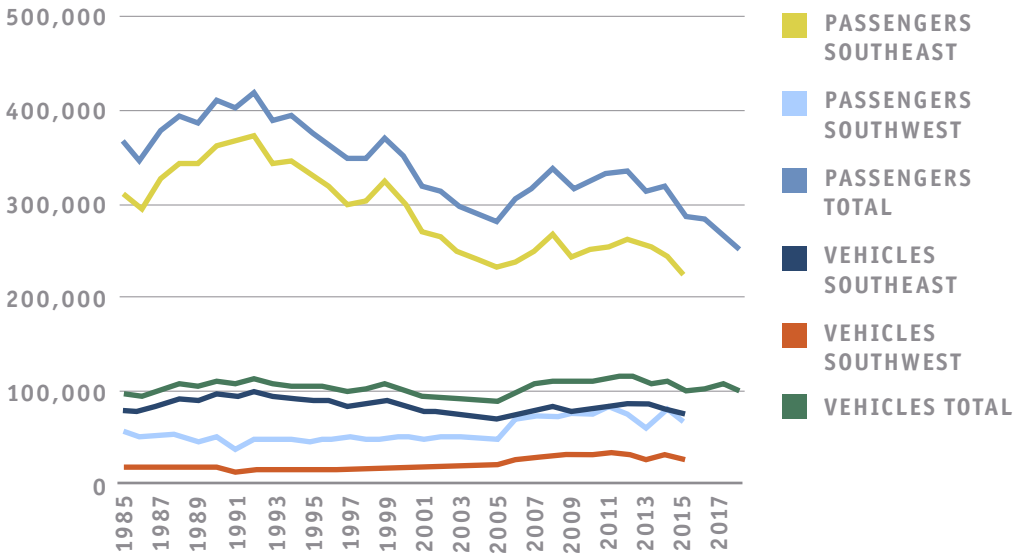
[48] Alaska House of Representatives (2019). The Economic Impacts of the Alaska Marine Highway System. Retrieved 19 August 2019 from http://www.amhsreform.com/sites/amhsreform.com/files/House%20Informational_SEC_McDowell%20Group%20AMHS%20Impacts%202.5.19.pdf

[49] 2008 figures for calendar year, 2018 figure for fiscal year.

The system's operating costs have long exceeded its revenue. Despite several fare increases cost recovery rate has decreased from between 50-60% in the 1990s and early 2000s to only between 30-35% since 2004. The shortfall is covered by the State of Alaska through a mix of Unrestricted General Funds, Marine Highway Funds, Capital Improvement Program Receipts and Alaska Motor Fuel Tax Fund.

The AMHS is faced with substantial budget cuts in line with overall decreases in State spending. Under the originally-proposed cuts by Gov. Mike Dunleavy, the system would have been faced with a $98 million cut from a budget of $180,1 million for the fiscal year 2018/19 to just $82,1 million for 2019/20, which would have resulted in a reduction in service between 1-30 September 2019 and no service at all between 1 October 2019 and 30 June 2020.[50] While this unprecedented cut in service was averted, the recently approved budget still includes cuts of $38 million for a total of $96,4 million resulting in lengthy service interruptions for Kodiak and Unalaska and a reduction in frequency for Southeastern communities, with just a single ferry remaining in operation during the first part of the year.[51]

FIGURE 10: Passenger and Vehicles on the AMHS 1985-2018 [52]



[50] Alaska Department of Transportation & Public Facilities (2019). Alaska Marine Highway System (AMHS) Overview. Retrieved 19 August 2019 from http://www.akleg.gov/basis/get_documents.asp?session=31&docid=22169

[51] McCarthy, A. (2019). Ferry cuts in Legislature budget are heavy, but could have been worse. Homer News, 13 June 2019. Retrieved from https://www.homernews.com/news/ferry-cuts-in-legislature-budget-are-heavy-but-could-have-been-worse/ and Brooks, J. (2019). Alaska ferry service dodges vetoes but not a big budget cut. Anchorage Daily News, 16 July 2019. Retrieved from https://www.adn.com/alaska-news/2019/07/16/alaska-ferry-service-dodges-vetoes-but-not-a-big-budget-cut/

[52] Alaska Department of Transportation & Public Facilities (2019). Alaska Marine Highway System (AMHS) Overview. Retrieved 19 August 2019 from http://www.akleg.gov/basis/get_documents.asp?session=31&docid=22169 and Alaska Marine Highway System (2015). 2015 Annual Traffic Volume Report. Retrieved 19 August 2019 from http://dot.alaska.gov/amhs/reports.shtml

Shipping in Arctic Alaska

Unlike North Norway, which is primarily located above the Arctic Circle, the majority of Alaskan territory, population, and economic activity is located well below the geographic Arctic. Previous studies and assessments use differing definitions for Arctic Alaska, but generally it includes the State's northern areas above or close to the Arctic circle. Arctic Alaska commonly includes the North Slope Borough, the Northwest Arctic Borough, and the Nome Census Area. It may also include the Yukon-Koyukuk Census Area.

In terms of maritime areas of Arctic Alaska two definitions are commonly used. According to the Polar Code, Arctic waters in the Bering Sea start at 60°N. The United States Coast Guard (USCG) currently defines its Arctic area of interest as starting at the Bering Strait at approximately 65.5°N just below the Arctic circle.

Independent of what geographical definitions are used, maritime activity in Alaska's Arctic has steadily increased over the past decade, albeit from a very low base. The USCG has been tracking vessels in its Arctic area of interest since at least 2008.[53] Over this time period vessel activity as measured by unique vessels has increased 130% from 120 vessels in 2008 to 276 vessels in 2018. Following Shell's withdrawal from offshore exploration in the Beaufort and Chukchi Sea traffic levels decreased slightly from a peak of 300 ships in 2015.

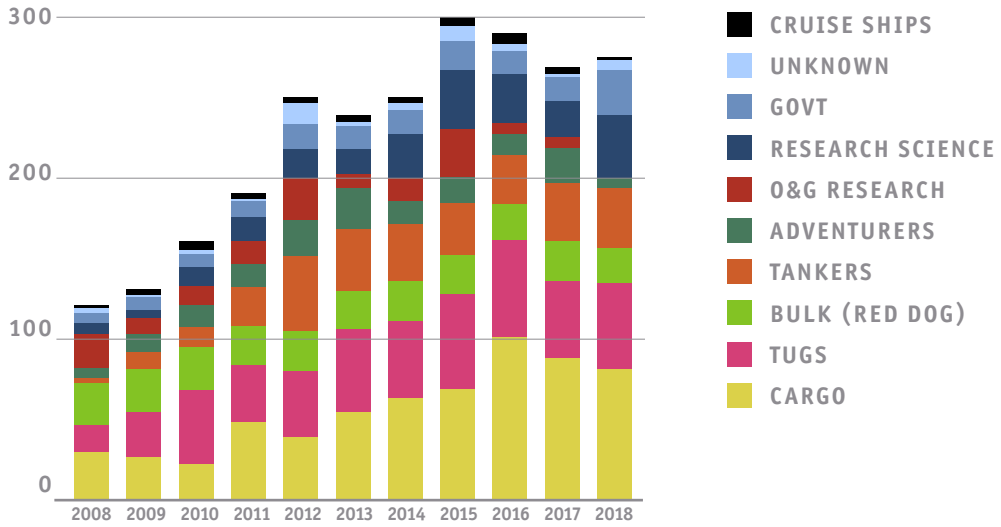
Cargo vessels, tugs, as well as bulk carriers and tankers account for around 70% of traffic passing through the area. Incidentally, these vessel categories have also experienced the largest growth. Cruise ships rarely venture above the Bering Strait with a maximum of seven ships in 2016. As commercial fishing in U.S. waters is only permitted south of the Bering Strait, the Coast Guard data set does not list fishing vessels.

The U.S. Committee on the Marine Transportation System (CMTS), which serves as a Federal interagency to assess the adequacy of the marine transportation system, utilizes the Polar Code's definition of Arctic waters in the Bering Sea starting at 60°N.[54] Both the CMTS' and the USCG's definitions capture maritime activity at the Port of Nome, the largest regional harbor.

[53] The USCG defines its Arctic area of interest from the Bering Strait in the south, to the North Pole in the north, Banks Island in the east and the New Siberian Islands in the west.

[54] The CMTS defines its Arctic area of interest from the 60°N in the south, the U.S. EEZ in the north, Wrangel Island in the west and Banks Island in the east.

FIGURE 11: Unique Vessel Counts by Vessel Type in Area of Interest North of the Bering Strait [55]



CMTS used Maritime Mobile Service Identity (MMSI) to identify unique vessels and measure shipping activity in the interest area. The results are similar to those recorded by the USCG. For the years 2015-2017, the Committee calculated that between 245 and 284 vessels operated in Arctic Alaskan waters above 60°N. In agreement with USCG data, cargo vessels, tugs and towing vessels represent the two largest vessel categories accounting for around 50% of traffic. In contrast to the Coast Guard's analysis, CMTS' south-ward expansion of Arctic waters allowed it to capture a number of fishing vessels operating south of the Bering Strait. Fishing vessels accounted for around 10% of all vessels.

Along the NSR, the route's administration makes official announcements as to the opening and closing of the route for general shipping operations – usually in June and November. In contrast, there is no official start and end date for shipping in Arctic Alaskan waters. According to CMTS the length of the shipping season increased by around ten days each year during 2015-2017, from 159 days, to 171 days, and 180 days.[56]

[55] U.S. Committee on the Marine Transport System (2019). A Ten-Year Projection of Maritime Activity in the U.S. Arctic Region, 2020–2030, September 2019. Washington, D.C. Retrieved 1 October 2019 from https://www.cmts.gov/topics/arctic

[56] U.S. Committee on the Marine Transport System (2019). A Ten-Year Projection of Maritime Activity in the U.S. Arctic Region, 2020–2030, September 2019. Washington, D.C. Retrieved 1 October 2019 from https://www.cmts.gov/topics/arctic

FIGURE 12: Unique Vessel Counts by Vessel Type in Area of Interest North of 60°N[57]

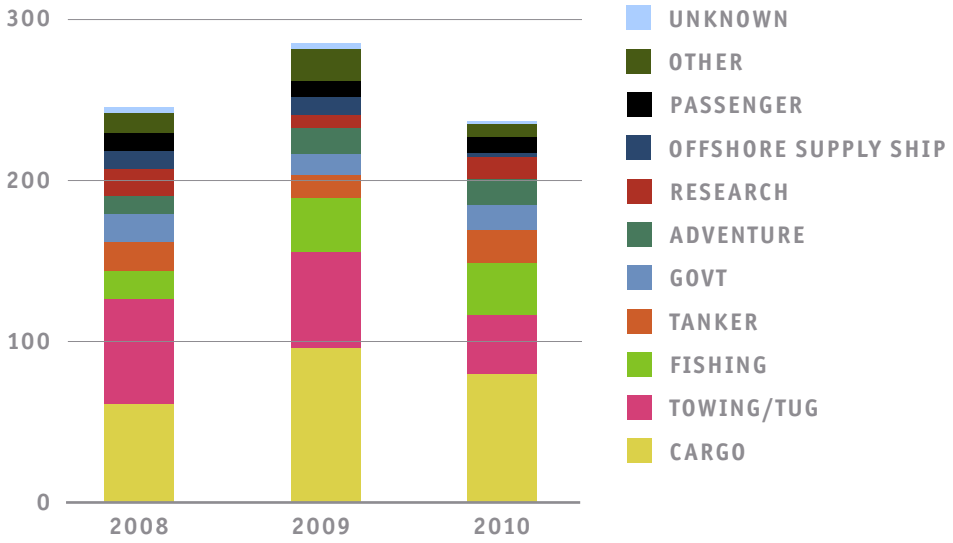
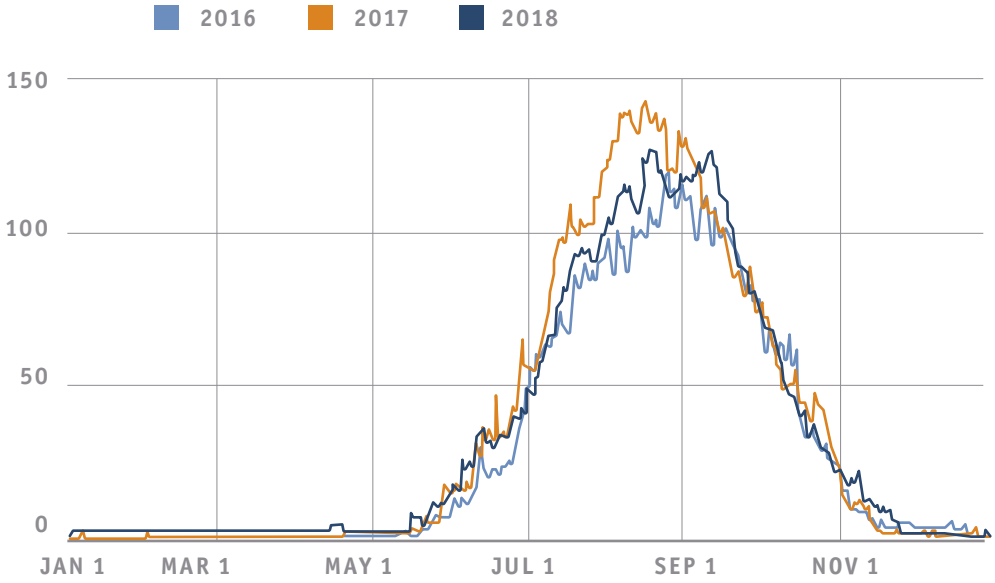


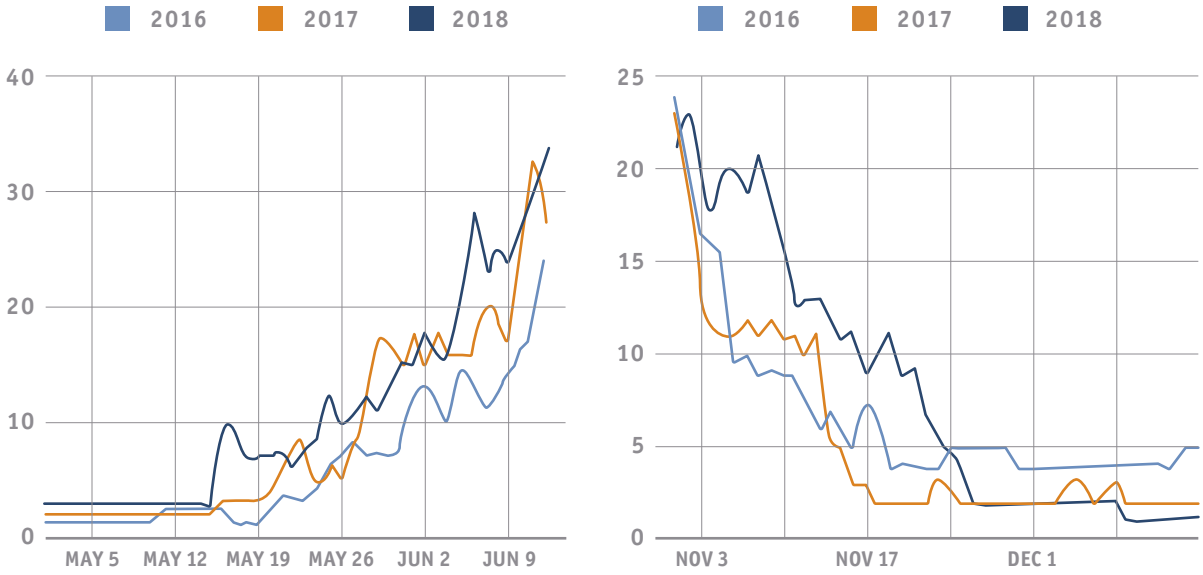
FIGURE 13: Number of unique vessels active in Arctic Alaskan waters, 2015-2017[58]



[57] U.S. Committee on the Marine Transport System (2019). A Ten-Year Projection of Maritime Activity in the U.S. Arctic Region, 2020–2030, September 2019. Washington, D.C. Retrieved 1 October 2019 from https://www.cmts.gov/topics/arctic

[58] U.S. Committee on the Marine Transport System (2019). A Ten-Year Projection of Maritime Activity in the U.S. Arctic Region, 2020–2030, September 2019. Washington, D.C. Retrieved 1 October 2019 from https://www.cmts.gov/topics/arctic

FIGURE 14: Close-up view of the start and end of navigation season in Arctic Alaskan waters, 2015-2017[59]



International Transit Traffic Passing Through the Bering Strait

The largest increase in shipping traffic through Alaska's waters through or North of the Bering Strait comes as a result of growing maritime activity along Russia's Northern Sea Route. The reasons for the increase are three-fold arising from both international transit traffic, e.g. voyages from Asia to Europe or vice-versa, the export of Russian natural resources from the Arctic to markets in Asia, and local or regional supply missions to communities in Russia's Far East.

