

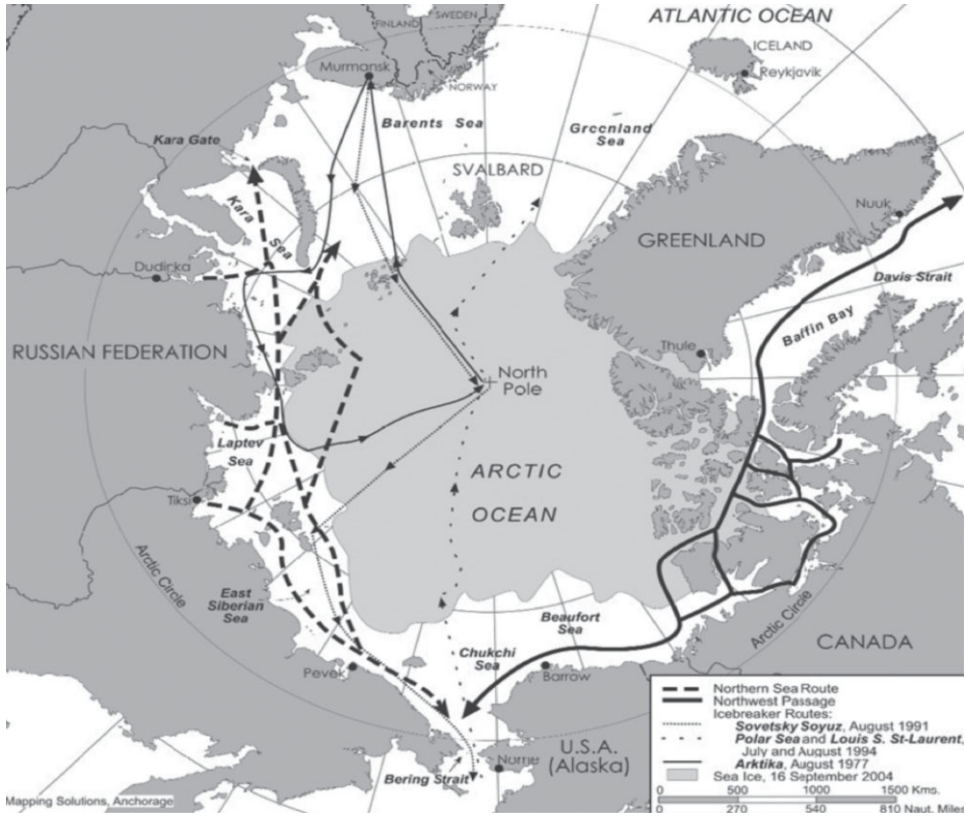
1 The transportation passages of the Arctic Ocean and connecting corridors in southern waters*

The purpose of this chapter is twofold.

First, we define the transportation passages of the Arctic Ocean on the basis of their geographical features, natural conditions, political significance, legal characteristics and usage pattern, displaying their distinctions, interrelations and eventual overlaps. The main focus will be on the *Northeast Passage* (NEP), of which the *Northern Sea Route* (NSR) is the main part, the *Northwest Passage* (NWP) and on the *Transpolar Passage* (TPP) running through the Central Arctic Ocean outside of coastal state jurisdiction (see [Figure 1.1](#)). This focus will allow us to address three types of sailing routes within each passage: *intra-Arctic routes*, i.e., sailing lanes between locations within the Arctic; *destination Arctic routes*, i.e., sailing lanes between harbors inside and outside of the region; and *transit routes*, i.e., sailing lanes between harbors in the Pacific and the Atlantic via the Arctic Ocean.

Second, we connect Arctic passages to world markets by interconnect transportation routes through southern waters. Here the focus will be on four routes: the *Northern Maritime Corridor* (NMC), connecting the NSR/NEP to the European continent and the east coast of the USA; the *Northern Pacific Corridor*, connecting the NSR, TPP and NWP to Asian markets and the western coast of North America; the *Fram Corridor* (FC) between Greenland and Svalbard, connecting the TPP to the North Atlantic and ultimately to the NMC; and the *Davis Corridor* (DC) connecting the NWP to the western branch of the NMC and the east coast of North America. Thus, the function of this chapter is to serve as an overarching definitional and organizing framework for the ensuing chapters.

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Source: Mapping Solutions, Lawson Brigham, USARC Anchorage 2006

Figure 1.1 The Arctic Ocean with transportation corridors.

1.1 The transportation passages of the Arctic Ocean

The assumption that the Arctic Ocean has three partly separated transportation passages dates back approximately 500 years. In 1527, the English merchant Robert Thorne suggested the existence of three alternative sea routes through these icy waters, “all of which were supposed to lead to the spice markets of the East Indies”: the NWP, the NEP and the “open polar sea-route via the North Pole”.¹ This idea stood the test of time and was gradually and imaginatively developed, first by the famous Russian scientist Mikhail Lomonosov who in the later part of the 17th century claimed that the Central Arctic Ocean was ice free and easily navigable between the Far East and Europe. A hundred years later, the German geographer August Peterman followed suit, explaining that the ice free part of the Arctic Ocean was due to the warming effect of the Gulf Stream. The assumptions of an ice free Central Arctic Ocean had no scientific justification or foundation, but have attracted renewed inter-

est in light of global warming. Today, all of Thorne's three passages have been tested and navigated by surface ships.

The Northeast and Northwest passages are often perceived as coastal sea lanes, whereas the Transpolar Passage is assumed to be a mid-ocean route across the North Pole to and from ports in the Pacific and Atlantic. This perception is far from accurate. Due to the presence of sea ice, neither of these transportation passages can offer ships a single set channel to follow. In practice, ships are forced to follow the channel that offers the best ice and navigational conditions at any one time and place. Thus, each of them is more like a broad transportation corridor stretching out in the north–south direction, containing several alternative navigational channels and fairly huge expanses of ice-infested waters. The corridor feature of these passages implies that they occupy broad stretches of waters that under certain specific circumstances and on occasions make them overlap and interact. In sum, the three corridors occupy the whole of the Arctic Ocean, which covers an area of 14.75 million sq. km and carries a volume of 18 million cubic km. of water. The lack of accurate geographical coordinates in the north–south direction leaves it to future politics and international law to delimit them from each other.

1.1.1 The Northeast Passage and the Northern Sea Route

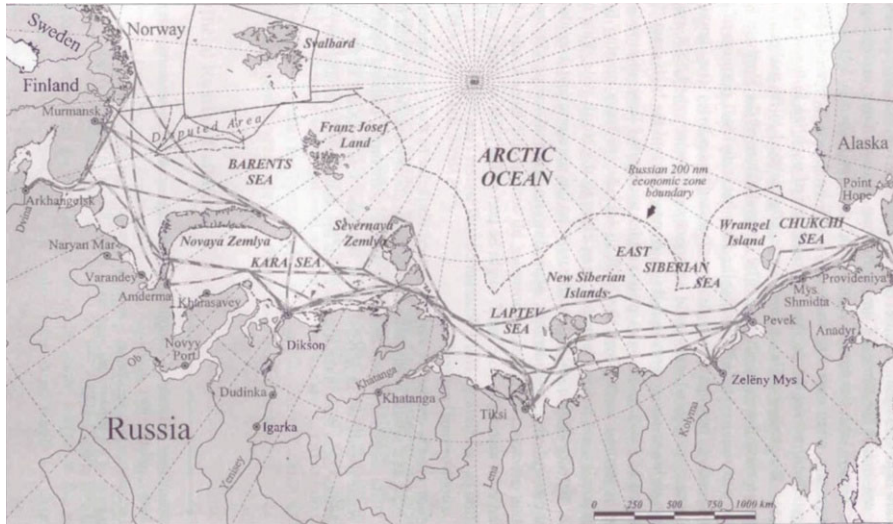
Politics were involved when the Russian government introduced the concept of the Northern Sea Route as constituting the main part of the NEP in the early 1930s. Therefore we will start our definitional exercise of the routes with the relationship between the NEP and the NSR.

Two approaches are often applied to determine the coordinates of the NSR: an *official definition* as found in Russian laws and regulations, and an *unofficial Russian functional definition* based on a mixture of organizational, operational and geopolitical criteria. The former restricts the route geographically to Arctic waters claimed to be national and under the exclusive national jurisdiction of the Russian Federation, whilst the latter extends it geographically to include additional expanses of international waters in the Atlantic and Pacific Oceans (see definitional difficulties in Chapter 1).