Russia's Northern Sea Route has seen a somewhat steady volume of transit traffic with the number of voyages varying between 18 vessels passing through the Bering Strait in 2015 and 62 ships in 2020.[60]

The bulk of traffic increase through this international sea way arises from the transport of liquefied natural gas (LNG) from the production sites on Russia's Yamal peninsula to markets in Eastern and Southeast Asia. In 2020 around 20% of Novatek's

[59] U.S. Committee on the Marine Transport System (2019). A Ten-Year Projection of Maritime Activity in the U.S. Arctic Region, 2020–2030, September 2019. Washington, D.C. Retrieved 1 October 2019 from https://www.cmts.gov/topics/arctic

[60] CHNL Statistics (2020). Retrieved 13 September 2020 from https://chnl.galschjodtdesign.no/?cat=27

LNG exports will be destined for Asia resulting in up to 100 voyages – about 50 trips each direction - of specialized Arc7 ice-class LNG carriers traveling through the Bering Strait.[61]

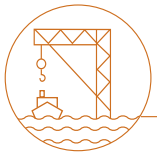
With additional LNG projects currently under construction on the Gydan peninsula and future planned facilities an estimated 70 million tons of LNG being produced in Russia's Arctic. Novatek aims to ship up to 80% of its production in and eastward direction towards Asia. This export of LNG could result in upward of 750 voyages – about 370 trips in each direction – passing through the Bering Strait by 2030.[62]

In addition, Russian communities bordering the Bering Sea, such as Anadyr and Egvekinot are destinations for a small number of general cargo voyages. As Novatek begins constructing infrastructure for its LNG transshipment hub on the Kamchatka Peninsula, resupply and cargo voyages to this region are likely to increase in the future.[63]

[61] The Moscow Times (2019). Powerful Fleet of LNG Tankers Sails Arctic Route to Asia as Ice Shrinks to Year's Low. Retrieved 13 September 2020 from https://www.themoscowtimes.com/2019/10/03/powerful-fleet-of-lng-tankers-sails-arctic-route-to-asia-as-ice-shrinks-to-years-low-a67579

[62] S&P Global Platts (2019). Novatek plans to send 80% of future Arctic LNG-2 output to Asia: CEO. Retrieved 13 September 2020 from https://www.spglobal.com/platts/en/market-insights/latest-news/natural-gas/060719-novatek-plans-to-send-80-of-future-arctic-lng-2-output-to-asia-ceo

[63] Novatek (2018). NOVATEK Signed Agreement with the Ministry of the Russian Federation for Development of the Far East and the Government of Kamchatka Territory. Retrieved 13 September 2020 from http://www.novatek.ru/en/press/releases/index.php?id_4=2655



Major Ports in Alaska

Malte Humpert, Germain Therre and Natalie Kiley-Bergen

Much of the discussion regarding maritime shipping in Alaska focuses on the lack of accessible port infrastructure in the Arctic. Shoreline facilities and services are essential for supporting and managing shipping activity, but are largely nonexistent in the Alaskan Arctic. These services and resources include deepwater ports, places of refuge, marine salvage processing capacity, and adequate port reception facilities for ship-generated waste and towing services. Services also include bilge water and wastewater facilities for cruise operators.

The most notable limitation in Alaska is the lack of a deepwater port in its Arctic waters. The nearest Alaskan deepwater port to the Arctic is Dutch Harbor in the Aleutian Islands, while the only deepwater port in the Bering Strait that is open to foreign ships is Provideniya.[64] Dutch Harbor is also a "Port of Refuge" providing protection and repair for vessels in need. The port also has infrastructure such as warehouses storage to serve as transshipment hug for thousands of vessels that pass through the region's waters. These capabilities may be expanded in the future if the need arises for Dutch Harbor to serve as a transshipment hub for vessel traffic coming from the NSR.

Deepwater ports are also considered essential for national security, as small northern ports in Alaska are unable to support military deployments and associated cargo needs.

The majority of Alaska's 125 ports was built before it gained statehood in 1959. Over the past two decades the State transferred ownership over many of its ports to local municipalities and boroughs, while retaining control over 24 state-owned ports. Among small-boat harbors alone, recapitalization requirements are in excess of $100 million. The short boating season lasting from May through August throughout much of Alaska also results in limited opportunities for locally-owned harbors to generate enough income from fees to properly maintain infrastructure and commission upgrades where needed.[65]

[64] Arctic Marine Shipping Assessment 2009 Report. Arctic Council, April 2009.

[65] American Infrastructure Report Card. 2017 Alaska Infrastructure Report Card. Retrieved 12 August 2019 from https://www.infrastructurereportcard.org/state-item/alaska/

Currently Alaska lacks an Arctic deepwater port. With the growth of both destinational and transit shipping throughout the region enhanced port infrastructure will become increasingly important. A deepwater port would support future economic development opportunities in the region, including resource extraction and tourism, by reducing operating costs, serving as a place of refuge, and providing marine services including vessel repair, maintenance, and emergency response.[66]

[66] American Infrastructure Report Card. 2017 Alaska Infrastructure Report Card. Retrieved 12 August 2019 from https://www.infrastructurereportcard.org/state-item/alaska/

Future Shipping Activity in Arctic Alaska

Malte Humpert

Shipping activity in Arctic Alaska remains very limited and even under the most aggressive growth forecasts will not rival maritime activity occurring already today in North Norwegian waters or along the NSR. According to CMTS' latest report even small-scale natural resource and infrastructure developments in the region can have a noticeable impact on the level of shipping activity in the Alaskan Arctic. In the case of Alaska, future levels of maritime activity will be determined by: a) domestic and foreign Arctic natural resource development, b) regional infrastructure development, and c) Arctic transit traffic. Shipping activity, especially transit traffic, will continue to fluctuate year-over-year due to high annual variability of sea ice coverage in.

Natural resource development in the Arctic, primarily liquified natural gas (LNG), and traffic from Canadian mines in Hope Bay and Mary River will be the main drivers of traffic increase.[67] Natural resource development will affect Arctic Alaskan traffic in several ways. The proposed export of LNG from Alaska's northern coast may result in a substantially amount of maritime activity, if natural gas is transported via LNG carriers rather than natural gas pipelines. Rapidly growing LNG exports from Russia's Yamal LNG and Arctic LNG 2 projects, will also increase shipping activity in Alaskan waters.

A proposed expansion of the Red Dog Mine to the Anarraaq and Aktigiruq prospects may also increase the vessel count. Several other existing or suggested mining operations, including a proposed rare-earth development near Nome, the Hope Bay and Black River gold mines, and the Mary River mine may add to vessel activity over the coming decade. Increases in fishing activity will be limited to below the Bering Strait. Regional infrastructure developments and needs, such as the expansion of the Port of Nome and proposed or ongoing road construction projects, will result in a temporary increase in traffic. Similarly, the adaptation of existing infrastructure

[67] U.S. Committee on the Marine Transportation System (2019). A Ten-Year Projection of Maritime Activity in the U.S. Arctic Region, 2020–2030. Retrieved 1 January 2020 from https://www.cmts.gov/downloads/CMTS_2019_Arctic_Vessel_Projection_Report.pdf

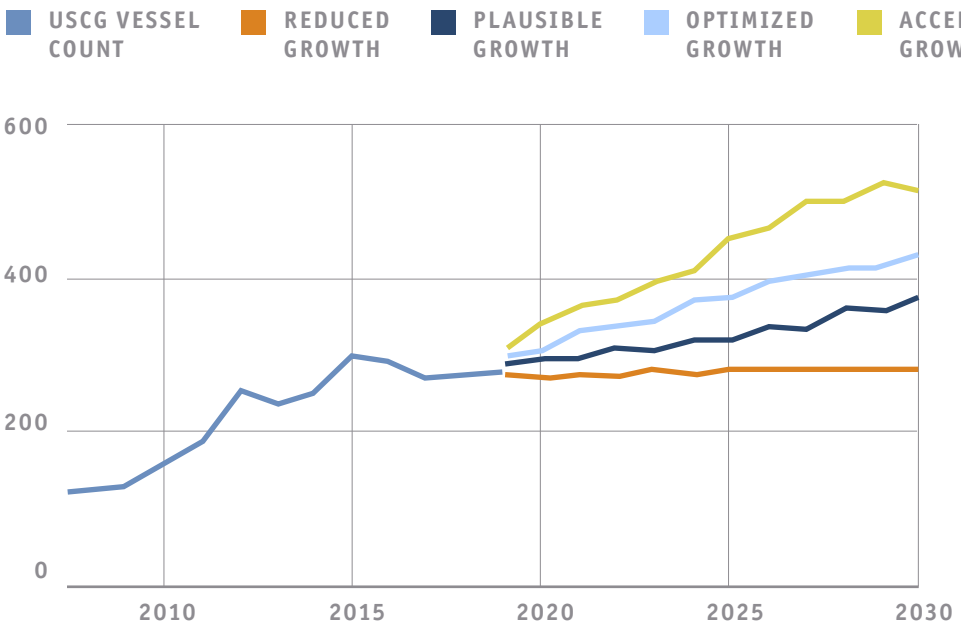
to the challenges of climate change, such as rising sea levels and coastal erosion, will lead to increasing needs to shipping activity.

Additional increases in shipping activity will come from Arctic transit traffic, both from cargo and non-cargo related voyages. Shipping activity along the line of Maersk's 2018 voyage of a container ship and COSCO's growing number of transits of general cargo vessels, is slated to increase over the coming decade. Additionally, a new generation of icebreakers and research vessels either planned or under construction in, among others, China, Russia and the U.S., will contribute to vessel activity. Furthermore, a growing number of ice-class cruise ships will increase passenger vessels traffic. Based on these factors, CMTS calculated growth scenarios for Arctic Alaska until 2030, including a reduced activity scenario, a most plausible scenario and an accelerated but unlikely scenario.

Under a reduced growth scenario maritime activity in Arctic Alaska remains stable hovering around 280 unique vessels. This scenario assumes e.g. very limited additional natural resource development as a result of declining raw material prices or global economic recession and persistent unfavorable ice conditions limiting e.g. cruise ship activity. Government or research vessels, such as new icebreakers, as well as LNG carriers from Russia's Yamal LNG and Arctic LNG 2 projects constitute the primary drivers of shipping activity. The most plausible scenario assumes modest developments in the natural resource and tourism sector and a continued growth of the U.S. economy roughly at current levels. Over the 11-year period from 2019-2030 this scenario expects a 2.2% annual growth of shipping activity leading to approximately 100 additional unique vessels operating in the Alaskan Arctic, for a total of 374, by 2030. An optimized growth scenario includes activity arriving from offshore oil and gas activity in the Chukchi Sea as well as a rapid development of the Arctic LNG 2 project. Under this scenario the U.S. and global economy continue to experience strong growth leading to a 3.5% annual increase in traffic resulting in 426 vessels present in Arctic waters per year by the end of the next decade.

The final, and most improbable scenario envisions accelerated growth, which assumes the highest theoretically possible level of activity in all areas, from natural resource development, to tourism activity, and transit traffic from cargo and non-cargo ships. Annual growth would average 4.9%, far above previously measured growth rates, and lead to 515 unique vessels active in the region by 2030.

FIGURE 15: Potential Growth Scenarios for Arctic Alaska by Unique Vessels, 2019-2030[68]



[68] U.S. Committee on the Marine Transportation System (2019). A Ten-Year Projection of Maritime Activity in the U.S. Arctic Region, 2020–2030. Retrieved 1 January 2020 from https://www.cmts.gov/downloads/CMTS_2019_Arctic_Vessel_Projection_Report.pdf

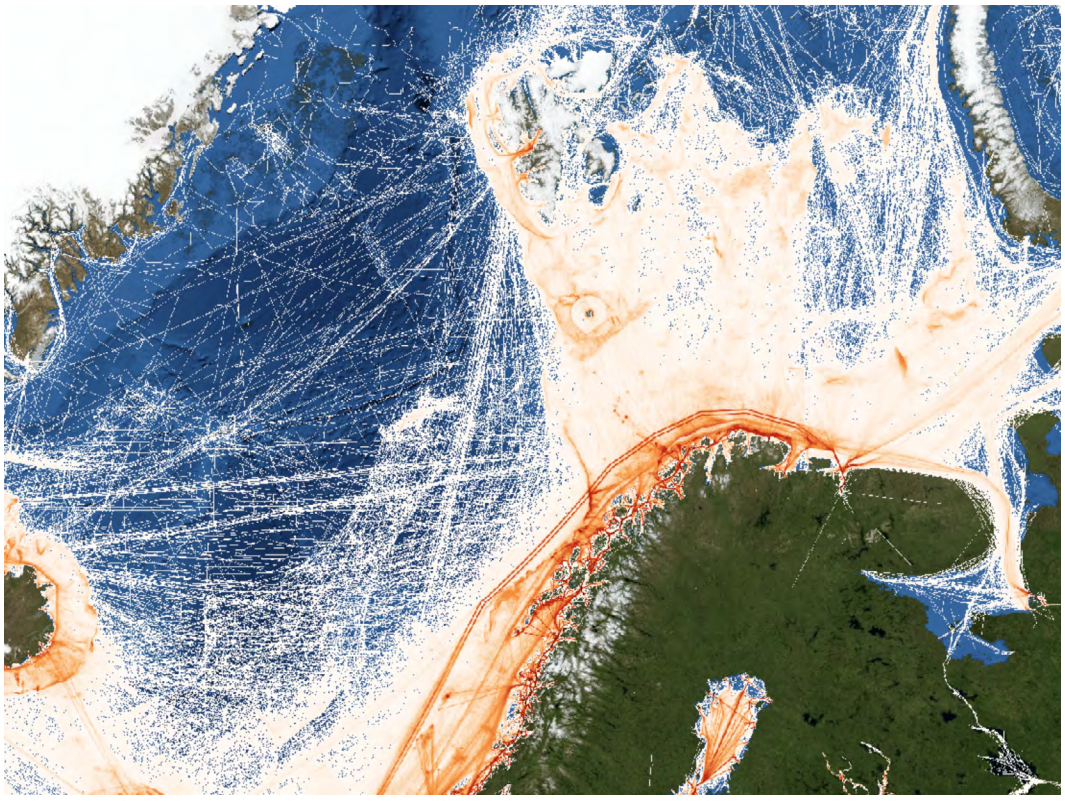
Shipping and Maritime Transportation in North Norway

Malte Humpert and Germain Therre

Maritime traffic in Norway's Arctic waters consists of shipping conducted between the region's ports and offshore installations, as well as transport to and from Norway's Arctic ports to harbors outside the Arctic. The steady growth of this type of traffic is characterized primarily by increasing shipping volume related to oil and gas activity, bulk shipping, fisheries and passenger traffic. In the waters surrounding Svalbard fisheries and tourism represent the primary drivers of maritime activity and a continued lengthening of the summer and fall navigation season due to decreasing sea-ice coverage.