The official Russian definition of the NSR

According to political perception and legal regulations in Russia,² the NSR stretches from Novaya Zemlja in the west (meridian 168 degrees 58 minutes and 37 seconds west) to the Bering Strait in the east (parallel 66 degree north). The establishment of the NSR as a separate part of the NEP was decided by the Council of People's Commissars of the USSR on 17 December 1932, which marks the beginning of the NSR as an administered, legal entity under full Soviet jurisdiction and control.³ It comprises the main part of the NEP which, with the addition of the waters of the Barents Sea, connects the Atlantic and Pacific Oceans along the entire length of the northern coast of Eurasia.

The NSR is a series of different sailing lanes, and ice conditions at any one time and place will decide the sailing course to be set. The route covers some 2,200 to 2,900 nautical miles of ice-infested waters (see [Figure 1.2](#)). It consists of a series of marginal seas – the Kara Sea, the Laptev Sea, the East Siberian Sea and the Chukchi Sea – which are linked by some 58 straits running through three archipelagos – the Novaya Zemlja, the Severnaya



Source: Løvås & Brude, INSROP GIS, 1999

Figure 1.2 The northern sea route.

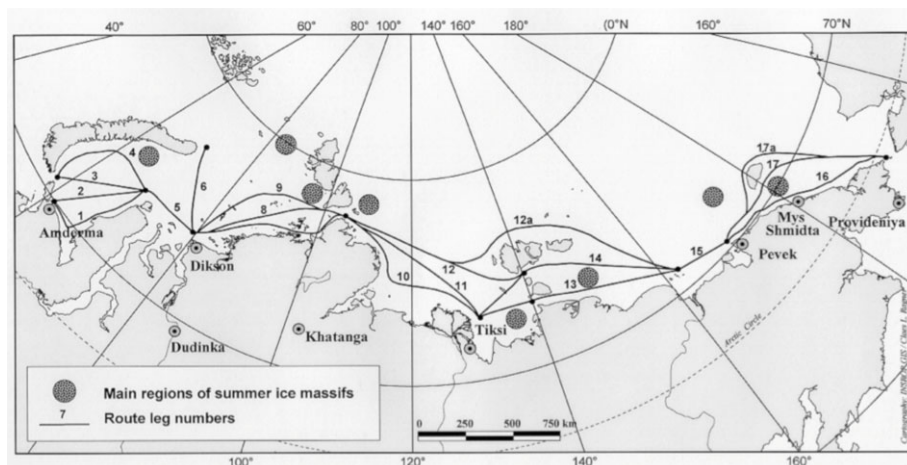
Zemlja and the New Siberian Islands. At times, surface vessels operating in convoys are forced to proceed due north of the large island masses as a result of the accumulation of pack ice in the straits,⁴ which may be clogged with sea ice. Ice conditions are in general more difficult along the eastern extremity of the route than in the west. In the Laptev, East Siberian and south-western Chukchi seas five *ice massifs* – large areas of close and very close ice – are identified (see Figure 1.3 and Chapter 4). These massifs often block the entrances to important navigational straits along the route, among them the Long Strait and Vilkitskii Strait. Although, some of these ice massifs are relatively stable, on rare occasions they disappear at the end of the melt season, but reoccur again in winter.⁵ The eastern sector is also the part of the route with the most shallow shelf areas. The East Siberian Sea has an average depth of 58 meters and the Chukchi Sea of 88 meters. The shallowness of the shelf is the most pronounced in the straits, with minimum depths of 8 meters (see Figure 1.6 and Chapter 5).⁶ This affects the size, volume and draft of ships (see Chapter 5).

The ocean areas west of the Yamal Peninsula are fortunate in having a slightly deeper shelf and lighter ice conditions in average than the eastern sector. This is partly due to the circumstance that the Kara Sea is to the north surrounded by several archipelagos which usually prevent heavy multiyear ice from the Central Arctic Ocean from penetrating into these waters. Multiyear ice, which is extremely hard and consequently a serious obstacle to navigation (see below), has survived the summer melt season and is typically 1–5 meters thick.⁷ The eastern sector lacks this kind of land protection and is more open to the influx of multiyear ice from the Central Arctic Basin. However, even in the east, ice conditions

are changing due to global warming. Here, new extreme minima of summer ice extent have been established repeatedly ever since 1979.⁸ In six of the last nine years, the Chukchi Sea was ice free with periods extending from 1 week to as much as 2.5 months. In contrast, there was always ice over the Chukchi Sea shelf in all of the previous 20 years (1979–98).⁹ In 2010, the Norilsk-Nickel operated vessel “Monchegorsk” became the first cargo ship to sail the entire NSR without icebreaker assistance.

In light of global warming the question has been raised whether we are “approaching a break even point when the extra investment cost on ice capability of the merchant ship is more cost effective than providing an icebreaker escort.”¹⁰ This is a valid question, but still debatable, not least for the NWP and TPP, and even for certain portions of the NSR (see discussion on the *concept of ice free* below).

In cases where the convoys along the NSR enter the high sea, prominent Soviet ocean law experts claim that the navigation lanes used are national and under full Russian control and jurisdiction: “The integral nature of the Northern Sea Route as a transport route is not affected by the fact that individual portions of it, at one time or another, may pass outside the aforesaid boundaries (i.e. boundaries of internal waters, territorial waters and economic zone) where the USSR exercises its sovereign rights or sovereignty in full (i.e. it may pass into the high seas)”.¹¹ Thus, as long as part of the voyage includes waters under Russian jurisdiction, the Russian Federation has, according to this reasoning, the right to define the NSR to include sea lanes running beyond its own economic zone in high latitudes, even close to the North Pole. In principle, this implies that all conceivable lanes south of the North Pole, and even across the Pole itself, might be part of the NSR as long as the voyage passes through North Russian coastal waters. In line with this reasoning, Russian scientists



Source: INSROP Working Paper no.108 , 1998

Figure 1.3 The ice massifs along the NSR.



Source: <http://www.arctic-search.com>

Figure 1.4 The NSR defined as part of Russian coastal waters and the High Seas

employed by the Federation claim that, “Voyages along the NSR are carried out along coastal, marine, high-latitudinal and near-pole routes. Coastal routes are the most traditional”..., whereas “the fourth route, which is 700 miles shorter than the coastal route, passes the large circle across the geographical North Pole” (Figure 1.4).¹² In this interpretation, the NSR overlaps with the TPP, covering huge expanses of the high seas that, according to the *UN Convention of the Law of the Sea of 1982* (UNCLOS), is open to all nations and where ships are subject to flag state jurisdiction only (see Chapter 6).

The NSR is part of an interconnected rectangular transportation system for the Russian north. The legs of the rectangle consist of, in addition to the passage itself, the big Siberian rivers and the east–west running railways in the south connecting with the rivers thousands of miles from the coast. Ocean-going vessels sail from the port of Igarka, which is 670 km south of the estuary of Yenisei, to Yakutsk which is 1160 km south of Igarka. The rivers Ob, Yenisei, Lena and Kolyma are navigable to the Trans-Siberian railway which is 2270 km south of Siberian coast. The river Lena connects with the Baikal-Amur railway.¹³ As has been stated, “The NSR and the river system is the primary mode of transportation in this remote part of the world apart from airborne transportation. Nearly all human activity in the Russian Arctic is in some way dependent on the NSR.”¹⁴ In this perspective and interpretation the NSR extends northward and southward from the coast, servicing huge ocean and land territories, covering thousands of kilometers from the North Pole to the railways of the south.

Unofficial functional definitions of the NSR

The official Russian definition operates with fixed geographical endpoints in the east–west direction: the Bering Strait in the east and the Novaya Zemlya in the west. Also functional definitions have geographical endpoints, but there are requirements as to what should characterize these ends. A sea route, in the functional tradition, is a trading link between towns and cities – between ports with loading, service and reception facilities, transport networks, sizeable populations, etc. Neither the Bering Strait nor Novaya Zemlja meet any of these criteria. These are desolate, environmentally hostile places with no needs, abilities or capabilities to take part in trading – not even small-scale trading. On this backdrop, it has been argued that the NSR should be defined functionally as connecting sizable ports on the Pacific side of the Russian far east with those in the European part of Russia, for instance Murmansk.¹⁵ As a secluded part of the NEP, the NSR has no meaning in large-scale trading other than securing Russia gateway control over the main part of the NEP. As has been pointed out: “If Vladivostok is the functional Russian eastern end point of the NSR, then the neighboring countries of Japan, North Korea, South Korea and China can easily become functional end points as well.”¹⁶

This functional reasoning has aptly been summarized: “In compliance with the definition of the term ‘Arctic’, adopted by the Russian marine fleet, the ports of Murmansk, Kandalaksha, Naryan-Mar, as well as the ports of the Far East, south of the Bering Strait, are not related to the Arctic, but of course this cannot lessen their role in the Arctic transport supply. The ports of the Barents and White Seas also play a significant role in the economic



Source: Barents Interactive Geography Viewer, www.metainfo.se/gitbarents/barents.html

Figure 1.5 The Barents region.

linkages between Russia and West Europe.”¹⁷ The same authors take full cognisance of this point by discussing the role of the Barents Euro-Arctic Region (BEAR), which lies west of Novaya Zemlya in the *economic development of the regions along the NSR* (Figure 1.5).¹⁸ In line with this analysis, it is interesting to note that Russian researchers use maps depicting the four principal transit routes of the NSR – the coastal, marine, high-litudinal and near-pole routes – as starting out in Murmansk going through the Bering Strait to ports in the North Pacific (see Figure 1.4).¹⁹ Given the fact that the BEAR, comprising the 11 northernmost counties of Russia, Norway, Sweden and Finland, host a Working Group for the NSR, the southernmost boundary of the route can be claimed to coincide with the Norwegian BEAR county of Nordland on the Atlantic.²⁰ In functional terms, the NSR stretches from the ice free portions of the North Pacific to Norway’s Nordland County on the Atlantic. In this definition it is more appropriate and even accurate to use the term ‘the Northeast Passage’ rather than the geographically confined term of the ‘Northern Sea Route’. To make the confusion complete, Russian researchers recently claimed that the Council of People’s Commissars of the USSR “ ... named the Northeast Passage the ‘Northern Sea Route’ ... to make the NSR a functioning, practicable shipping route from the White Sea to the Bering Strait.”²¹ Here the NSR is made the same as the NEP, placing the White Sea, which is west of Novaya Zemlja, the endpoint of both the NSR and the NEP.

The definition and legal sensitivity of the Northeast Passage

The Northeast Passage complies with different versions of the functional definition of the Northern Sea Route as long as this corridor connects the Atlantic and Pacific Oceans in a continuous stretch. A minimum definition of the NEP is that it is made up of all the marginal seas of the Eurasian Arctic, i.e., the Chukchi, the East Siberian, the Laptev, the Kara and the Barents Seas. As such, the NSR makes up approximately 90 percent of the NEP.

Formally, Russia opened the NSR to international shipping on 1 July 1991 on the premise that the users would comply with coastal state regulations. Since the archipelagos of the NSR are legislated to become internal waters, Russia claims the same sovereignty over these parts of the route as over her land territory (see Chapter 6). This stand provides Russian authorities with an unlimited regulatory power which is challenged by both the United States and the European Union (EU) (see Chapters 2 and 6). Their position is that the NSR is an *international strait* open to international shipping on the condition of transit passage as defined in *Law of the Sea Convention of 1982* (UNCLOS).²² If, as indicated in the official definition of the NSR, Russia extends her jurisdiction also to the high seas of the Arctic Ocean, diplomatic protests will be heard from Washington, Brussels and capitals of smaller states (see Chapter 2). In the spirit of UNCLOS, the high-litudinal and near-polar routes claimed to be part of the NSR regime may be interpreted as “creeping jurisdiction” and a blatant violation of the High Seas regime (see Chapter 6).

1.1.2 Intra-Arctic, destination-Arctic and transit routes of the Northern Sea Route

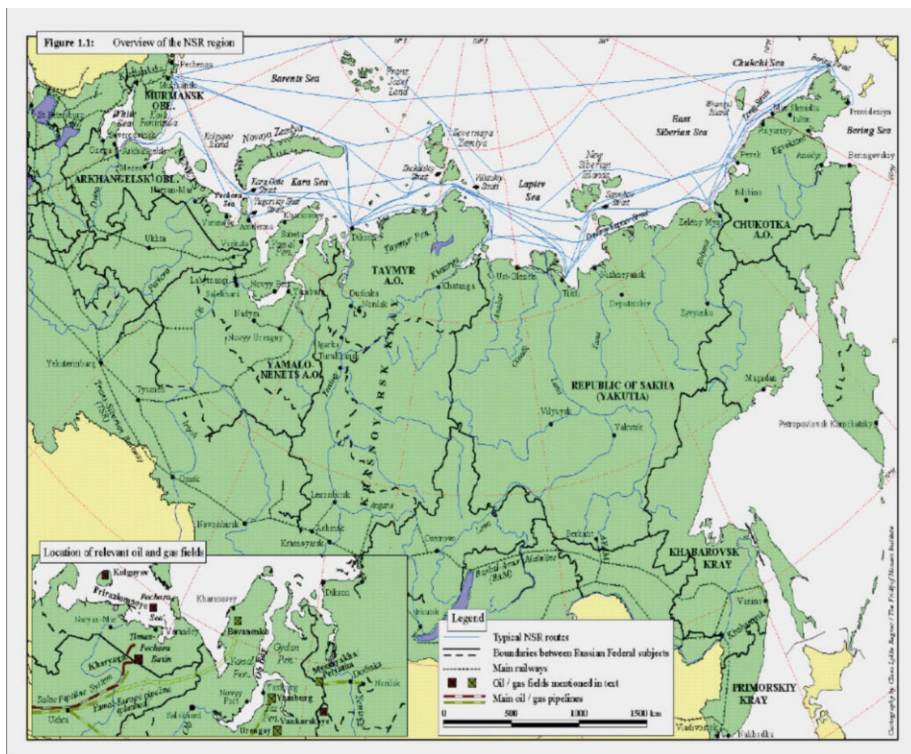
Immediately following the 1917 October revolution, the Soviet authorities authorized hydrographical surveys, primarily in the Kara Sea, for the purpose of improving navigation there. Geographical observatories were constructed on Novaya Zemlja, Franz Josef Land, Severnaya Zemlja and the New Siberian Islands. In 1930, plans for developing naviga-

tion possibilities in the Kara Sea were expanded drastically, and the entire NEP was to be opened to transport and transit sailings.²³ To attain this goal, research was stepped up. By 1937, Glavsevmorput – the Directorate of the Northern Sea Route, formally established in 1932 – had spent an equivalent of 1 billion US dollars on activities north of 60 degrees N latitude and had some 40,000 persons on its pay role.²⁴ From 1937 until 1956, the Soviet Union equipped scientific expeditions to a total of 524 different destinations in the Arctic. These research efforts did not pass unnoticed abroad. During the 1960s and 1970s it was conventional wisdom in western research circles that the Soviet “knowledge of the region (was) much more extensive than that of the sum of the other nations bordering the basin.”²⁵

After World War II, Soviet research efforts were followed up by an ambitious program for constructing a large fleet of powerful icebreakers. At its peak in the 1980s, this fleet counted 38 vessels operating along the route and southward on the big Siberian rivers. Six of these icebreakers were nuclear powered of which the biggest exerted 75 000 horsepower. In addition, a fleet of close to 700 ice-strengthen vessels was built to operate along the route on a year-round basis.²⁶ These efforts notwithstanding, on occasions convoys of ships had to overwinter in the NSR before they were freed by icebreakers in late spring the following year. Accidents happened and freighters were damaged and lost. According to Russian sources, in the period 1954–1990 the total number of ice damage to ships traversing the NSR averaged 800, i.e., 22 a year. The accidents were distributed as follows: the Kara Sea 49% (here the intensity of navigation is the highest, see below); the Laptev Sea 20%; the East Siberian Sea 2%; the Chukchi Sea 14% (here the density of ships is the lowest and ice conditions the worst).²⁷ Many ships’ captains experienced the truth that “... being at sea is risky, being at sea in ice is twice as risky, and being at sea in a convoy with an icebreaker present is three times the risk.”²⁸ In the period 1945–70, the sailing season of the eastern part of the NSR was restricted to about three months, whereas ice conditions in the western part allowed for an extended sailing season of up to 4.5 months.