FIGURE 16: Maritime Traffic in Northern Norway 2016-2017

Shipping activity mid-2016-mid-2017 along Norway's coastline as well as around the archipelago of Svalbard. Source: Norwegian Coastal Administration: https://havbase.no/havbase_arktis



In 2018, North Norwegian ports handled 44,9 million tons of cargo, of which 8,8 million tons were inbound and 36,2 million tons were outbound. This compares to around 215 million tons handled by all Norwegian ports that year.

TABLE 15: Total Cargo in Tons Handled by North Norwegian Ports, 2013-2018[69]

	2013	2014	2015	2016	2017	2018
Total	40,942,409	45,382,811	51,490,382	50,260,170	45,154,858	44,959,569
Inbound	6,200,665	7,516,295	12,874,601	10,487,338	8,217,076	8,796,614
Outbound	34,741,744	37,866,516	38,615,781	39,772,832	36,937,782	36,162,955

North Norway's largest ports by cargo volume are Narvik, Hammerfest, Mo i Rana, Tromsø, Bodø and Harstad. Cargo volume at Narvik, Mo i Rana, and Hammerfest is dominated by single commodities, iron ore at the two former and natural gas at the latter. Cargo at Tromsø, Bodø, and Harstad tis composed of a mix of agricultural and food products as well as manufactured goods and raw materials. Together these six ports account for almost 33 million tons of cargo representing around 75% of North Norway's total.

TABLE 16: Largest Ports in North Norway by Tons of Cargo, 2018[70]

Narvik	Hammerfest	Mo i Rana	Tromsø	Bodø	Harstad
20,343,772	5,472,777	4,025,696	1,085,808	927,115	700,936

Bulk Shipping

The vast majority of North Norwegian cargo volume comes in the form of bulk cargo, both dry and liquid bulk. In 2018, North Norway's ports handled 38,5 million tons of bulk cargo, representing 85% of all cargo shipped by the region's ports. The vast majority of bulk cargo was outbound with 32,2 million tons compared to 6,2 million tons inbound. Outbound dry bulk cargo, largely in the form of iron ore, constitutes around 70% of total. Liquid outbound bulk cargo, primarily in the form of LNG, represents 15% of all bulk cargo.

[69] Statistics Norway (2019). Maritime Transport: Cargo, by port, direction, partner port and type of cargo (tonnes) 2013 – 2019. Retrieved 17 July 2019 from https://www.ssb.no/en/statbank/table/10916

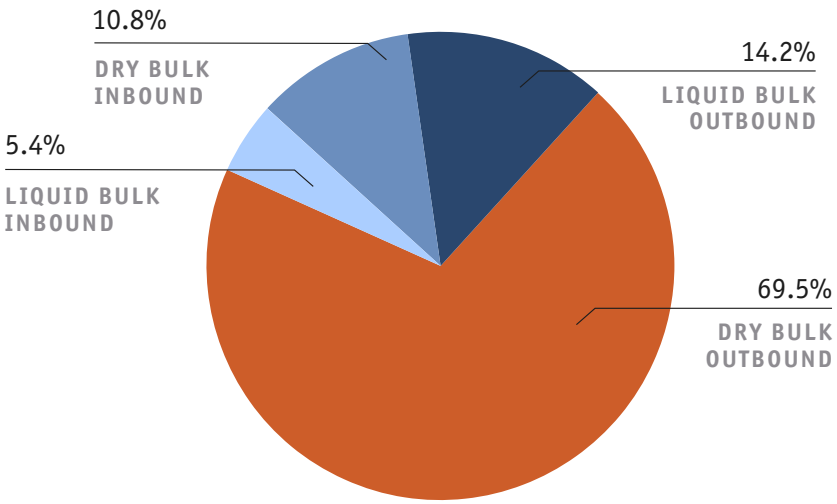
[70] Statistics Norway (2019). Maritime Transport: Cargo, by port, direction, partner port and type of cargo (tonnes) 2013 – 2019. Retrieved 17 July 2019 from https://www.ssb.no/en/statbank/table/10916. North Norwegian ports south of Mo i Rana are excluded.

TABLE 17: Bulk Cargo Volume in tons, 2018 [71]

Total Bulk	Total Inbound	Total Outbound	Total Dry Bulk	Dry Bulk Inbound	Dry Bulk Outbound	Total Liquid Bulk	Liquid Bulk Inbound	Liquid Bulk Outbound
38,514,581	6,276,368	32,238,213	30,952,106	4,178,349	26,773,757	7,562,475	2,098,019	5,464,456

Bulk cargo is focused in a small number of ports, primarily Narvik for iron ore and Hammerfest for LNG. In 2018, Narvik saw total dry bulk shipments of 20,2 million tons, of which 19,8 million were outbound. The iron ore is not mined in Norway, but transported via the Ofoten Line railway from Sweden to the Norwegian coast. Hammerfest handled 5,3 million tons of liquid bulk cargo of which 5,25 million were outbound, primarily natural gas from Snøhvit via the LNG Export Terminal on Melkøya Island.

FIGURE 17: Dry and Liquid Cargo Volume 2018[72]



The largest dry and liquid bulk cargo ports are Narvik and Hammerfest, handing in excess of 21 million and 5 million tons annually.

[71] Statistics Norway (2019). Maritime Transport: Cargo, by port, direction, partner port and type of cargo (tonnes) 2013 – 2019. Retrieved 17 July 2019 from https://www.ssb.no/en/statbank/table/10916

[72] U.S. Committee on the Marine Transportation System (2019). A Ten-Year Projection of Maritime Activity in the U.S. Arctic Region, 2020–2030. Retrieved 1 January 2020 from https://www.cmts.gov/downloads/CMTS_2019_Arctic_Vessel_Projection_Report.pdf

TABLE 18: Bulk Cargo Volume in tons, 2018 [73]

	Narvik	Rest of North Norway		Hammerfest	Rest of North Norway
Dry Bulk	20,242,930	7,902,776	**Liquid Bulk**	5,305,511	2,256,964

Existing and planned developments in the petroleum sector contribute significantly to maritime activity in the Norwegian Arctic waters. Shipping traffic originates from activities related to the exploration and development of reserves, the deliveries of supplies to off-shore platforms, and the transport of hydrocarbon resources from the point of production or transshipment.

Natural gas originating in Snøhvit is shipped from the Melkøya industrial facility via LNG carriers and accounts for between seven and nine voyages per month.[74] These figures can be expected to remain relatively stable over the lifetime of the facility until around 2035. Similarly, crude oil produced at the world's northernmost oil platform, Goliat, is transported by tankers representing around four tankers trips per month since 2015 with an anticipated production period of at least 30 years.[75] Both installations are resupplied through the ports of Sandnessjøen and Hammerfest.

The anticipated development of the Johan Castberg field will during initial stages result in increased traffic from offshore services, support vessels, and drilling activity. During the production phase traffic will either originate from the floating production storage and offloading itself or from a coastal loading terminal, dependent on Equinor's final investment decision. Traffic related to the 10-year development period of the Castberg field will account for up to five drilling rigs and up to 20 offshore service vessels.[76]

[73] Statistics Norway (2019). Maritime Transport: Cargo, by port, direction, partner port and type of cargo (tonnes) 2013 – 2019. Retrieved 17 July 2019 from https://www.ssb.no/en/statbank/table/10916

[74] MARPART Project Report 1 (2016). Maritime activity in the High North -current and estimated level up to 2025, Nord University. Retrieved 24 July 2019 from https://nordopen.nord.no/nord-xmlui/bitstream/handle/11250/2413456/Utredning72016.pdf?sequence=5&isAllowed=y

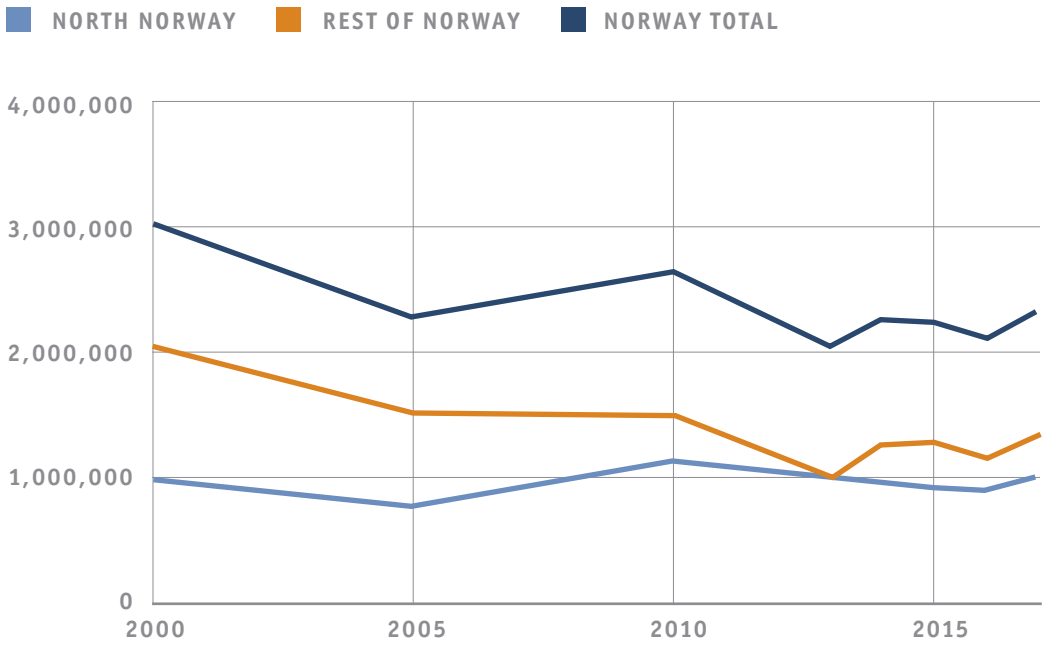
[75] MARPART Project Report 1 (2016). Maritime activity in the High North -current and estimated level up to 2025, Nord University. Retrieved 24 July 2019 from https://nordopen.nord.no/nord-xmlui/bitstream/handle/11250/2413456/Utredning72016.pdf?sequence=5&isAllowed=y

[76] Equinor. Johan Castberg. Retrieved 24 July 2019 from https://www.equinor.com/en/what-we-do/new-field-developments/johan-castberg.html

Fisheries

North Norway accounts for a substantial amount of fishery landings.[77] While Norway's total catch has decreased by around 25% over the past two decades, North Norway's amount has remained stable. In 2017 Nordland, Troms, and Finnmark accounted for 980,347 tons representing around 43% of Norway's total of 2,3 million tons.[78] North Norway's total has fluctuated by around 20% over the past 20 years peaking at 1,2 million tons in 2019 with a minimum of 740,706 in 2004, but by and large has held steady around a mean of around 970,000 tons. In contrast, Norway's total has continuously declined from more than 3 million tons in 2000 to a low of 2 million tons in 2013.

FIGURE 17: Commercial Fishery Landings in Norway, 2000-2017[79]



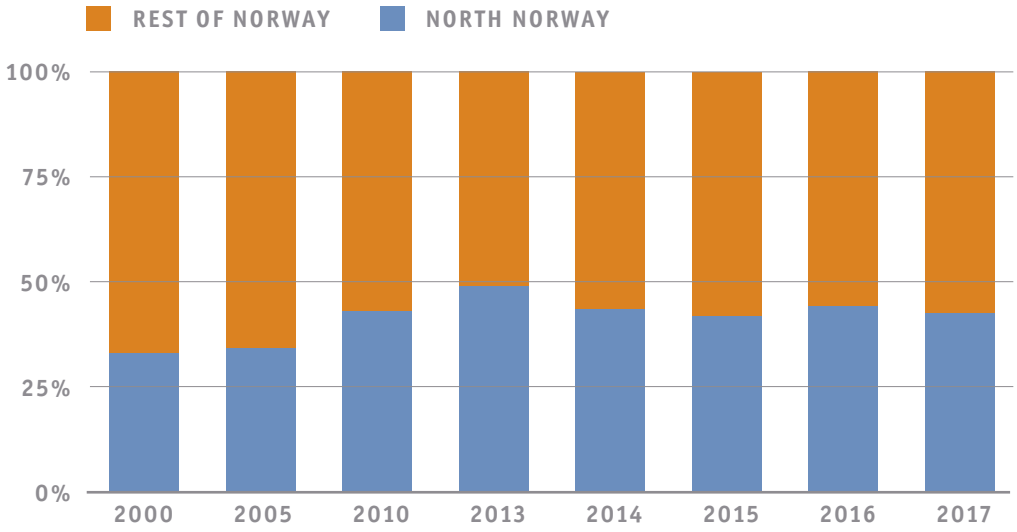
North Norway's share of Norway's total has increased from around 33% in 2000 to a peak of 49% in 2013. Since then, North Norway's share has hovered around 43%.

[77] Note that part of the fishing trawler fleet have delivery obligation to some port/fish factories under Norwegian law.

[78] On 1 January 2020, Troms and Finnmark were merged into one county: Troms and Finnmark.

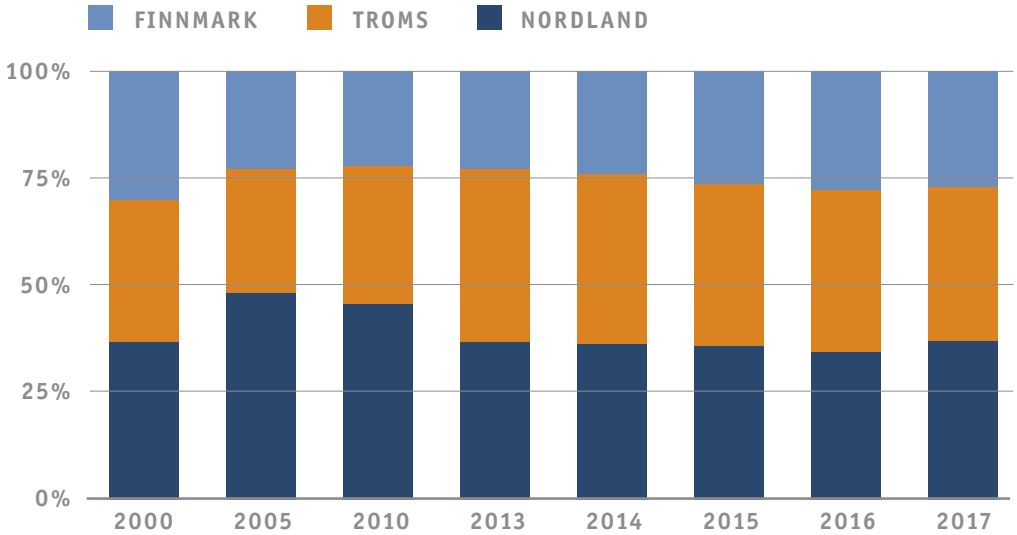
[79] Statistics Norway (2019). Fisheries: Catch, by fishing vessel's landing municipality and main group of target species (M) (closed series) 2000 - 2018. Retrieved 17 July 2019 from https://www.ssb.no/en/statbank/table/08868/

FIGURE 18: Share of Commercial Fishery Landings in North Norway, 2000-2017[80]



Annual catch volume is fairly evenly distributed between the three counties, with Finnmark country accounting for 27%, Troms representing 35% and Nordland constituting 38% in 2017. Nordland's share has decreased from nearly 50% in 2005 to below 40% in 2017 primarily at the expense of Troms county.