The NSR never got its intended significance as a transit route between the two world oceans. Transit traffic reached its maximum cargo volume in 1993 with 208,600 tons brought in by 30 voyages of multipurpose ships of the Norilsk type (SA-15).²⁹ Mostly, the NSR served regional developmental purposes. In the 1980s, more than 400 Soviet ships were active in cargo shipments supporting several destinations at the estuaries of the great rivers of Siberia. Raw materials were transport out of the region and necessities of life were brought in. In addition, some 100 scientific, commercial and military outposts were supplied this way. The areas attracting intra-Arctic and destination-Arctic shipping on a regular and long-lasting basis were, and still are the Barents Sea, Dickson, Cape Chelyuskin, Tiksi, Kolyma river, Pevek, Cape Schmidt and the Bering Strait (see [Figure 1.6](#)).³⁰ Cargo shipping along the route to these ports increased steadily for some years. In 1987, it peaked at 6.58 million tons – the heyday of Soviet Arctic marine traffic in the Arctic.³¹ Since then, and in particular following the dissolution of the Soviet Union in 1991, there has been a steep drop in the volume of cargo. In 1998, it dropped to an all-time minimum of 1.5 million tons, increasing to 2.13 million tons in 2007, which equals the volume transported in the late 1960s. Current indications are that this negative trend may continue for the immediate future.³² But there are exceptions to the rule for certain sections of the NSR.

Since 1978 and up to the present, the Russian icebreaker fleet has succeeded in keeping the stretch from Murmansk to Dudinka on the banks of the Yenisei River (231 nautical



Source: Ragner FNI Report 13/2000b

Figure 1.6 Ports along the NSR.

miles from the river's mouth) open for sailings 12 months a year. This means that more than 1000 nautical miles, or some 10 percent of the NEP between Murmansk and the Bering Strait, is now kept open for shipping all year round. This stretch is what throughout history has been labelled the *Kara Sea Route*. The driving force behind this achievement was the prospect of increased revenues stemming from year-round shipments of nickel from Igarka. In 1980 this transportation provided revenues. The nickel industry then got an extra income of 71 million roubles, whereas the extra costs of the shipping activity amounted to 23 million roubles.³³

In January 1988, the Ministry of the Fleet was instructed to run the NSR on a commercial basis, signalling that the state subsidies for the route would stop and the management of the route should be secured by the income it generated. Today, modern ice strengthened oil and gas tankers ply the Kara Sea Route along with the nickel industry. A clearly identifiable intra-Arctic route has been established across the politically defined geographical divide between the NSR and the NEP. In 2006, regional transportation of hydrocarbons within the Barents and White Seas alone amounted to 8.5 million tons,³⁴ which is four times more

than the volume of cargo transported through the rest of the NEP/NSR. Profitability is one decisive key to increasing shipping. History provides a source of evidence. The most massive, sustained activity in terms of Arctic shipping was that of whaling. Between 1610 and 1915, just over 39,000 voyages were undertaken to the Arctic in pursuit of the bowhead whales. This activity took place in ice infested waters in four main areas: the Svalbard/Greenland Sea areas, Davis Strait and Baffin Bay, Hudson Bay and the Bering, Chukchi and Beaufort Seas.³⁵ The prospects of profit will be the driving force in the future as well.

Russian authorities are planning to expand the volume of cargo transported along the NSR to between 7.8 and 11.4 million tonnes in 2015.³⁶ Of this total, oil products are expected to make up 4.6–5.9 million tons, i.e., close to 60% of the total cargo flow.³⁷ Independent research estimates indicate an increase in transit cargo by 2020 of about 5–6 million tons per year in the eastern direction and 2–3 million tons in the western direction.³⁸ The dominant shipping activity is and will be destination-Arctic in character, involving among others indigenous communities.

Within the northern territorial frontiers of the Russian north there are 26 different indigenous groups or nationalities. All together, they number close to 180,000 individuals. The effects of increased shipping on Arctic communities – coastal as well as inland – are assumed to be many, positive as well as negative.³⁹ If, however, due consideration to indigenous livelihood, culture and social life is not an integral part of the economic planning process, these peoples may be victimized by the increasing developmental pressure exerted on the region from the south.⁴⁰

The problem relating to the Arctic transportation corridors in general is that there “... is insufficient information to identify with any precision the likely effects of marine shipping for most Arctic coastal communities. No current database exists for indigenous use in local Arctic waterways that could be used to develop multiple use management measures and potential mitigation strategies.”⁴¹ Until such a database is established, the interests of indigenous peoples find protection only in various documents of Human Rights, among them the *ILO Convention Document no. 169*, and in soft law institutions like the Arctic Council (see Chapter 6). The protection offered by these instruments is totally dependent on the ability and willingness of the Executive to put their spirit and letter into practice. In this respect, Soviet history is no source of encouragement.⁴² As such, the NSR is a “one state and multiple nation route”, whereas the NEP is a “two state and multiple nation route”. All voices claim a role in development planning.

In the Barents Sea there are two shipping routes between the Norwegian archipelago of Svalbard, which has no native population of its own, and cities on the Russian and Norwegian mainland. Cargo ships from Murmansk supply the Russian community of Barentsburg in Spitsbergen and bring coal back to the city of Murmansk, whereas Norwegian ships do the same between Longyearbyen in Spitsbergen and the city of Tromsø in north Norway. These routes have been in operation in the summer season ever since the early 1900s. In recent years, the Norwegian route has been operated on a commercially-viable basis. In addition, a rapidly increasing number of cruise ships call on different locations in the archipelago during the summer (see Chapter 3).

Huge areas of the Arctic currently have inadequate infrastructure to support marine shipping. This includes such infrastructure components as availability of ports and port facilities needed for different types of vessels operating in Arctic waters, the accuracy and

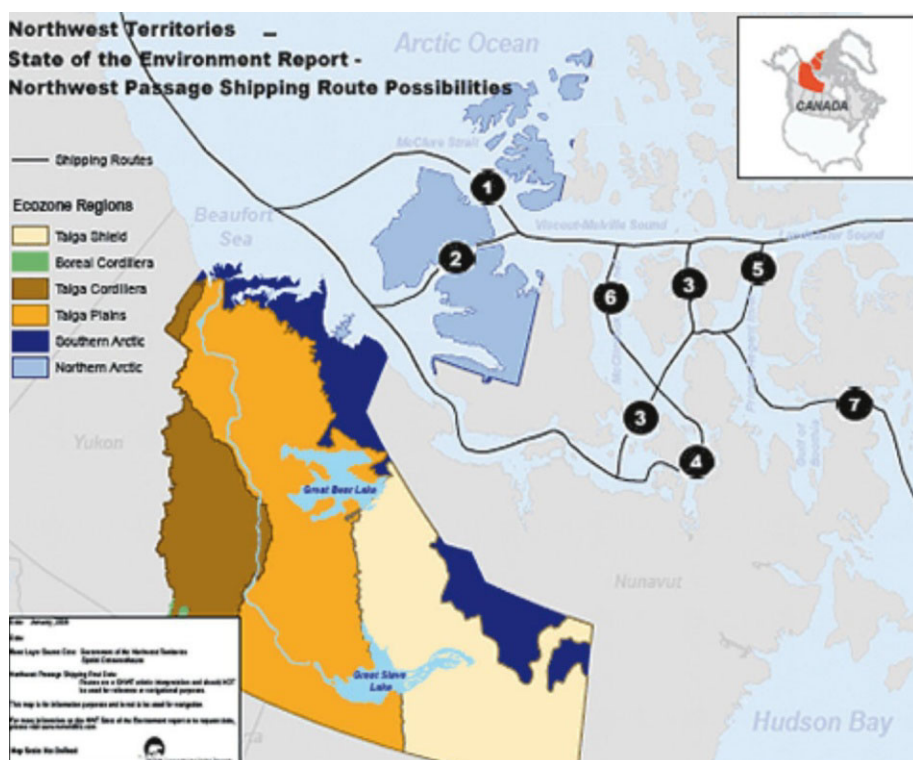
availability of information needed for safe navigation, and availability of search and rescue assets.

Along the NSR/NEP there are several ports and port points. Even if there is adequate access to icebreaker assistance, only very few of the ports have the essential facilities such as adequate water depth, berths and mechanizations needed for increased shipping. Adequate marine communication systems exist in some parts of the NSR but not in others. Communications using VHF-radio, MF- and HF-systems and satellite are generally adequate for the lower parts of the NSR, but data transmission becomes problematic when the High Arctic is reached. Russia has currently several on-going projects developing systems to meet the demand of better communications for ships operating along the NSR. Several search and rescue centers are located along the NSR, but only a few can give the support needed for ships sailing along the route. Russia has made structural plans for implementation of search and rescue technology along the NSR up to 2020, but needs great financial support to complete the plans (see Chapter 5).

1.1.3 The Northwest Passage

The Northwest Passage is the name given to a set of marine routes between the Atlantic and Pacific Ocean, spanning the straits and sounds of the Canadian Archipelago, the Davis Strait and Baffin Bay in the east and the Beaufort Sea in the west. Like the NSR, it is a transportation corridor channelled through islands occupying broad expanses of water and land in the north–south direction. The base of the archipelago stretches some 3000 km along the mainland coast, covering about 80 degrees of ocean and land territories.⁴³ The tip of Ellesmere Island is less than 900 km from the geographic North Pole. The archipelago is one of the largest in the world and consists of a labyrinth of islands and headlands of various sizes and shapes. There are 73 major islands of more than 50 sq. miles in area, and some 18,114 smaller ones.⁴⁴ If islets and rocks are included, the archipelago comprises approximately 36,000 pieces of dry land above sea level, making it one of the most complex geographies on Earth.⁴⁵

The Canadian Archipelago is divided into two main parts by the Parry Channel: the northern part consists of the Queen Elizabeth Islands, whereas the southern part comprises all islands located north of the Canadian mainland and south of the Parry Channel. Thus, the most troublesome part of the NWP, as seen from a mariner's point of view, runs through a continuous archipelago with narrow straits often jammed with impenetrable multiyear sea ice drifting in from the Central Arctic Ocean. The NWP consists of seven different routes, of which six run through the southern part of the archipelago (see [Figure 1.7a](#)).⁴⁶ Every route starts out in the eastern part of the Parry Channel heading westward, until six of them break off at different points along the channel and take a southerly direction to reach the coastal waters of the mainland before making a turn westwards towards the Beaufort Sea. The seventh route employs the Parry Channel in its entirety until it reaches the Beaufort Sea through the often ice clogged M'Clure Strait between Melville and Banks Islands. Of the six southerly routes, the most navigable to be employed by international shipping comprises the Parry Channel until it takes a southerly direction and goes through the Prince of Wales Strait between Banks and Victoria Islands, and then west again along the north coast of the Canadian mainland and Alaska to the Bering Strait (see [Figure 1.7](#)).⁴⁷ Like the NEP,



Source: Stuart et al. (2005), from http://www.enr.gov.nt.ca/_live/pages/wpPages/soe_human_activities.aspx

Figure 1.7 Seven possible routes through the NWP.

there is no single set channel for ships to follow. The channel used is based on which one offers the best sea ice conditions at any one time and place. Thus, the NWP, like the NEP/NSR, is a transportation corridor through one massive archipelago until it reaches open, but ice infested waters in the Baffin Bay (east) and Beaufort Sea (west). From Baffin Island (east side) to Banks Island (west side) it covers a distance of about 2400 kilometers, and the size of this whole archipelago is approximately 2.1 million sq. kilometers, i.e., about the size of Greenland.⁴⁸

Sea ice condition within the archipelago varies dramatically from year to year, presenting unpredictability to any surface operation. There is mounting evidence that sea ice reduction will continue, although there is great uncertainty over the rate at which sea ice will continue to diminish. In the summers of 2007 and 2008 most of the archipelago was so-called ice free, promising to open the NWP to high volumes of intercontinental commercial shipping. This warrants a comment on the concept of *ice free*.

Most Arctic shipping experts view this term as meaning ice infested with icebergs, bergybits and growlers present, even in the summer period. In fact, some believe shipping



Source: blogs.chron.com/sciguy/archives/2009/08/

Figure 1.8 The sailing lanes of the NWP.

operations in this environment can be even more dangerous than in ice covered areas. From a mariner's point of view it has been assumed that "... with less ice, more icebreaking capacity will be needed".⁴⁹ The reasoning goes as follows: "Initially, as first-year ice weakens and/or disappears, its ability to keep multiyear ice out of shipping areas will be adversely affected. This will mean that, even if there is less ice overall, it will be much harder, pose more of a damage risk and be more difficult to break the passage through. I have rammed multiyear ice with a heavy icebreaker, stopped and when the icebreaker was reversed, was not able to see any evidence of the impact of ice. The same lack of first-year ice will also allow for much more freedom of movement of the multiyear ice pack which will then likely compact in chokepoints, thereby compounding the problem. In the future then, as the climate changes, we can look forward to standard ice deviations in coverage, thickness and movement that will continue to increase dramatically, giving shipping some of the best "ice" years yet, but potentially some of the worst as well."⁵⁰ Ice free does not necessarily mean problem-free or, for that matter, preclude icebreaker assistance.

The inter-annual variability in sea ice conditions within the Canadian Archipelago will continue to be extreme. According to the Canadian Ice Service, "It is quite likely that the latter half of this century will still experience occasional summers with ice conditions as severe as those witnessed in the 1980s. Multiyear ice, particularly in low concentrations, will present the major hazard to shipping ... Since the oldest and thickest ice in the Arctic Ocean is that which is driven against the western flank of the Canadian Archipelago, this will likely be the last multiyear ice to remain. As long as this remains a source of multiyear ice in the Arctic Ocean, it will continue to drift through the Canadian Archipelago."⁵¹

M'Clure Strait between Melville and Banks Island is one of the straits that have a fairly long history of being blocked with multiyear ice drifting in from the Central Arctic Ocean. In addition come shallow waters and draft restrictions, narrow straits acting like chock points, and the combination of the two making navigation a regular and punctual activity hard to achieve. In the AMSA study the conclusion is clear: "Even during the most recent periods of reduced ice, the location of the ice, its thickness from year to year and the variability of ice-free areas makes it nearly impossible to schedule transits with any degree of certainty of reaching the desired port on schedule."⁵² Model experiments suggest that the maritime accessibility of Type A vessels, which are capable of limited icebreaking, to the NWP will at baseline increase from 63% (2014) to 82% by mid-century (2045–2059) in the period July to September, whereas the NSR and TPP will be fully accessible.⁵³

In 1969, the ice strengthened American supertanker *Manhattan* transited the Canadian Archipelago from the east coast of the USA to Prudhoe Bay in Alaska. The next year it returned the same way. The purpose was to prove that supertankers are capable of transporting petroleum through ice-covered waters. The two voyages were completed as planned and, in that respect, they were deemed successful. But *Manhattan* also encountered challenges, unleashing a heated debate in several countries on what the environmental consequences would be if the NWP became an object of large-scale regular shipping activities – if oil leaked into ice infested fragile waters. During the first voyage, *Manhattan* was accompanied by the Canadian icebreaker *Macdonald* which at one point registered an unexpected "shoal" in the vicinity of the sailing route. One year later, the Canadian research vessel *Hudson* proved with the help of side-scanning sonars that the "shoal" was a seabed pingo. A pingo is old ice shaped like a cone extending like a knife from the seabed upwards towards the surface of the ocean. At the base, the biggest measure more than 300 meters, and may rise more than 60 meters above the seabed. The assumption is that seabed pingoes, which are often covered and strengthened with frozen clay and mud, are relics from the time when the seabed was above sea level. The Hudson expedition registered over 100 pingoes scattered around the continental shelf of the Beaufort Sea and within the shallow channels of the Canadian Archipelago.⁵⁴ At the time, it was not known how many pingoes the NWP hosted, but the number was assumed to be significant.