FIGURE 19: Share of Commercial Fishery Landings by Region in North Norway, 2000-2017[81]



[80] Statistics Norway (2019). Fisheries: Catch, by fishing vessel's landing municipality and main group of target species (M) (closed series) 2000 - 2018. Retrieved 17 July 2019 from https://www.ssb.no/en/statbank/table/08868/

[81] Statistics Norway (2019). Fisheries: Catch, by fishing vessel's landing municipality and main group of target species (M) (closed series) 2000 - 2018. Retrieved 17 July 2019 from https://www.ssb.no/en/statbank/table/08868/

Six of the fifteen-largest fishing ports in Norway are located in North Norway, led by Tromsø, which is the country's second-largest with more than 245,000 tons in 2017. Together these six ports account for more than 490,000 tons representing 20% of Norway's total.

TABLE 19: Largest Fishing Ports in North Norway by Tons, 2017[82]

Tromsø	Båtsfjord	Lødingen	Sortland - Suortá	Øksnes	Hammerfest
245,581	94,820	38,830	38,494	37,177	36,280

Norway's fishing fleet accounts for more than 70% of traffic in Norway's northern waters, operating as far as 81 degrees northern latitude. As of 2013, North Norway is home of 3427 fishing vessels.[83]

Fisheries in coastal waters operate year-round and are responsible for around 50% of all coastal traffic in the region.[84] Future traffic volume and patterns depend in large part on the movement of fish stocks, with general trends indicating a North- and Westward migration of fish resources. In addition, burgeoning aquaculture production has also resulted in, and will continue to do so, new coastal traffic flows.

With continually decreasing amount of sea ice surrounding the archipelago of Svalbard during the winter months, fishing activity continues virtually year-round, albeit at a smaller scale during the months of January through May. The fishing fleet varies from 10-20 during this first part of the year to a peak of 50-60 vessels during the months of September-December.[85] While Svalbard does not prominently feature in statistics about commercial fishery landings, fishing vessels operating in its waters account for more traveled distance as those fishing vessels in Nordland county.

[82] Statistics Norway (2019). Fisheries: Catch, by fishing vessel's landing municipality and main group of target species (M) (closed series) 2000 - 2018. Retrieved 17 July 2019 from https://www.ssb.no/en/statbank/table/08868/

[83] MARPART Project Report 1 (2016). Maritime activity in the High North -current and estimated level up to 2025, Nord University. Retrieved 24 July 2019 from https://nordopen.nord.no/nord-xmlui/bitstream/handle/11250/2413456/Utredning72016.pdf?sequence=5&isAllowed=y

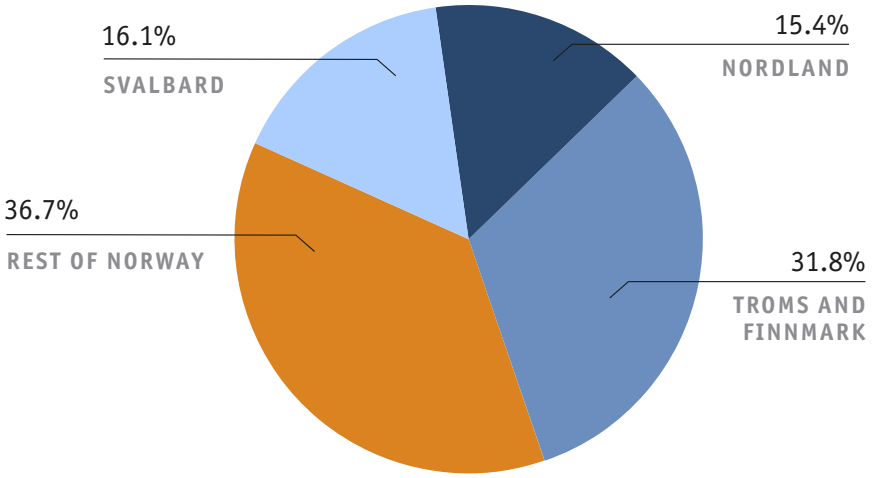
[84] MARPART Project Report 1 (2016). Maritime activity in the High North -current and estimated level up to 2025, Nord University. Retrieved 24 July 2019 from https://nordopen.nord.no/nord-xmlui/bitstream/handle/11250/2413456/Utredning72016.pdf?sequence=5&isAllowed=y

[85] MARPART Project Report 1 (2016). Maritime activity in the High North -current and estimated level up to 2025, Nord University. Retrieved 24 July 2019 from https://nordopen.nord.no/nord-xmlui/bitstream/handle/11250/2413456/Utredning72016.pdf?sequence=5&isAllowed=y

TABLE 20: Traveled Distance in Norwegian Waters, 2013 *(in 1000 nautical miles)*[86]

	Nordland	Troms and Finnmark	Svalbard	Rest of Norway
Fishing Vessels	1080	2231	1133	2578

FIGURE 20: Share of Traveled Distance in Norwegian Waters, 2013[87]



Container Cargo

With a good road network and rail connection to Bodø and Narvik, seaborne container shipping to and from North Norway is very limited. In 2018, North Norwegian ports handled 537,682 tons of containerized cargo.[88] The largest ports in terms of container cargo are Hegeland, Tromsø, Longyearbyen, Stokmarknes (Hadsel), Harstad and Hammerfest. Previously, Bodø was the largest container port in North Norway. The port, however, lost that position when regular scheduled service provided by the container ship *MS Tege* ended in 2013. The vessel operated three roundtrips between Bodø and Tromsø per week with a once-a-week extension to Alta.

[86] DNV GL (2018). Sjøsikkerhetsanalysen 2014: Prognoser for skipstrafikkenmot 2040, 2014-1271, 14 February 2018. Retrieved 24 July 2019 from https://www.kystverket.no/globalassets/nyheter/2015/november/prognoser_2040-rev.e-2018-02-14-002.pdf

[87] DNV GL (2018). Sjøsikkerhetsanalysen 2014: Prognoser for skipstrafikkenmot 2040, 2014-1271, 14 February 2018. Retrieved 24 July 2019 from https://www.kystverket.no/globalassets/nyheter/2015/november/prognoser_2040-rev.e-2018-02-14-002.pdf

[88] Statistics Norway (2019). Maritime Transport: Cargo, by port, direction, partner port and type of cargo (tonnes) 2013 – 2019. Retrieved 17 July 2019 from https://www.ssb.no/en/statbank/table/10916

This North Norway line transported around 13,000 TEU from the railway station of Bodø northwards via Harstad, Tromsø and Alta. Subsequent to the retirement of the *MS Tege* container volume shifted both to road and rail. Some volume was absorbed by the Ofotbanen railway to Narvik, but a large share is now transported via truck from the Nordlandsbanen station at Fauske. By some estimates this has resulted in 6,000 more trucks on North Norwegian roadways annually.[89]

TABLE 21: Container Volume at Select North Norwegian in TEU, 2018[90]

Helgeland	Tromsø	Harstad	Hammerfest
12,853	5,475	465	130

The limited nature of container shipping in the region is also reflected by the small distance traveled by container ships in North Norwegian waters.

TABLE 22: Traveled Distance in Norwegian Waters, 2013 *(in 1000 nautical miles)*[91]

	Nordland	Troms & Finnmark	Svalbard	Rest of Norway
Container Ships	27	1	-	363

Cruise Ship Tourism

Cruise ship traffic and tourism-related maritime activity in North Norway has been increasing steadily over the past decade and cruise tourism is a growing contributor to the North Norwegian economy. In 2018, Norway saw almost 800,000 cruise passengers, of which around a quarter traveled throughout northern coastal Norway and Svalbard. Cruise passenger spending directly contributes around 2,3 billion to Norwegian economy and cruise tourism employed around 14,000.[92]

[89] Johansen, Ø. (2013). Kutter ut MS "Tege". Avisa Nordland, 28 May 2013. Retrieved 24 July 2019 from https://www.an.no/sport/kutter-ut-ms-tege/s/1-33-6679569

[90] Statistics Norway (2020). Maritime Transport: Maritime transport statistics. Goods, by ports, type of containers and domestic/foreign 2003K1 - 2020K1. Retrieved 17 July 2020 from https://www.ssb.no/en/statbank/table/03648

[91] DNV GL (2018). Sjøsikkerhetsanalysen 2014: Prognoser for skipstrafikkenmot 2040, 2014-1271, 14 February 2018. Retrieved 24 July 2019 from https://www.kystverket.no/globalassets/nyheter/2015/november/prognoser_2040-rev.e-2018-02-14-002.pdf

[92] Cruise Lines International Associations Europe (2013). The Cruise Industry: The Cruise Industry, Contribution of Cruise Tourism to the Economies of Europe 2013 Edition. Retrieved 24 July 2019 from https://www.cruise-norway.no/viewfile.aspx?id=3824 and Innovation Norway (2014). Key figures for Norwegian travel and tourism 2014. Retrieved 24 July 2019 from https://www.innovasjonnorge.no/globalassets/reiseliv/markedsdata/in_nokkeltall_eng_web_enkel.pdf

On average, cruise passengers spend 3,945 NOK (422USD) during the voyage, with 860 NOK (92 USD) per day during onshore visits. This figure is in line with the global average of USD 80 of onshore spending per passenger. While there is limited data for the economic contribution of cruise tourism in coastal North Norway, new studies indicated that cruise tourism contributed an estimated 110 million NOK (USD 12 million) to Svalbard's economy in 2018.[93]

Since around 2010, a growing number of cruise operators have extended their routes north from the traditional markets of Bergen and Geiranger. This has resulted in an increasing number and larger vessels calling at ports in North Norway.

Norway has experienced a stark increase in cruise tourism with figures doubling every 10 years, from around 200,000 passengers in 2000, to 400,000 in 2010, and in excess of 800,000 expected for 2019. In line with other global cruise markets, the Norwegian cruise market has substantial exposure to downturns in the global economy, with passengers' figures growing substantially above pre-recession levels in the last couple of years.

The bulk of cruise activity and cruise tourism growth remains focused south of the Norwegian Arctic in the fjords of Western Norway, which sees more than half of all passengers. Over the past 25 years North Norway annual growth rate in terms of cruise ship port calls has been substantially lower than Western Norway and then Norway as a whole.

Along coastal North Norway the waters of the Lofoten, and the municipalities of Tromsø, Hammerfest and Nordkapp/Honningsvåg are the most frequented. Svalbard has also seen significant growth in passenger numbers in its waters. Tromsø is the largest cruise ship destination in the region, welcoming more than 140,000 passengers in 2018. Approximately 50 different cruise ships make more than 100 port calls in Tromsø between March and November, including growing numbers of winter cruises.[94]

In 2018, the region saw around 200,000 unique cruise ship passengers, compared to 789,000 for Norway as a whole. Passenger numbers have grown around 30% since 2013 for both coastal North Norway and Svalbard, in line with growth throughout Norway.

[93] Epinion (2019). Cruise Study Svalbard: An examination of the economical impact of cruise tourism (expedition-and conventional cruise) in Svalbard, August 2019. Retrieved 24 July 2019 from https://www.aeco.no/wp-content/uploads/2019/09/2019-Epinion-Cruise-Study-AECO-and-VisitSvalbard-Final-report.pdf

[94] MARPART Project Report 1 (2016). Maritime activity in the High North -current and estimated level up to 2025, Nord University. Retrieved 24 July 2019 from https://nordopen.nord.no/nord-xmlui/bitstream/handle/11250/2413456/Utredning72016.pdf?sequence=5&isAllowed=y

FIGURE 21: Average Annual growth rate of cruise ship ports calls North Norway, West Norway, and Norway, 1993-2018[95]

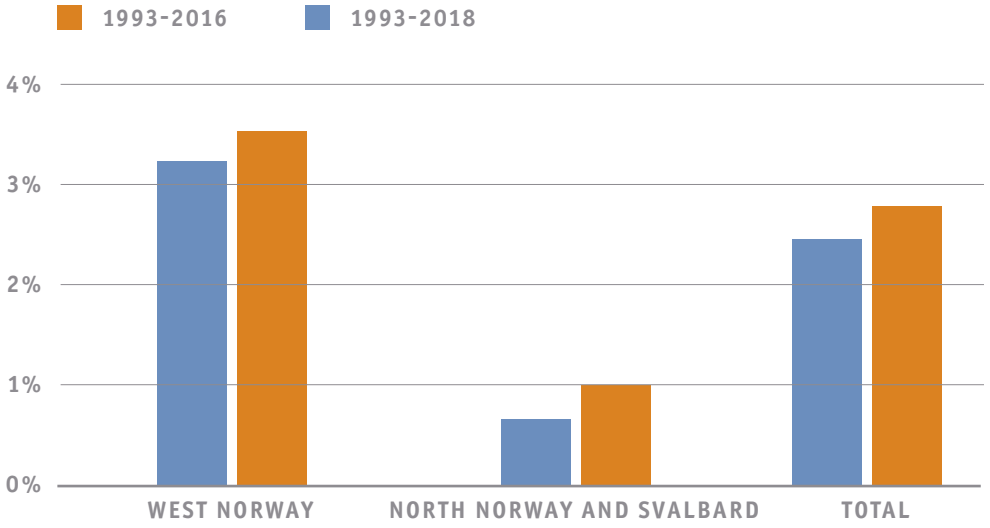


TABLE 23: Cruise Ship Passengers Norway, 1995-2018[96]

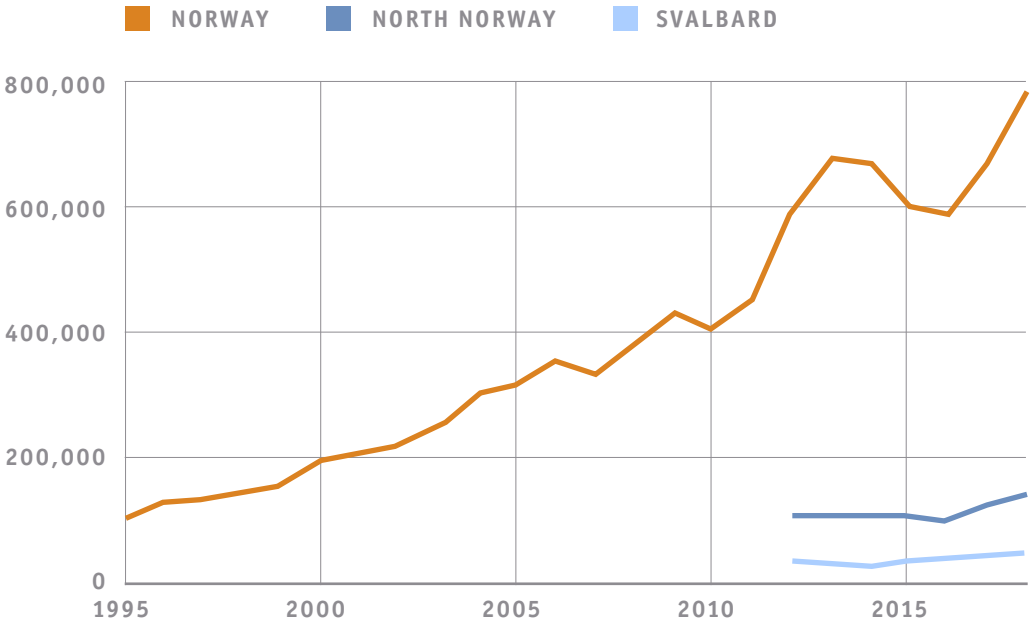
Year	Norway	North Norway[97]	Svalbard (Longyearbyen)
2012	588,000	110,000	38,345
2013	681,000	113,000	38,019
2014	675,000	115,000	36,118
2015	605,000	115,000	37,545
2016	593,000	107,000	41,627
2017	670,000	130,000	46,200
2018	789,000	148,000	49,899

[95] Transportøkonomisk institutt (TØI) (2018). Cruisetrafikk til norske havnerOversikt, historie og prognoser 2018-2060. TØI-rapport1651/2018. Retrieved 24 July 2019 from https://www.toi.no/publikasjoner/cruisetrafikk-til-norske-havner-oversikt-utvikling-og-prognoser-2018-2060-article35124-8.html

[96] Transportøkonomisk institutt (TØI) (2018). Cruisetrafikk til norske havnerOversikt, historie og prognoser 2018-2060. TØI-rapport1651/2018. Retrieved 24 July 2019 from https://www.toi.no/publikasjoner/cruisetrafikk-til-norske-havner-oversikt-utvikling-og-prognoser-2018-2060-article35124-8.html; Port of Longyearbyen (2019). Statistics Port of Longyearbyen 2007 and 2012-2018. Retrieved 17 July 2019 from http://portlongyear.no/wp-content/uploads/2017/02/Statistics_2007_2012-2018.pdf and Innovation Norway (2017). Key Figures for Norwegian Tourism 2017. Retrieved 24 July 2019 from https://assets.simpleviewcms.com/simpleview/image/upload/v1/clients/norway/Key_Figures_2017_pages_9b3f82d5-43f4-4fe9-968c-7a85a36704b2.pdf

[97] Approximate numbers for North Norway.

FIGURE 22: Cruise Ship Passengers Norway, 1995-2018[98]



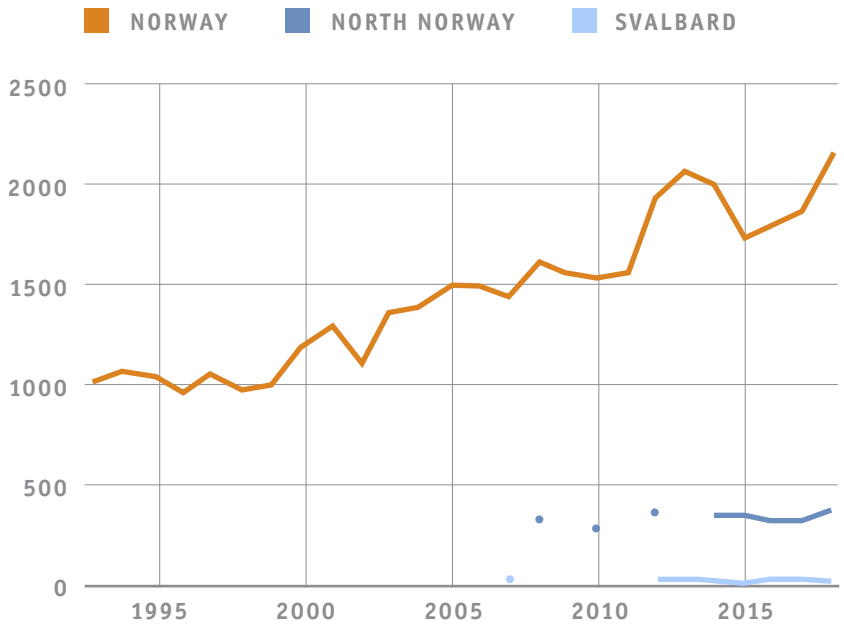
Similarly, to cruise passenger numbers, the majority of port calls occurs to the south of North Norway. Out of 2159 total cruise ship port calls, 388 occurred in coastal North Norway with an additional 44 calls on Svalbard.

[98] Transportøkonomisk institutt (TØI) (2018). Cruisetrafikk til norske havnerOversikt, historie og prognoser 2018-2060. TØI-rapport1651/2018. Retrieved 24 July 2019 from https://www.toi.no/publikasjoner/cruisetrafikk-til-norske-havner-oversikt-utvikling-og-prognoser-2018-2060-article35124-8.html; Port of Longyearbyen (2019). Statistics Port of Longyearbyen 2007 and 2012-2018. Retrieved 17 July 2019 from http://portlongyear.no/wp-content/uploads/2017/02/Statistics_2007_2012-2018.pdf and Innovation Norway (2017). Key Figures for Norwegian Tourism 2017. Retrieved 24 July 2019 from https://assets.simpleviewcms.com/simpleview/image/upload/v1/clients/norway/Key_Figures_2017_pages_9b3f82d5-43f4-4fe9-968c-7a85a36704b2.pdf

TABLE 24: Cruise Ship Port Calls Norway, 1993-2018[99]

Year	Norway	Coastal North Norway	Svalbard (Longyearbyen)
2012	1963	377	49
2013	2070		48
2014	2018	383	45
2015	1744	356	37
2016	1809	341	53
2017	1895	344	56
2018	2159	388	44

FIGURE 23: Cruise Ship Port Calls Norway, 1993-2018[100]



[99] Transportøkonomisk institutt (TØI) (2018). Cruisetrafikk til norske havnerOversikt, historie og prognoser 2018-2060. TØI-rapport1651/2018. Retrieved 17 July 2019 from https://www.toi.no/publikasjoner/cruisetrafikk-til-norske-havner-oversikt-utvikling-og-prognoser-2018-2060-article35124-8.html and Port of Longyearbyen (2019). Statistics Port of Longyearbyen 2007 and 2012-2018. Retrieved 24 July 2019 from http://portlongyear.no/wp-content/uploads/2017/02/Statistics_2007_2012-2018.pdf

[100] Transportøkonomisk institutt (TØI) (2018). Cruisetrafikk til norske havnerOversikt, historie og prognoser 2018-2060. TØI-rapport1651/2018. Retrieved 17 July 2019 from https://www.toi.no/publikasjoner/cruisetrafikk-til-norske-havner-oversikt-utvikling-og-prognoser-2018-2060-article35124-8.html and Port of Longyearbyen (2019). Statistics Port of Longyearbyen 2007 and 2012-2018. Retrieved 24 July 2019 from http://portlongyear.no/wp-content/uploads/2017/02/Statistics_2007_2012-2018.pdf

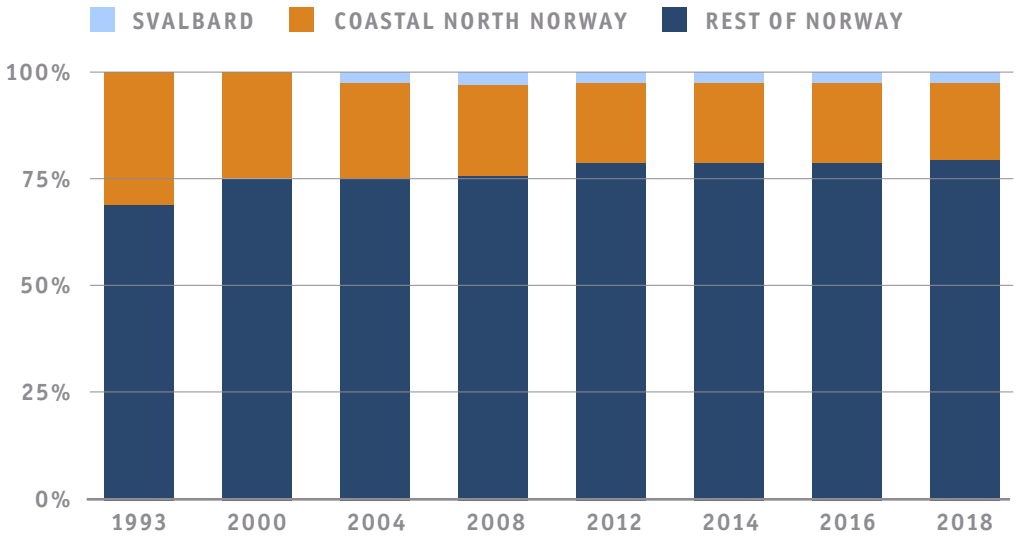
In contrast to passenger numbers which have doubled every ten years, port calls have only grown by 50% over the same period, due to the fact that cruise ships are becoming increasingly large. Over the past decade vessel size has grown substantially, more than doubling in some regions. Vessel size in North Norway remains around 50% smaller than cruise ships in other parts of the country.

TABLE 25: Average vessel size by passengers Norway, 2006-2018 [101]

	2006	2012	2018
Oslo	1322	1783	1887
South Norway	1462	1287	1839
West Norway	737	1388	1779
Trondelag	803	1210	1995
North Norway	607	896	1120

North Norway and Svalbard accounted for around 20% of all port calls in 2018, down from almost 35% in 1993.

FIGURE 24: Share of Cruise Ships Passengers in Svalbard, North Norway and Rest of Norway, 1993-2018



[101] Transportøkonomisk institutt (TØI) (2018). Cruisetrafikk til norske havnerOversikt, historie og prognoser 2018-2060. TØI-rapport1651/2018. Retrieved 17 July 2019 from https://www.toi.no/publikasjoner/cruisetrafikk-til-norske-havner-oversikt-utvikling-og-prognoser-2018-2060-article35124-8.html

Longyearbyen in Svalbard has witnessed a rapid growth of conventional, ice-class expedition-type cruises and day trips. In 2018 the island saw nearly 50,000 passengers from conventional cruises originating from 44 port calls up from 20,000 passengers in 2007. An additional 12,000 passengers originate from expedition-type vessels.[102] The main season lasting from June through September. The number of visited landing sites has risen from 52 in 1996 to 144 in 2010.[103]

In 2018, cruise tourism generated an estimated 110 million NOK (USD 12 million) in contribution to Svalbard's economy. Contributions consist of both passenger spending while onshore and cruise operator purchases, such as port services and fees, resupplies, activities and excursions, and environmental fees. A new study on cruise tourism in Svalbard indicates that expedition cruise contributes as much as five times to the local economy as conventional cruises.[104]

The region's largest ports and destinations for cruise ships are Nordkapp/Honningsvåg and Tromsø both seeing in excess of 140,000 passengers in 2018.

TABLE 26: Largest Ports by Passengers North Norway, 2018[105]

Nordkapp/ Honningsvåg	Tromsø	Lofoten - Leknes	Longyearbyen	Alta	Bodø	Hammerfest
142,757	142,348	60,482	49,899	26,641	18,311	15,969

Similarly, in terms of port calls Tromsø and Nordkapp/Honningsvåg far outpace other destinations in North Norway with more than 100 port calls, more than twice as much as the next most-popular port.

[102] MARPART Project Report 1 (2016). Maritime activity in the High North -current and estimated level up to 2025, Nord University. Retrieved 24 July 2019 from https://nordopen.nord.no/nord-xmlui/bitstream/handle/11250/2413456/Utredning72016.pdf?sequence=5&isAllowed=y

[103] MARPART Project Report 1 (2016). Maritime activity in the High North -current and estimated level up to 2025, Nord University. Retrieved 24 July 2019 from https://nordopen.nord.no/nord-xmlui/bitstream/handle/11250/2413456/Utredning72016.pdf?sequence=5&isAllowed=y

[104] Epinion (2019). Cruise Study Svalbard: An examination of the economical impact of cruise tourism (expedition-and conventional cruise) in Svalbard, August 2019. Retrieved 17 July 2019 from https://www.aeco.no/wp-content/uploads/2019/09/2019-Epinion-Cruise-Study-AECO-and-VisitSvalbard-Final-report.pdf

[105] Cruise Norway. 2019 Forecast - calls and guests. Retrieved 24 July 2019 from https://www.cruise-norway.no/viewfile.aspx?id=5556; Cruise Norway. 2018 - Cruise calls and cruise guests. Retrieved 24 July 2019 from https://www.cruise-norway.no/viewfile.aspx?id=5558; Bodø Havn. Havnestyremøte 29 March 2019. Retrieved 24 July 2019 from http://www.bodohavn.no/getfile.php/133356-1559129644/Dokumenter/Dokumenter%202019/Havnestyre/Innkalling%20med%20sakspapirer%20havnestyrem%C3%B8te%2029.03.2019.pdf and Port of Tromsø. Statistics. Retrieved 24 July 2019 from https://www.tromso.havn.no/en/about-us/about/statistics/

TABLE 27: Largest Ports by Call North Norway, 2018[106]

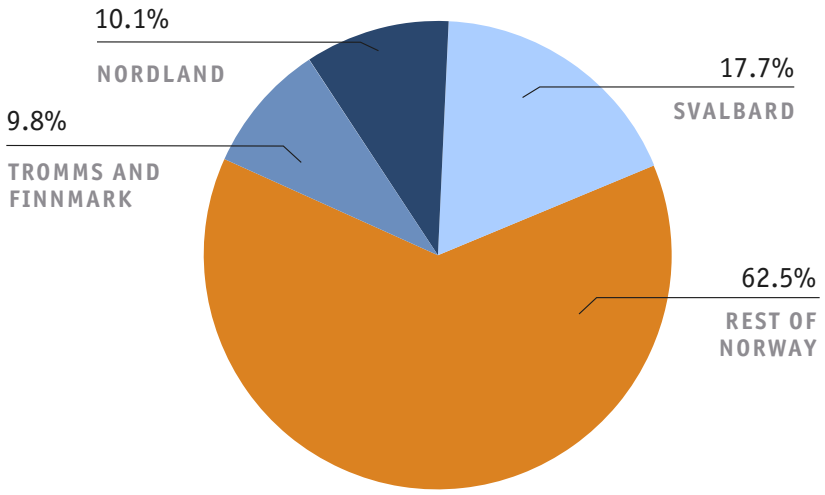
Tromsø	Nordkapp/ Honningsvåg	Lofoten - Leknes	Longyearbyen	Svolvaer	Hammerfest	Alta
114	104	49	44	30	19	18

Cruise ships in North Norway need to bridge larger distances between ports or popular sights in comparison to most popular destinations in the south west of the country. This fact is reflected by the relative larger distance cruise ships travel in North Norway, especially given the remoteness of Svalbard.