Seabed pingoes undoubtedly represent a danger to ships with deep drafts. If a ship collides with a pingo the hull may be ripped open and an environmental catastrophe could result. An example: *Manhattan* had a draft of 56 feet whereas the peaks of the pingo often are no more than 40 feet beneath the surface of the ocean. The semi-official journal, *Canada Today*, claimed in 1974 that: "The discovery meant that the long-sought passage around the top of North America was at the time a dead end for super tankers and that the *Manhattan*, which had pioneered the route less than a year before, could be the last as well as the first to make the run ... One tanker ripped open by a pingo ... could disrupt the fragile ecological balance of much of the Arctic."⁵⁵ Even if all pingoes are registered and mapped so that ships can steer away from the danger areas, the risk of collisions is not eliminated. The strength, thickness and drift direction of the surface sea ice will impact the freedom of navigation and decide what route to choose. Despite *Manhattan* being a "giant" for its time with a displacement of 115,000 dwt. and exercising 43,000 horsepower, it got stuck in the ice no less than 25 times during her first trip through the NWP. For *Manhattan* to get free from the ice she needed icebreaker assistance multiple times. In the meantime, *Manhattan*

could have drifted helplessly over pingo areas without being able to avoid collisions. On her return voyage, the sea ice of Lancaster Sound knocked out a huge panel from *Manhattan*'s hull, spilling 15,000 barrels of ballast water.⁵⁶ Thus, to avoid areas of pingoes, pilots and sea captains may be forced to choose areas of heavy sea ice. The combination of ice on surface and seabed leaves restricted space for maneuvering and safe navigation.⁵⁷

After the startling discovery of seabed pingoes in the early 1970s, the impression was that the Canadian government would take action to map them and eventually destroy them where needed. If this was ever done is not known to these authors; however, we note that pingoes as a navigational challenge have vanished from recent literature on the NWP, and also from the AMSA report. Actually, during our fact-finding trip to Ottawa in October 2010 (for this book), we were surprised to find that when we posed the question of pingoes, Canadian bureaucrats seemingly did not know what we were talking about. This can be explained either as an indication that the problem had been resolved (through mapping and destruction of pingoes) and then was forgotten about, or that the pingoes are still with us without anyone knowing or thinking about it. If the latter is true, someone responsible should readdress the challenge.

In the Beaufort Sea, the NWP passes through the coastal waters of Canada and the United States and in the Davis Strait between Greenland and Canada, and as such is a "three-state and multi-nation route". The indigenous peoples – of which the Inuit population is the biggest – makes up the multination characteristics of the route. They are exposed to the same possible negative and positive effects of increasing shipping as their counterparts along the NEP and NSR (see above and Chapters 4 and 6). But there are important differences between the natives of the two passages. In Greenland the Inuit have enjoyed home rule since 1979 and in Nunavut (meaning "our land") a fair amount of native autonomy was achieved in 1999. This notwithstanding, the indigenous peoples of the two countries do have an image of governance and institutions that differs from that of their former colonizers. As has been stated, "(t)here is a need for more flexibility and a rethinking of the boundaries of Danish-European and Anglo-Canadian legal imaginations that would adopt to Inuit realities and better serve their aspirations to self governance."⁵⁸ The assumption is that with increasing autonomy follows increasing political influence on regional affairs. That may provide the natives of the two countries with a place at the table and a more decisive role in national and international decision making (see Chapter 6).

Canada claims full and unlimited jurisdiction over the archipelagic section of the route which was declared part of Canadian internal waters, effective January 1986. The United States and later the EU have protested against this claim, which they find illegal. According to the US government, the NWP is an *international strait* open to international shipping on the basis of the principle of *transit passage* without any interferences from the coastal state. Thus, when it comes to the legal status of their respective passages, Canada and Russia are faced with the same legal and political opposition (see Chapters 2 and 6). This disagreement surfaced in 1970 when Canada enacted the *Arctic Water Pollution Prevention Act* (AWPPA), establishing a 100 nautical miles environmental zone north of the Archipelago as a precautionary step to prevent ship-based pollution. This was a unilateral reaction on the part of Canada to the roundtrip of the US tanker *Manhattan* through the NWP in 1969–70. At the time of its enactment the Act was not part of accepted international ocean law. Thus, the US government immediately declared the Canadian move a violation of

international law and a threat to the status of the NWP as a strait open to international navigation. Diplomatic notes were exchanged and protests issued in both directions. In the 1980s, the two parties calmed the disagreement and agreed to disagree. However, in 2009 the USA restated her long-term opposition against the Canadian position, indicating that the question of freedom of navigation is high on her political agenda and that national interests are at stake if that freedom is curbed.⁵⁹ The EU Commission has followed suit and supported the US stand on the legal status of the NWP (see Chapter 6).⁶⁰

1.1.4 Intra-Arctic, destination-Arctic and transit routes of the Northwest Passage

Despite attempts to find the NWP during the 19th century, the first transit passage was not achieved until Gjøa negotiated the southern coastal route in 1903–06. *Manhattan* completed the first round trip in 1969–70 and the cruise ship *Lindblad Explorer* made the first revenue-earning voyage in 1984. Between 1903 and 2004 there have been 94 single transit passages by larger ships, 30 round trips and 27 recreational small boat passages (from Atlantic to Pacific waters or vice versa). Thus, counting round trips as two passages, there have been 181 transits during the 101-year period and most of these have been through the southern coastal route. On average, 1.7 transits have been conducted per year in the course of 101 years. These voyages were undertaken by 67 vessels carrying 15 different flags. In the same period, 175 partial transits were recorded through the waters of the archipelago (not going through the whole of the NWP, including the Beaufort Sea).⁶¹ A further brief examination of available data shows that transits of the passage remained a fairly sporadic affair until the 1970s, up to which point only nine complete transits had been made. In terms of flag activity, 63 percent of transits between 1903 and 2004 were Canadian flag, mainly Canadian Coast Guard icebreakers.⁶² The last 34 years have seen the most transit sailings. From 1969 to the end of the 1980s, over 30 complete transits of the passage were undertaken by a variety of vessels. The bulk of these voyages were Canadian, of which most were involved in the search for hydrocarbon resources in the Canadian offshore area of the Beaufort Sea. Between 1984 and 2004, a total of 23 commercial cruise ships and 15 recreational yachts accomplished transits of the NWP. Cruise ships operating in these waters doubled in 2006, from 11 to 22. There were 26 transits in 2010, out of which only three were commercial.⁶³ The AMSA study concludes: “Modern history of Arctic marine transport indicates that despite the historical attempt to make the NWP a viable route between the East and the West, it is unlikely the passage will become the route it was originally intended.”⁶⁴ Thus, destination-Arctic shipping is anticipated to increase incrementally in the years ahead mostly driven by the search for resources, in particular oil and gas.

The Hudson Bay Company started destination-Arctic shipping to the area as early as 1670. In terms of commercial vessel traffic, throughout the 19th century all commercial shipping in the Canadian Arctic was to the account of this company, ending in 1913. Re-supply of commodities has been and still is the most stable element of shipping in the Canadian Arctic. Nearly all the voyages are destination-Arctic coming from the Atlantic to support the sealift of cargo to local communities.

The war years brought marine activity in support of the United States Air Force construction of the airfield of Frobisher Bay, and later the Cold War brought the mid-Canada line (1947) and the DEW line (1954). All these activities required active marine support

with some seasons having as many as 50 vessels on charter. The DEW line shipping activity segued into a combination of defence and community resupply which, with changes to ships, focus and administration, continues today as a community lifeline.

Current shipping demand in the Eastern Arctic involves up to 22 seasonal trips and occurs during the 100-day navigation season that spans from mid-July to the end of October (most communities receive at most two resupply calls a year). Each voyage can include deliveries to 8–9 communities. All cargo is lightered from the anchored resupply ship to a beach landing and delivered at the high water mark. Recently, marine operations averaged 100 voyages by large ships in summer.

Churchill is a prime trading port in the east. In 2004, 14 out of 18 foreign voyages to the Canadian Arctic called at the port of Churchill, shipping wheat and grain to international markets. The first Russian shipment of fertilizer to the port of Churchill, coupled with a perception of an extended sailing season due to global climate change, has renewed planning for establishing an international “Arctic Bridge” between Murmansk and Churchill. In September 1992, the *Arctic Bridge Agreement* was signed between Canada and Russia. The major goods that might become the basis for significant trade between the two regions are bulk commodities, mainly the export of an estimated 315,000 tonnes of mineral products and lumber from Murmansk, and a minimum of 600,000 tonnes of export grain from Churchill.⁶⁵ The Bridge goes through the Barents and Norwegian Seas and proceeds south of Iceland and Greenland before making a northward turn through the Davis Strait to reach Churchill in Hudson Bay (see [Figure 1.9](#)). It will then partly overlap with the transoceanic branch of the NMC (see below). For this bridge to materialize, Churchill will require significant additional port and rail investments, as well as further study by both countries regarding costs, cargos and volumes. The port of Murmansk is in need of similar improvements before this intra-regional traffic scheme – or intra-international route – can be realized. Model experiments suggest, however, that global warming will continue to keep the Bridge fully open for maritime transport throughout the century.⁶⁶ It is the endpoints that need fixing, not the bridge itself.