TABLE 28: Traveled Distance in Norwegian Waters, 2013 *(in 1000 nautical miles)*[107]

	Nordland	Troms and Finnmark	Svalbard	Rest of Norway
Cruise Ships	64	62	112	396

FIGURE 26: Share of Traveled Distance for Cruise Ships in Norwegian Waters, 2013[108]



[106] Cruise Norway. 2019 Forecast - calls and guests. Retrieved 24 July 2019 from https://www.cruise-norway.no/viewfile.aspx?id=5556; Cruise Norway. 2018 - Cruise calls and cruise guests. Retrieved 24 July 2019 from https://www.cruise-norway.no/viewfile.aspx?id=5558; Bodø Havn. Havnestyremøte 29 March 2019. Retrieved 24 July 2019 from http://www.bodohavn.no/getfile.php/133356-1559129644/Dokumenter/Dokumenter%202019/Havnestyre/Innkalling%20med%20sakspapirer%20havnestyrem%C3%B8te%2029.03.2019.pdf and Port of Tromsø. Statistics. Retrieved 24 July 2019 from https://www.tromso.havn.no/en/about-us/about/statistics/

[107] DNV GL (2018). Sjøsikkerhetsanalysen 2014: Prognoser for skipstrafikkenmot 2040, 2014-1271, 14 February 2018. Retrieved 24 July 2019 from https://www.kystverket.no/globalassets/nyheter/2015/november/prognoser_2040-rev.e-2018-02-14-002.pdf

[108] DNV GL (2018). Sjøsikkerhetsanalysen 2014: Prognoser for skipstrafikkenmot 2040, 2014-1271, 14 February 2018. Retrieved 24 July 2019 from https://www.kystverket.no/globalassets/nyheter/2015/november/prognoser_2040-rev.e-2018-02-14-002.pdf

Hurtigruten Coastal Route

In addition to cruise ship traffic, the North Norwegian coast sees regular, usually daily, traffic from Hurtigruten's coastal route operating between Bergen and Kirkenes. The service dates back to 1893 and remains an important part not only of Hurtigruten's business but provides a crucial connection for local communities along the route that lack railroad connection or reliable road conditions during winter. Only three out of 34 ports of call have railroad connections. In 2015, Hurtigruten transported 297,000 local passengers and more than 30,000 motor vehicles on short port-to-port journeys. In addition, it accommodates in excess of 100,000 cruise-type passengers which travel part or usually the entire length of the route over the course of six days.

Hurtigruten's twelve vessels, eleven of which feature car decks, also carry a growing amount of cargo, especially along the northernmost sections, under a charter agreement with Nor Lines for freight handling. Along the entire route the company transported 100,598 tons in 2014, up from 95,942 tons in 2013. Between Tromsø and Kirkenes alone the vessels carried 60,452 tons in 2014, a 21% increase over 2013 with 49,899 tons.[109]

Passenger volume on Hurtigruten's coastal route has steadily decreased over the past decade, from nearly 500,000 boardings in 2006 to around 380,000 in 2018. The decline has been most pronounced in North Norway, where boardings shrank from more than 300,000 to just above 200,000. The growing competition from traditional cruise tourism in North Norway may help explain the declining popularity of the coastal route.

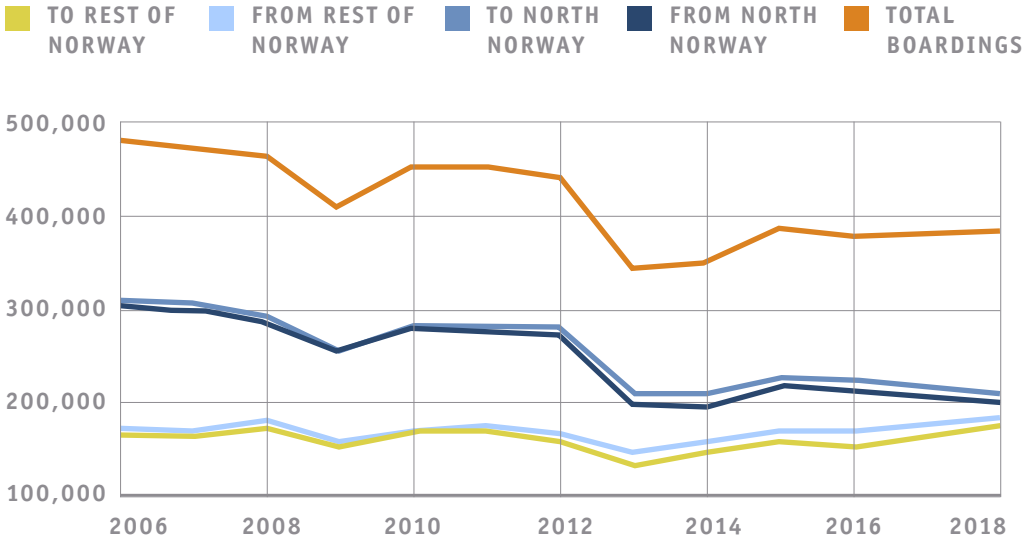
TABLE 29: Hurtigruten Passenger embarkations and disembarkations, 2006-2018[110]

	2006	2012	2013	2014	2015	2016	2017	2018
To Rest of Norway	169,382	159,007	135,168	144,439	157,460	156,731	164,776	173,433
From Rest of Norway	172,659	167,659	146,102	155,784	166,333	166,913	173,704	182,468
To North Norway	309,915	280,535	207,800	207,590	225,467	222,011	215,557	210,793
From North Norway	306,638	271,883	196,866	196,245	216,594	211,829	206,629	201,758

[109] Hurtigruten (2015). Annual bond report 2014. Retrieved 24 July 2019 from https://www.hurtigruten.com/globalassets/global/about-hrg/investor-relations/2014/hurtigruten_silk-bidco_annual-bond-report-2014.pdf

[110] Statistics Norway (2020). Maritime Transport: Maritime transport statistics. The Express Coastal Liner Bergen - Kirkenes. The number of passengers, by port 2006M01 - 2020M03. Retrieved 17 July 2020 from https://www.ssb.no/en/statbank/table/06207/

FIGURE 27: Hurtigruten Passenger embarkations and disembarkations, 2006-2018[111]



International Traffic Passing Through Norway's Coastal Waters

Increases in international transit traffic are in large part the result of growing shipping activity along the NSR. Primary cargo originating along the route are oil and gas resources produced in the Russian Arctic bound for markets in northern and western Europe. Around 15 cargo vessel and approximately 25 LNG and oil tankers transit through Norwegian coastal waters each month.[112]

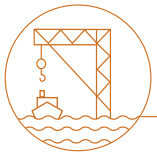
TABLE 30: Transit of Russia Petroleum Products Along Norwegian Coast Line, 2013 (tons)[113]

	Amount	Ship Type
Petroleum Distillates	5,480,516	Chemical/Product Tanker
Crude Oil	5,606,515	Oil Tanker
Natural Gas	28,466	Gas Tanker

[111] Statistics Norway (2020). Maritime Transport: Maritime transport statistics. The Express Coastal Liner Bergen - Kirkenes. The number of passengers, by port 2006M01 - 2020M03. Retrieved 17 July 2020 from https://www.ssb.no/en/statbank/table/06207/

[112] MARPART Project Report 1 (2016). Maritime activity in the High North -current and estimated level up to 2025, Nord University. Retrieved 24 July 2019 from https://nordopen.nord.no/nord-xmlui/bitstream/handle/11250/2413456/Utredning72016.pdf?sequence=5&isAllowed=y

[113] DNV GL (2018). Sjøsikkerhetsanalysen 2014: Prognoser for skipstrafikkenmot 2040, 2014-1271, 14 February 2018. Retrieved 24 July 2019 from https://www.kystverket.no/globalassets/nyheter/2015/november/prognoser_2040-rev.e-2018-02-14-002.pdf



Major Ports in North Norway

Malte Humpert and Germain Therre

Until 1 January 2020, North Norway was composed of three counties, ranging from Nordland in the south, Troms in the middle, to Finnmark in the north. Of Norway's 32 main ports, five are located in Norway's three northernmost counties. From South to North these are: Mo i Rana, Bodø, Narvik, Harstad and Tromsø.[114] The largest cities are located in the coastal areas and together with ports represent the region's economic hubs. The largest ports based on cargo volume in descending order are Narvik, Hammerfest, Mo i Rana, Tromsø, Kirkenes, Bodø, Harstad as well as Sveagruva on the island of Svalbard. Additionally, Longyearbyen, also located on Svalbard, is an important port for the tourism industry. All ports along Norway's coastal waters are ice-free year-round, with Svalbard's ports usually free of ice between June and December.

[114] Jernbanedirektoratet (2019). Hovedrapport: Ny jernbane Fauske –Tromsø (Nord-Norgebanen), Oppdatert kunnskapsgrunnlag, 1 July 2019. Retrieved 24 July 2019 from https://www.jernbanedirektoratet.no/contentassets/0520e5fc169e47b98fbf5aa7893ed53a/jernbane-fauske---tromso-nord-norgebanen-oppdatert-kunnskapsgrunnlag.-hovedrapport--kopi.pdf

Future Shipping Activity in North Norway

Malte Humpert

Future growth opportunities for maritime activity in North Norway come primarily from freight and cruise ship traffic. Based on traffic forecasts to 2040, Nordland, Troms and Finnmark, as well as Svalbard, will experience the largest relative growth of freight transport passing through the regions' waters, outperforming Norwegian regions in the south and west of the country.[115]

Cargo Traffic Through 2040

In absolute figures, cargo volume passing through Troms' and Finnmark's waters is forecast to more than triple and more than double for Nordland's waters. However, cargo volumes, in mid-, west, and south-Norway are forecasted to remain substantially above North Norway. As shipping from and into the Arctic region, especially Russia's NSR continues to grow, the share of traffic passing through North Norway's waters but not calling at any of its ports, will steadily increase.

CARGO TRAFFIC THROUGH 2040 IN VOLUME

The transport of crude oil, natural gas, and petroleum-based chemicals and products will account for the bulk of shipping traffic increases in waters off Troms and Finnmark and Nordland. Crude oil amounts passing through the two region's waters is expected to grow from around 6 million and 8,5 million tons to more than 20 million tons by 2040. Along the same lines, natural gas transport, primarily in the form of LNG, is forecast to grow from 2,5 million tons and 2 million tons to above 10 million tons. Petroleum-based products and chemicals will expand from around 6 million tons to beyond 23 million tons. In contrast, bulk cargo and traffic from container ships and general cargo vessels is forecasted to only grow modestly or even decrease. Bulk cargo is projected to decline from above 3 million tons to below 3 million tons in the waters of Troms and Finnmark, and increase slightly from around 30 million tons to 37 million tons in Nordland. Container and general cargo shipping, is expected to grow moderately from 1 million to around 1,5 million for Toms and Finnmark and from around 4 million tons to approximately 8 million tons for Nordland.

[115] DNV GL (2018). Sjøsikkerhetsanalysen 2014: Prognoser for skipstrafikkenmot 2040, 2014-1271, 14 February 2018. Retrieved 24 July 2019 from https://www.kystverket.no/globalassets/nyheter/2015/november/prognoser_2040-rev.e-2018-02-14-002.pdf

FIGURE 28: Forecasted cargo volume passing through the waters of Norwegian Regions, 2040[116]

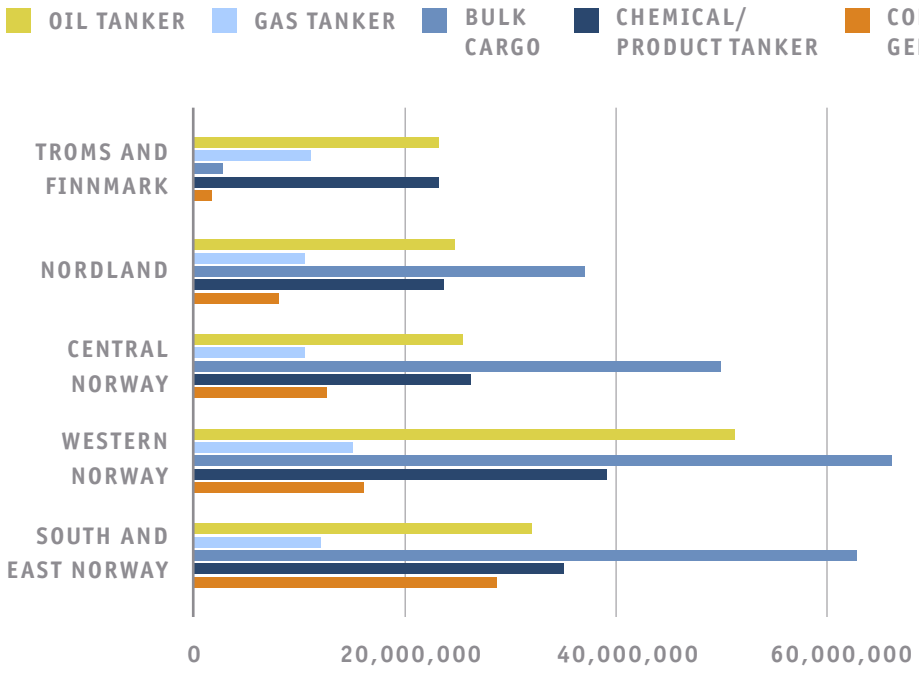
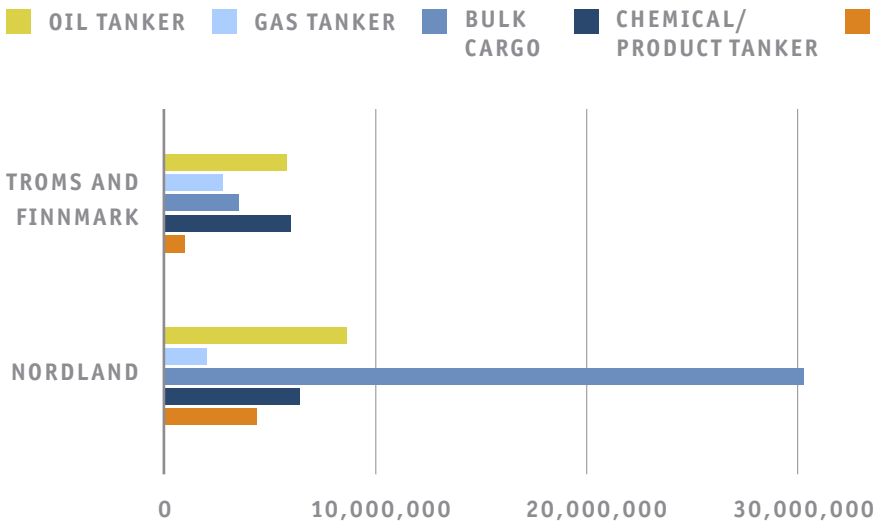


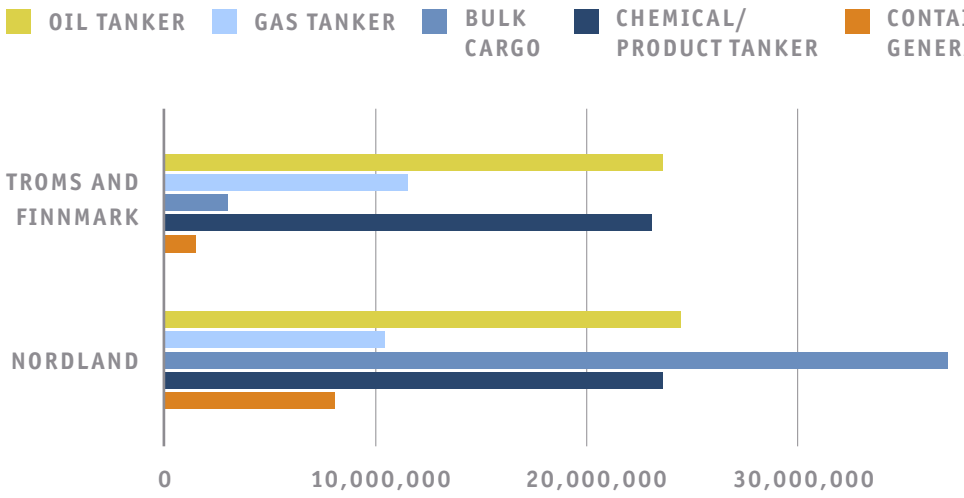
FIGURE 29: Cargo volume passing through the waters of North Norway, 2012[117]



[116] DNV GL (2018). Sjøsikkerhetsanalysen 2014: Prognoser for skipstrafikkenmot 2040, 2014-1271, 14 February 2018. Retrieved 24 July 2019 from https://www.kystverket.no/globalassets/nyheter/2015/november/prognoser_2040-rev.e-2018-02-14-002.pdf

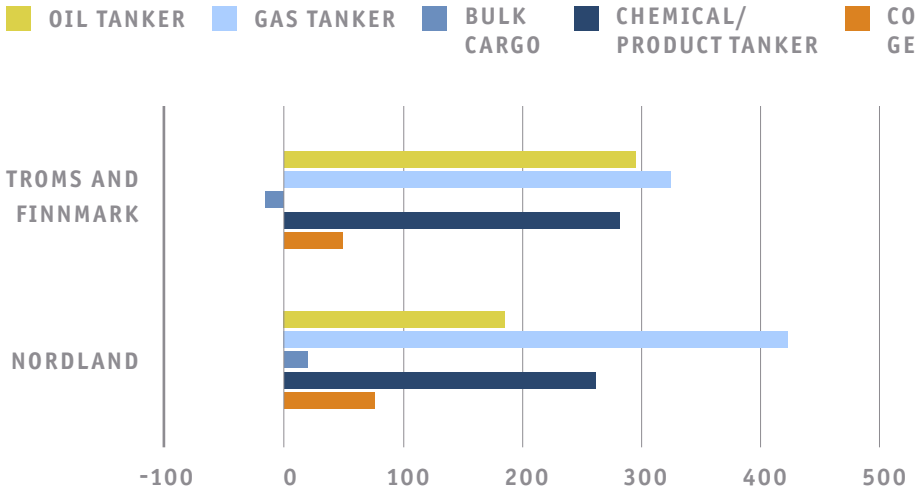
[117] DNV GL (2018). Sjøsikkerhetsanalysen 2014: Prognoser for skipstrafikkenmot 2040, 2014-1271, 14 February 2018. Retrieved 24 July 2019 from https://www.kystverket.no/globalassets/nyheter/2015/november/prognoser_2040-rev.e-2018-02-14-002.pdf

FIGURE 30: Forecasted Cargo volume passing through the waters of North Norway, 2040[118]



Traffic originating from oil, gas, and chemical/product tankers is forecast to grow between 200 – 400% in the waters off North Norway. While Nordland is expected to see the largest, a 400% increase in cargo volume carried by gas tankers, Troms and Finnmark are projected to see around a 300% increase in the volume of oil, gas, and chemical/product tankers transported in its waters.

FIGURE 31: Forecasted Percentage Growth of Cargo volume passing through the waters of North Norway, 2012-2040[119]



[118] DNV GL (2018). Sjøsikkerhetsanalysen 2014: Prognoser for skipstrafikkenmot 2040, 2014-1271, 14 February 2018. Retrieved 24 July 2019 from https://www.kystverket.no/globalassets/nyheter/2015/november/prognoser_2040-rev.e-2018-02-14-002.pdf

[119] DNV GL (2018). Sjøsikkerhetsanalysen 2014: Prognoser for skipstrafikkenmot 2040, 2014-1271, 14 February 2018. Retrieved 24 July 2019 from https://www.kystverket.no/globalassets/nyheter/2015/november/prognoser_2040-rev.e-2018-02-14-002.pdf

CARGO TRAFFIC IN DISTANCE TRAVELED

The increase in shipping activity can also be measured in sailing distance traveled. This statistic accounts for differences in vessel size. In this regard, some other trends emerge. While crude oil and natural gas tankers still represent a significant increase measured by distance traveled, general cargo ships and container ships make a strong showing as well. As these vessels are frequently smaller than large oil and gas tankers, more voyages are required to carry similar amounts of tonnage, resulting in proportionately higher sailing distances.

Especially noteworthy is the growth of distance traveled by general cargo ships, which is expected to increase from 1,3 million nautical miles (nm) to 2,3 million nm in Nordland and from 0,7 million nm to 1,1 million nm in Troms and Finnmark.

Container ship traffic is forecast to experience significant growth from just 27,000 nm in Nordland in 2012 to 137,000 nm by 2040. Similarly, while there is none too little container traffic in the waters surrounding Troms and Finnmark as well as Svalbard today, by 2040 forecasts expect as much as 49,000 and 130,000 nm traveled by container ships.

In relative terms, container traffic is slated to experience the largest growth increasing four-fold in Nordland and more than 60-fold increase in Troms and Finnmark. This is due to the very limited amount of container shipping traffic in Troms and Finnmark. While this category growth from a low base, this nonetheless represents a significant opportunity.

Traffic originating from oil, gas, and chemical/product tankers is forecast to grow between 200 – 400% in the waters off North Norway. While Nordland is expected to see the largest, a 400% increase in cargo volume carried by gas tankers, Troms and Finnmark are projected to see around a 300% increase in the volume of oil, gas, and chemical/product tankers transported in its waters.

Overall Nordland, Troms & Finnmark, and Svalbard outpace other regions in Norway, including the South-East and the West. Only Mid-Norway is expected to experience a similar increase in shipping activity.[120]

FISHING

Fishing operations represent a substantial amount of vessel activity in Norway. In North Norway they account for more than 70% of traffic. As of 2013 out of 6,128 registered fishing vessels, North Norway is home to 3,427 vessels.[121]

[120] DNV GL (2018). Sjøsikkerhetsanalysen 2014: Prognoser for skipstrafikkenmot 2040, 2014-1271, 14 February 2018. Retrieved 24 July 2019 from https://www.kystverket.no/globalassets/nyheter/2015/november/prognoser_2040-rev.e-2018-02-14-002.pdf

[121] DNV GL (2018). Sjøsikkerhetsanalysen 2014: Prognoser for skipstrafikkenmot 2040, 2014-1271, 14 February 2018. Retrieved 24 July 2019 from https://www.kystverket.no/globalassets/nyheter/2015/november/prognoser_2040-rev.e-2018-02-14-002.pdf

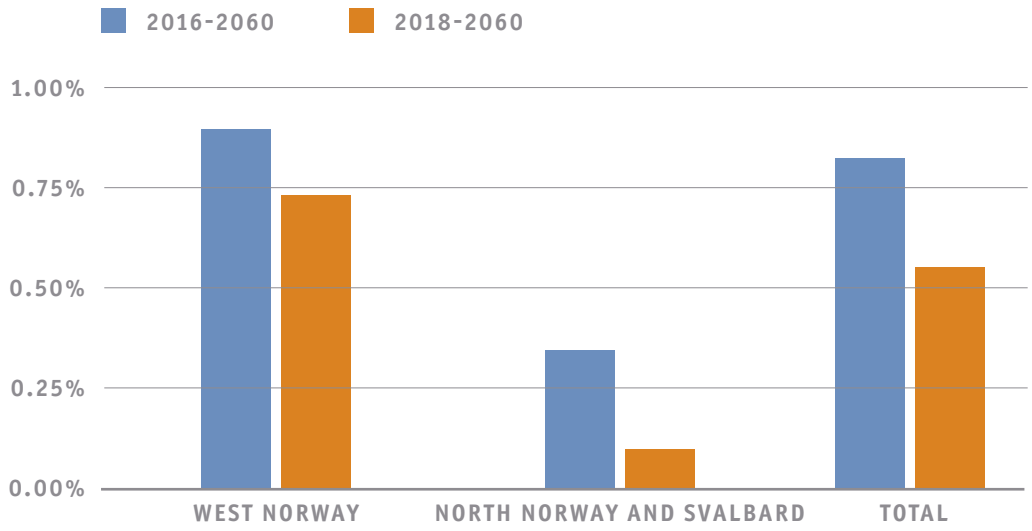
Troms and Finnmark saw the largest amount of fishing activity of all regions in Norway in 2013. Together with Nordland and Svalbard the three regions account for nearly two-thirds of all fishing activity.

Overall future levels of activity in the fishing industry will be defined by fewer but larger fishing vessels and by hard-to-predict geographical changes in fish stocks. Norway three northern regions will remain the most important area for fisheries, although sailing distance is forecast to decrease until 2040.

CRUISE SHIP TRAFFIC

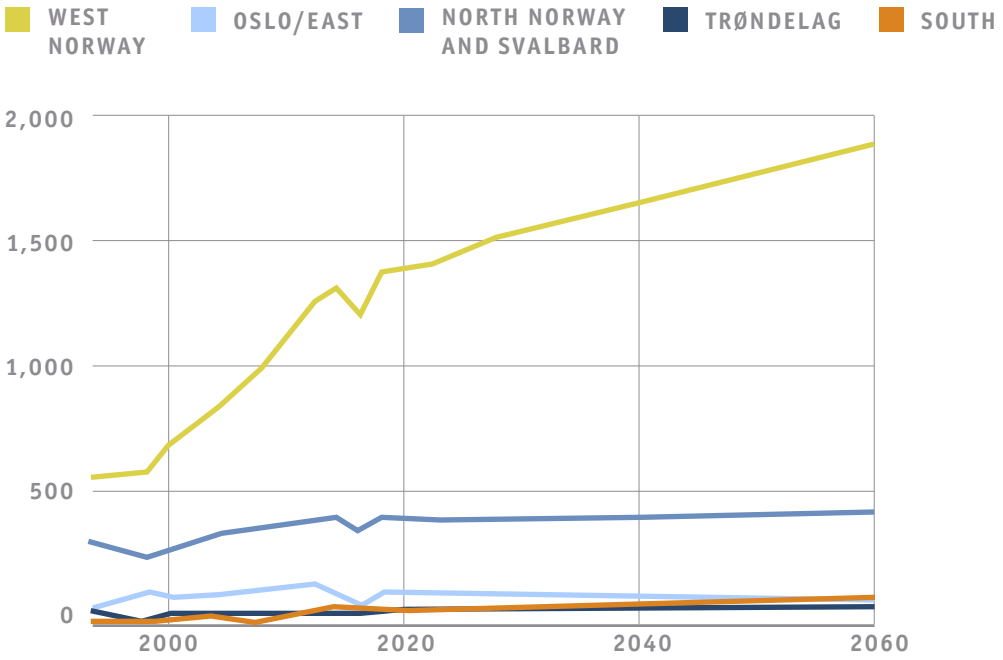
Cruise tourism in Norway, and globally, has experienced substantial growth far outpacing economic growth over the past two decades. Growth has been slower in North Norway than in other parts of the country, especially Western Norway. Nonetheless, cruise tourism has seen significant growth in the region as, e.g. Bodø's success in attracting especially winter cruise, shows. For the coming four decades until 2060 the *Institute of Transport Economics (Transportøkonomisk institutt)* projects continued albeit cyclical expansion of the sector. Growth in North Norway is projected to continue to lag behind Norway as a whole. In a medium-forecast scenario combining factors from a base-line and high-growth projection, port calls in North Norway are estimated to grow around 0.35% annually between 2016-2060. However, as the size of cruise ships will continue to grow, actual passenger numbers will grow at around twice this rate.

FIGURE 32: Forecasted Annual Growth Rate of Cruise Ship Tourism



The Institute's forecast does not foresee a substantial increase in the number of port calls in North Norway, growing from 421 ports calls in 2018 to 440 by 2060. In contrast port calls in West Norway will grow by around 40% to almost 1900.

FIGURE 33: Cruise Port Calls 1993-2018, Most likely Scenario Forecast 2022-2060[122]



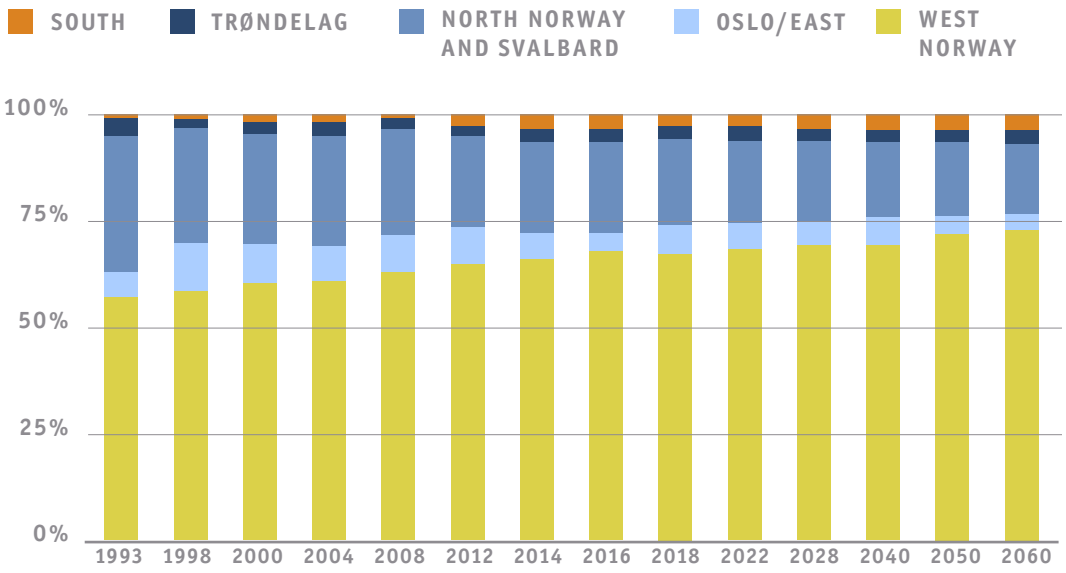
For Svalbard, which is included in the North Norway figure, the Institute expects that port calls remain between 50-60 per year, but with significantly larger vessels. The study cites the Svalbard Act and associated regulations, a future heavy fuel oil ban, and restrictions to land-based travel on Svalbard, as limiting factors to future growth.

Additional limits to growth may be challenging weather conditions for those ports, e.g. Bodø, that have attracted winter cruises. In 2019, Bodø had to cancel seven out of 15 winter port calls between January and March due to adverse weather conditions.

As a result of continued higher growth rate in Western Norway, North Norway, while it will retain its position as the second-largest market in the country, will see a further reduction in the share of port calls. While the region accounted for more than 30% of port calls in 1993, it will account for less than 20% by 2060.

[122] Transportøkonomisk institutt (TØI) (2018). Cruisetrafikk til norske havnerOversikt, historie og prognoser 2018-2060. TØI-rapport1651/2018. Retrieved 24 July 2019 from https://www.toi.no/publikasjoner/cruisetrafikk-til-norske-havner-oversikt-utvikling-og-prognoser-2018-2060-article35124-8.html

FIGURE 34: Share of Port Calls 1993-2018, Most likely Scenario Forecast 2022-2060[123]



The results of the Institute's study are confirmed by another forecast titled "Forecasts for shipping traffic towards 2040" prepared by DNV GL for the Norwegian Coastal Administration. This report looked at cruise ship activity on the basis of "distance sailed" and concluded that growth between 2013-204 in Nordland and Troms and Finnmark will be in line with the rest of the country. The Svalbard region will see above-average growth, primarily due to the significantly longer sailing distances to the from the archipelago compared to the shorter distances in coastal waters.

Traffic Increase from Trans-Arctic Shipping to 2040

Part of the increase in shipping activity throughout North Norway arrives from growing Arctic shipping traffic. Some of this activity, primarily from the NSR, has already arrived in Norwegian waters as it travels down the country's coastline.

FUTURE TRAFFIC FROM NSR

Forecasts expect up to 22 million tons of petroleum products, up to 22,4 million tons of crude oil and up to 8,25 million tons of natural gas to flow through along the Norwegian coastline by 2040.[124] Especially with regard to natural gas, primarily

[123] Transportøkonomisk institutt (TØI) (2018). Cruisetrafikk til norske havnerOversikt, historie og prognoser 2018-2060. TØI-rapport1651/2018. Retrieved 24 July 2019 from https://www.toi.no/publikasjoner/cruisetrafikk-til-norske-havner-oversikt-utvikling-og-prognoser-2018-2060-article35124-8.html

[124] DNV GL (2018). Sjøsikkerhetsanalysen 2014: Prognoser for skipstrafikkenmot 2040, 2014-1271, 14 February 2018. Retrieved 24 July 2019 from https://www.kystverket.no/globalassets/nyheter/2015/november/prognoser_2040-rev.e-2018-02-14-002.pdf

LNG, these figures may underestimate the pace and extent of Russia's hydrocarbon developments.