In the western Canadian Arctic cargo is handled by tugs and barges, with most cargo shipped down the Mackenzie River to Tuktoyaktuk for transfer to ships with deeper ocean drafts. Current shipping demand involves 14–15 seasonal tug-barge trips. These operations take place in what has been labeled the *Mackenzie River route*⁶⁷ – a Canadian intra-Arctic route of some regional significance. The western Arctic sailing season is typically 60 days between mid-July and mid-September. These are some of the more important destination-Arctic shipping locations within the Canadian Arctic: the port of Churchill, the oil field at Cameron Island, the Nanisivik zinc-lead mine in the vicinity of Arctic Bay, Tuktoyaktuk, Cambridge Bay, Resolute, Pond Inlet, Inuvik and Whitehorse. It is anticipated that by 2020, annual resupply demand will require up to 30 ship trips, and destination-Arctic export shipping will probably include Mary River Iron ore, Port at Steensby Inlet, Roche Bay magnetite, Igloolik, Grays Bay and Bathurst Inlet (see [Figure 1.9](#)).⁶⁸

The NWP has essentially no adequate ports with the necessary facilities to support the growing amount of commercial traffic along the northern slope of Alaska and throughout the Canadian Archipelago. Several ports have been proposed and are under development, but it is unclear if these ports will have the necessary facilities to meet the demand of increased shipping along the NWP. Currently there is a lack of adequate communication



Source: AMSA (2009)

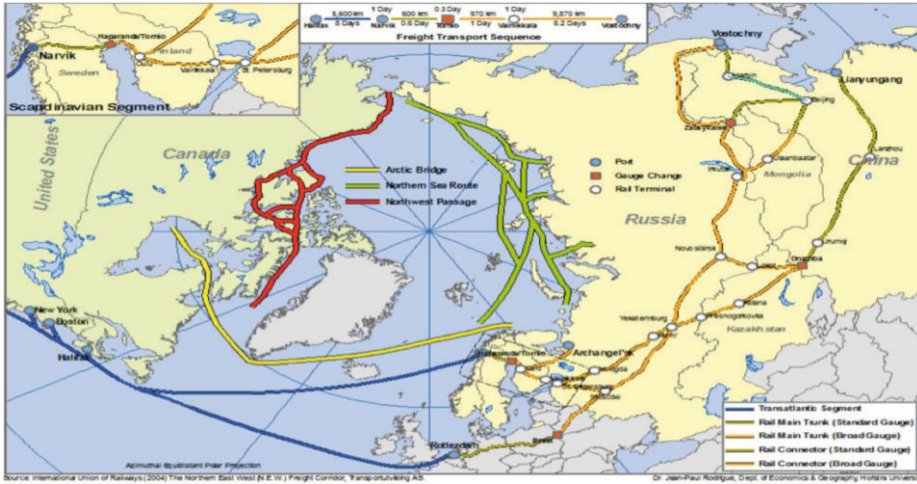
Figure 1.9 Transportation patterns of the NWP.

systems along the route. The United States has made few contributions in the development of adequate communication systems and services, while Canada operates with seasonal systems. The Canadian Coast Guard (CCG) is the primary agency along the NWP relative to rescue, safety and environmental response. Since the CCG icebreakers leave the Arctic at the end of October there is a lack of emergency response along the NWP on a year-round basis. Longer active shipping seasons along the NWP raise a number of service level issues for the governments of Canada and the United States.

The AMSA report makes three important conclusions when it comes to the future economic attraction of the NWP:

1. Despite climate change, the NWP will continue to be controlled by ice conditions at four choke points (see Chapter 4).
2. It may be years before the Canadian Arctic matches the resources extracted when compared with Alaska or the Russian Arctic (see Chapter 3).
3. Other transit routes are more attractive compared with the NWP (see Chapter 7).

A Canadian paper adds a fourth point: "...ice conditions are widely expected to improve more rapidly in Russia's Northern Sea Route than in the Canadian. In a survey of ship-owners' motivations to engage in the Arctic, eight out of 15 businesses favor the Northeast



Source: International Union of Railways. The Northern East West (N.E.W.) Freight Corridor, Transportutvikling AS (2004)

Figure 1.10 Arctic bridges, including the Murmansk-Churchill bridge.

Passage (Northern Sea Route), which has better infrastructures, more local ports to service and more mining and oil and gas operations (than the NWP).⁶⁹ In fact, this is probably one reason why most of the 'pioneer commercial transit'⁷⁰ to date has been through the NEP rather than the NWP. This far, passages of this kind are for the 'adventurously minded'.⁷¹ On these grounds, it seems a reasonable conclusion that the NWP in a short and medium term will not be a serious competitor to the NSR or will open up to high volumes of international commercial shipping.⁷² Most Arctic shipping scenarios indicate an increase in cargo shipped in the years ahead, but the bulk will be destination-Arctic and intra-Arctic and mostly resource driven.

1.1.5 The Transpolar passage

Transpolar routes outside of national jurisdiction in the Arctic Ocean cover all waters that are part of the high seas and where the freedom of navigation applies. This definition includes two sections of water expanses: The first is the Central Arctic Basin which is 4.7 million sq. km in area. Here, coastal states have no jurisdiction at all apart from the flag state jurisdiction they exercise over their own ships and crews. The second section includes all ocean areas beyond the territorial seas of 12 nautical miles and within the outer limits of the 200 nautical miles exclusive economic zones (EEZ). This belt is 188 nautical miles in extension measured outwards from the outer limits of the territorial sea. Here, coastal state rights and obligations mix with the rights and obligations of all other states. In this belt the coastal states have sovereign rights over certain issue areas, among them the exploration and exploitation, conservation and management of natural resources – living and nonliving – on and in the sea bed and in the water column above. The coastal states also exercise

rights to adopt and enforce nondiscriminatory laws and regulations for the prevention, reduction and control of marine pollution from vessels in those areas that are ice covered within the limits of the EEZ. In the ice covered areas of these stretches, Article 234 of UNCLOS provides coastal states with some additional powers to apply pollution regulations. At the same time, Article 87 of the same Convention claims these waters to be part of the High Seas, guaranteeing the freedom of navigation to coastal and landlocked countries alike. Thus, this belt is where coastal state jurisdiction meets with the freedoms of the High Seas and where all parties shall have due regard to the rights and duties of other states and where all are obligated to act in a manner compatible with the spirit and letter of the Convention (see Chapter 6). The biggest chunk of Arctic water is that designated the High Seas, i.e., both the Central Basin and the 188 nautical miles belt of the EEZs. The direct distance across the Central Arctic Ocean from the Bering Strait across the North Pole to the Fram Strait is 2100 nautical miles. All other transit distances within the Arctic Basin are longer. The state of sea ice at any one time will decide if the distance advantage of using the TPP instead of the alternatives will attract the interest of international shipping.

Contrary to popular belief the ice cover of the Central Arctic Ocean is not a static unbroken surface. It is constantly in motion, breaking into pieces, and building up pressure ridges above and below the surface where floes grind together. Because of the cleavage of the sea ice canopy, leads and areas of open water (called polynyas) and thin ice (called skylights) are present all year round. As early as the 1960s (before global warming of the present was recorded) these open water areas constituted from 5 to 8 percent of the total area of the Arctic Ocean during the winter season, and approximately 15 percent during summer.⁷³ By way of example, the open space available to shipping in the Central Arctic Ocean during the summer season was about twice the total size of the Caspian Sea (approx. 700,000 sq. km) and about the size of the Caspian in winter (approx. 235,000–376,000 sq. km).⁷⁴ The distribution and frequency of polynyas and skylights are random, but they appear even in the vicinity of and at the very North Pole throughout the year.⁷⁵ Some of the leads and skylights in the vicinity of the Pole were assessed to be nearly half a mile in diameter.⁷⁶

The sea ice varies in shape, thickness, age and hardness, presenting different challenges to navigation. These are some of the more frequent:⁷⁷

- *New ice*: Recently formed ice composed of ice crystals that are only weakly frozen together (if at all) and have a definite form only while they are afloat.
- *Nilas*: A thin elastic crust of ice (up to 10 cm thick), easily bending on waves and swell and under pressure growing in a pattern of interlocking “fingers” (finger rafting).
- *Young ice*: Sea ice in the transition stage between nilas and first-year ice and 10–30 cm in thickness.
- *First-year ice*: Sea ice of not more than one winter’s growth, developing from young ice having a thickness of 30 cm or more.
- *Old ice/multiyear ice*: Sea ice that has survived at least one summer’s melt. Its topographic features generally are smoother than first-year ice and can be a few meters thick. Old ice is also much harder than first-year ice, and can be much more damaging to ships, if hit at a normal cruise speed.