TABLE 31: Transit of Russia Petroleum Products Along Norwegian Coast Line, 2013, 2030 and 2040 (million tons)[125]

	2013	2030	2040
Petroleum Distillates	5,5	15,8	22,0
Crude Oil	5,6	16,2	22,4
Natural Gas	0.028	8,25	8,25

CONTAINER TRAFFIC

While the vast majority of container traffic will not be rerouted via the Arctic, there nonetheless exist growing potential for limited and ad-hoc container shipping across Northern Norway. According to a study by DNV GL on behalf of Norway's Kystverket the Arctic will up 300 round-trip voyages of medium-sized container ships. These voyages would account for 91,000 nm sailing distance in Nordland, 48,000 nm in Troms and Finnmark, and 130,000 nm in Svalbard.

Especially noteworthy is that the vast majority of container shipping increase in all three North Norwegian regions predicted to occur by 2040 comes from Transpolar traffic. Nordland saw just 27,000 nm of sailing distance from container shipping in 2013. By 2040 this figure is predicted to grow to 137,000 nm, of which 91,000 come from container shipping originating from Arctic traffic. Similar numbers hold true for Troms and Finnmark as well as Svalbard were forecasted growth in container shipping comes almost exclusively from Arctic container shipping activity.

BULK CARGO

Similarly, increasing levels of bulk shipping between Europe and Asia and vice versa will travel through Norwegian waters. The same study predicts 22,000 nm sailing distance of bulk carriers throughout Nordland's waters, 12,000 nm throughout Troms and Finnmark and 31,000 nm around Svalbard. In terms of relative growth, transpolar container shipping is forecast to account for 66% of container shipping increase in Nordland, 97% in Troms and Finnmark and 100% in Svalbard. While the figures for bulk shipping are less impressive, Arctic shipping activity is still expected to account for 18% of future growth in Nordland, 3.7% in Troms and Finnmark and

[125] DNV GL (2018). Sjøsikkerhetsanalysen 2014: Prognoser for skipstrafikkenmot 2040, 2014-1271, 14 February 2018. Retrieved 24 July 2019 from https://www.kystverket.no/globalassets/nyheter/2015/november/prognoser_2040-rev.e-2018-02-14-002.pdf

56% in Svalbard. As bulk shipping already constitutes a major share of shipping traffic in North Norway, relatively modest increases from Arctic shipping result in a smaller relative share.

TRANSPOLAR TRAFFIC

In addition to the NSR the continuous melting of Arctic sea ice will over the next decades open up a larger share of the Central Arctic Ocean allowing for transpolar shipping voyages. While vessels may initially stay closer to the NSR and Russian territorial waters, studies suggest that by the middle of the century the Transpolar Sea Route may emerge as the main pathway during the summer months.

Comparing Alaska and North Norway

Malte Humpert

At first glimpse the maritime shipping sector in Alaska and North Norway exhibit a range of similarities. Both regions see roughly equal amounts of traffic per year, around 40 million tons, with a heavy reliance on natural resource export, substantial fisheries activities, and important cruise tourism activities. They are also both home to a maritime highway to transport goods, motor vehicles, and people along coastal waters.

The more in-depth analysis of this work package, however, showed that despite quantitative similarities, there exist significant qualitative differences, especially between Arctic Alaska and North Norway, which inhibit cooperation and investment opportunities. Nonetheless, the work package identifies limited opportunities for investments and lessons-learned.

As the analysis showed, both Alaska and Northern Norway have a substantial number of deep-water ports. However, in contrast to Northern Norway where full-service ports are located all along the coastline reaching far above the Arctic Circle, Alaska does not have a single deep-water port in waters above or even close to the Arctic Circle. Discussions to expand the port of Nome remain ongoing.

A similar situation persists with respect to the maritime industrial sector. In contrast to Norway, where a well-developed maritime support sector exists, Alaska relies almost exclusively on services outside the state for maintenance, repairs, and vessel construction.

Despite overall comparable cargo volumes and some similarities traffic flow, traffic patterns differ substantially between the two regions.

Northern Norway has long seen significant levels of domestic and international traffic passing through its coastal waterways. Traffic volumes have increased both

due to e.g. domestic hydrocarbon exploration in its Arctic waters, as well as transiting vessels from more distant Arctic developments, e.g. on Russia's Yamal peninsula. High traffic volume has long necessitated a Vessel Traffic Service (VTS) managed by the Norwegian Coastal Administration to improve safety at sea and protect the environment.

In contrast, there exists only very limited routine traffic through Alaska's Arctic waters apart from fishing activity and narrow Russian transit traffic. There is currently no VTS-type system active in Alaska's Arctic waters. Nonetheless, as of 2019 voluntary shipping corridors through the waters of the Bering Strait were agreed upon.

As Alaska relies on the Trans-Alaska Pipeline none of the state's hydrocarbon resources are transported through the Arctic by sea. Plans to resume exploration for crude oil resources of Alaska's northern coast as well as discussions to produce and transport LNG via ice-capable carriers may alter this state. In contrast, Northern Norway relies on maritime transport to deliver crude oil and natural gas.

There also exist vast seasonal differences in maritime activity between the two regions. With year-round ice-free waters, apart from Svalbard, shipping traffic in Northern Norway does not undergo a significant annual cyclical variation.

Transit shipping through Norway's Arctic waters from the Russian Arctic in fact increases during the winter months due to the impassability of the eastern reaches of the NSR. Similarly, there exist stable activity and growing interest for cruise ship tourism in Northern Norway even during winter months, in contrast to Alaska where cruise tourism activity is largely limited from March through October. Furthermore, except for special Arctic voyages, all of Alaska's cruise activity occurs outside of Arctic waters.

Internal and destinational traffic also differs between the two regions. While Alaska almost exclusively imports all its goods via the sea, in part due to very limited road and rail connectivity to places outside the state, Northern Norway is increasingly relying on rail and road for the import of containerized cargo.

While both regions sport a network of coastal ferries and vessels which provide essential transport capabilities their operations differ substantially. Alaska's AMHS has seen a continued decline in passenger volume and has faced budgetary cuts for at least the past decade. Norway's Hurtigruten has established a successful business model combining aspects of coastal steaming supplying and connecting local communities with cruise ship-type tourism services aboard modern vessels.

Similarities in maritime activity extend to the bulk shipping and fisheries sector. Both regions rely on substantial dry bulk cargo activity to export product from its Arctic waters to more southerly latitudes. While both Alaska and North Norway see vast liquid bulk cargo operations, this type of activity is limited to well below the Arctic in Alaska.

Fisheries activities are the sector with the most similarities between the two areas. While overall volumes are larger in Alaska, a number of fishing harbors of similar size, such as Dutch Harbor and Tromsø exist.

Key Recommendations

OPPORTUNITIES IN THE MARITIME INDUSTRIAL SUPPORT (MIS) SECTOR

There may exist investment opportunities in Alaska for Norway's maritime service sector. Norway has century-old experiences to harness the synergies between shipowners, shipbuilders, and service providers in the fishing and oil and gas sector which could translate into a competitive edge offering maritime industrial support services in Alaska.[126]

Alaska lacks infrastructure, private investment, and expertise to construct, maintain or repair ships. Nearly all vessels based and operated in Alaska were constructed out of state and the vast majority of the 10,000 vessels active in Alaskan waters periodically travel to the lower 48 states, primarily Washington, for maintenance and repair. In recent years there have been limited investments by communities and private business to offer the required services in state. However, there exist significant opportunities for growth of and investment in the state's MIS sector.

With an aging fleet of more than 9,400 ships above 28 feet in length the maintenance and repair sector will experience sustained growth in the years to come. The majority of Alaskan vessels are between 25 and 45 years old having originated between 1970 and 1989. Alaskan vessel owners are estimated to spend between USD 80-100 million annually on repair and maintenance. With only five dry dock facilities in all of Alaska, vessels larger than 100 feet routinely travel to facilities in Washington's

[126] Norwegian Shipowners' Association (2013). High North – High Stakes Maritime opportunities in the Arctic. Retrieved 14 September 2020 from https://rederi.no/DownloadFile/?file=1001.

Puget sound resulting in fuel bills ranging in the USD 10,000-100,000. In addition, especially relevant for fishing vessels, the time away from Alaska's fishing grounds represents lost revenue.[127]

In addition to Alaskan-based vessels, more international vessels are operating in and transiting through Alaskan waters. This will likely result in increased traffic in Alaskan ports and growing demand for the MIS sector. Such a demand increase was observed during Royal Dutch Shell's drilling activity on Alaska's outer continental shelf. A fleet of 20 support vessels relied on Alaskan harbors and MIS service providers.

With the cyclical nature of increased maritime activity in Arctic Alaskan waters it, however, remains unclear if future levels of Alaskan and Arctic shipping activity will be sufficient to ensure the profitability of investments into the MIS sector.

OPPORTUNITIES IN THE ALASKAN SHIPBUILDING SECTOR

Currently, the Merchant Marine Act of 1920, also known as the Jones Act, presents a formidable obstacle for foreign opportunities in the construction of U.S.-based vessels as it stipulates that vessels larger than 5 tons carrying goods between U.S. ports need to be constructed in the United States. However, there have been repeated calls for the U.S. to revise to scrap the Jones Act. If such efforts come to fruition limited opportunities may exist for the Norwegian shipbuilding industry to use the Northern Sea Route during summer months as a marine connection to supply newbuild vessels to Alaska.[128]

With more 1,100 vessels constructed before 1970 Alaska's fishing fleet will see a sustained drive to replace aging vessels for the coming two decades. Many vessels in the Alaska's fishing fleet have reached or are approaching the end of their useful lifespan. The replacement of small vessels under 60 feet will become a major theme in the coming years as 3,100 vessels under 60 feet will be over 45 years old in 2025.[129]

The ship building sector is of very limited economic importance to Alaska and the sector accounts for only around 500 jobs in the entire state. Traditionally Wages account for between 40-60 percent of overall cost of maritime industrial projects placing Alaska at a disadvantage due to its high wages. Furthermore, high shipping

[127] Alaska Department of Commerce, Community and Economic Development. (2014). Alaska Maritime Industrial Support Sector. Retrieved 14 September 2020 from https://www.mcdowellgroup.net/wp-content/uploads/2015/02/Trends-and-Opportunities-in-the-Alaska-Maritime-Industrial-Support-Sector.pdf

[128] U.S. Department of Transportation (2020). The Jones Act. Retrieved 14 September 2020 from https://www.maritime.dot.gov/ports/domestic-shipping/domestic-shipping

[129] Alaska Department of Commerce, Community and Economic Development. (2014). Alaska Maritime Industrial Support Sector. Retrieved 14 September 2020 from https://www.mcdowellgroup.net/wp-content/uploads/2015/02/Trends-and-Opportunities-in-the-Alaska-Maritime-Industrial-Support-Sector.pdf

costs due to the state's remoteness, size, topography and lack of extensive road and rail system represent formidable obstacles to establishing a shipbuilding sector in the state, even given its expansive vessel fleet. According to calculations the transport of sheet steel from the lower 48 states to Alaska increases vessel construction costs by 6 percent compared to shipbuilding in Washington state.[130]

Replacement vessels will not be constructed locally, but will be imported from the largest private-sector shipbuilding industries located very distantly from Alaska along the U.S. East Coast and the Gulf of Mexico in states such as Virginia, Connecticut, Louisiana, and Mississippi.

Given the great distance between traditional shipbuilding centers and Alaska, new and emerging trade routes along Russia's Northern Sea Route may represent a feasible alternative and could potentially create an opportunity for Norwegian shipyards to offer and sell products to Alaska.[131]

EXPANDING EXPEDITION CRUISE TOURISM: LESSONS FROM SVALBARD FOR ARCTIC ALASKA

Expedition cruise tourism remains limited across Arctic Alaska. In contrast, Svalbard has witnessed a rapid growth of ice-class expedition-type cruises which account for a growing share of visits to the archipelago. In 2018 the island saw nearly 50,000 passengers from conventional cruises originating from 44 port calls up from 20,000 passengers in 2007. An additional 12,000 passengers originate from expedition-type vessels.[132] In contrast, the largest ports along Alaska's Arctic coastline, such as Nome and St. Paul, see far less than 5,000 in combined passenger figures. Expedition tourism makes 5x the economic contribution per passenger to the local economy compared to conventional cruises. Expedition cruises are characterized by smaller vessels that are not reliant on port infrastructure and bring passengers close to nature by making landings in more remote areas. This makes them especially suitable for Arctic Alaska where port infrastructure is limited. Svalbard's experience and effective marketing in this sector as well as best practices learned can help inform how to expand this industry in Alaska.

[130] Alaska Department of Commerce, Community and Economic Development. (2014). Alaska Maritime Industrial Support Sector. Retrieved 14 September 2020 from https://www.mcdowellgroup.net/wp-content/uploads/2015/02/Trends-and-Opportunities-in-the-Alaska-Maritime-Industrial-Support-Sector.pdf

[131] University of Alaska Fairbanks (2015). Alaska and the New Maritime Arctic Executive Summary. Retrieved 13 September 2020 from https://www.commerce.alaska.gov/web/Portals/6/pub/Alaska%20and%20the%20New%20Maritime%20Arctic.pdf

[132] MARPART Project Report 1 (2016). Maritime activity in the High North -current and estimated level up to 2025, Nord University. Retrieved 18 August 2019 from https://nordopen.nord.no/nord-xmlui/bitstream/handle/11250/2413456/Utredning72016.pdf?sequence=5&isAllowed=y

IMPROVING COASTAL TRANSPORT SYSTEMS – LESSONS FROM HURTIGRUTEN FOR ALASKA MARINE HIGHWAY SYSTEM

Both the Alaska Marine Highway System (AMHS) and Norway's coastal Hurtigruten provide year-round ferry service to more than 30 ports. While AMHS has seen a decrease in ridership over the past decade, in part due to budget constraints which resulted in a reduction of service, Hurtigruten has seen steadily increasing revenue and occupancy rates placed a number of new vessels in service over the past decade. AMHS' operating costs have long exceeded its revenue despite several fare increases, cost recovery rate has decreased from between 50-60 percent in the 1990s and early 2000s to only between 30-35 percent since 2004. AMHS may benefit from a comparison of economic models between the two systems to understand how Hurtigruten has been able to successfully position itself in the market and operate not only as a coastal transport system.

MANAGING GROWING CRUISE TOURISM – LESSONS FROM SOUTHEAST ALASKA FOR NORTH NORWAY

While cruise ship tourism has long been a staple of maritime activity across many Alaskan ports, larger vessels and more frequent port calls now represent a challenge for smaller ports. Limited berthing infrastructure increasingly requires "hot berthing" systems, where vessels cycle through the docks or lightering, where passengers are transferred to shore with smaller tender vessels. Some Norwegian ports have seen growing calls to limit cruise ship visits and the number of passengers going ashore. North Norwegian ports can benefit from the experiences in southeast Alaska and through a dialogue with its Alaskan counterparts can develop tools to manage passenger flow and ensure sustainability as cruise tourism is slated to grow over the coming two decades.