- *Ice massifs*: Extensive accumulations of close or very close ice that are found in the same region every summer.⁷⁸
- *Drift ice*: Ice that floats on the surface of the water in cold regions, as opposed to *fast ice*, which is attached “fastened” to a shore. Usually drift ice is carried along by winds and sea currents, hence its name, “drift ice”.⁷⁹
- *Pack ice*: When the drift ice is driven together into a large single mass, it is called pack ice. Wind and currents can pile up ice to form ridges 3–4 meters high, creating obstacles difficult for powerful icebreakers to penetrate. Typically, areas of pack ice are identified by high percentage of surface coverage by ice, e.g., 80–100%.⁸⁰
- *Ice floe*: A large piece of drift ice that might range from tens of meters to several kilometers in diameter. Wider chunks of ice are called *ice fields*.⁸¹

Although reliable information about the proportion and distribution of different ice thicknesses is difficult to obtain, a Swedish study dating back to the 1970s estimated the area of the Arctic Ocean covered with ice thinner than 4–5 feet to be 30 percent or more.⁸² Forty years later, global warming has increased the portion of navigable waters in the central part of the Arctic.

Expert opinion is that the present thawing is long-term and that the ice-edge will steadily migrate northward along with a further thinning and weakening of sea ice. Over the last 30 years, sea ice thickness in the Central Arctic Ocean has decreased by 42%, a decrease of 1.3 meters from 3.1 to 1.8 meters,⁸³ with an accompanying reduction of some 73% in the frequency of deep pressure ridges.⁸⁴ As a consequence, the influx of multiyear ice from the Central Arctic Ocean to the coastal areas has decreased by 14 percent from 1978 to 1998. This decrease greatly benefits economic activities in coastal waters (see Chapter 4).

On the basis of these and other scientific observations, model experiments suggest a further decrease in sea ice thickness of some 30%, and an ice volume decrease between 15 and 40% by 2050.⁸⁵ If this trend continues, one postulate is that summertime disappearance of the ice cap is possible in the course of this century and that significant areas of the Arctic Ocean may become permanently free of sea ice in summer.⁸⁶ One of the models simulates an ice free Arctic Ocean in summer by 2050 (see the discussion of the concept of ice free above). This scenario implies that the physical occurrence of multiyear ice can possibly disappear from these waters in the future, further improving the conditions of economic activity in the Central Arctic Basin. The accessibility of Type A vessels (see above) at baseline to the TPP by mid-century (2045–2059) will, according to model experiments, increase to 100% from 64% at present for the period July–September.⁸⁷

This is not to say that the Arctic Ocean will become an ice free ocean in winter. As concluded in the AMSA study: “Even after the first ice-free summer is recorded, there will almost certainly be subsequent years when all of the ice does not melt in summer but survives to become ‘old’ ice the following year. It is ... generally agreed that the Arctic waters will continue to freeze over in winter.”⁸⁸ Russian scientists go one step further, maintaining that the likelihood of an ice free Arctic Ocean in the future is small even if the air temperature continues to increase. Their doubt is founded on the argument that the sustainability of the composition and functioning of the structure of the upper layers of the Arctic Ocean will control and reduce the melting process.⁸⁹ Let us illustrate the point: In

mid-September 2007, the Arctic Ocean reached its absolute sea ice minimum so far covering only 4.1 million square km. One year later – in September 2008 – the extent of sea ice was about 1 million square km bigger than at the same time the year before, covering 5.2 million square kilometers.⁹⁰ In March 2008 the ice extent rebounded rapidly to a winter maximum that was actually higher than in the previous four years. On these grounds, sea ice experts expect strong natural variability events in the future, causing both decreases and increases of the Arctic sea ice cover on seasonal and decadal time scales.⁹¹ Thus, different sources assume sea ice to be a lasting characteristic of the Arctic Ocean, although still very different from the conditions 30 years back.

As already discussed, ever since 1978 the sea ice extent has been declining. This trend is most pronounced at the end of September, but all months show a declining trend. However, the retreat introduces the dangerous *polar lows* to new areas of the Arctic Ocean. Polar lows are high latitude, maritime small-scale cyclones caused by cold air interacting with relatively warm open oceans. These cyclones, which are difficult to forecast, appear suddenly and unexpectedly, and are often associated with strong surface winds and heavy snowfall. They usually originate north of 70 degree N and practically all move in a southward direction. Polar lows are not only found in ice covered areas as they also appear in southern waters, such as near Japan.⁹² Recent studies suggest, however, that the likelihood of polar lows occurring in open waters for various reasons will decrease over time, whereas “... the retreat of sea ice will expose large new ocean regions to the atmosphere. In these regions, where *polar lows* and related weather have been non-existent so far (because *polar lows* need energy from the oceans), *polar lows* will make their first appearances in the future. These are the same regions that have been proposed as tomorrow’s shipping lanes and oil/gas exploration areas.”⁹³ In this respect, improvement in one operational condition for ships – retreat of sea ice – is counteracted by the introduction of a new challenge – polar lows. Among the passages, the TPP will be the least affected by the newcomer, which gradually will become more characteristic of Arctic operational conditions (see Introduction).

Transpolar routes can serve both intra-Arctic, destination-Arctic and transit purposes. The two former imply that vessels can use international waters for parts of their voyage, entering the NEP and NWP from the north to unload their cargo. On such occasions, Transpolar routes become affected by the controversial legal regimes of the NSR and NWP. For transit voyages between the Pacific and Atlantic oceans, this can be avoided by using the high sea sections of the Arctic Ocean, accessing or exiting through the Fram and Bering Straits (see Chapter 2).

1.1.6 Intra-Arctic, destination-Arctic and transit routes in the High Seas of the Arctic Ocean

The first surface ship ever to reach the North Pole was the Soviet nuclear icebreaker *Arktika* on 17 August 1977. *Arktika* departed from Murmansk on 9 August and sailed eastbound through the Vilkitskii Strait to the ice-edge of the Laptev Sea, then turned northward and sailed along longitude 125 degrees East, reaching the North Pole eight days later. The ship arrived back in Murmansk on 23 August after having sailed 3852 nautical miles in 14 days with an average speed of 11.5 knots. Parts of the voyage took place in heavy ice. This trip unleashed several more voyages from several other countries. Between 1977 and 2008,

ship access to the North Pole in summer has been attained in all regions of the Arctic Basin. Data show that 77 voyages have been made to the geographic North Pole by icebreakers from Russia (65), Sweden (5), USA (3), Germany (2), Canada (1) and Norway (1). Of all the visits, 85% have been undertaken by Soviet/Russian icebreakers. Nineteen of these trips were in support of scientific exploration and the remaining 58 were for the entertainment of tourists. Eight icebreakers reached the Pole in summer 2004, and during the four consecutive summer seasons, 33 ships reached the North Pole mainly for tourist and scientific purposes. Of the 76 icebreaker trips that have been to the Pole in summer, the earliest date of arrival has been 2 July 2007 and the latest 12 September 2005. This indicates that the navigation season has been restricted to about 10 weeks for highly capable icebreaking ships. The only voyage of the 77 not conducted in summer was that of the Soviet nuclear icebreaker *Sibir*, which supported scientific operations during the period from 8 May to 19 June 1987, reaching the North Pole on 25 May.⁹⁴ As has been stated, “*Sibir* navigated in near-maximum thickness of Arctic sea ice while removing the personnel from Soviet North Pole Drift Station 27 and establishing a new scientific drift station (number 29) in the northern Laptev Sea. This trip is the most demanding icebreaker operation to date.”⁹⁵

Eleven of the 77 voyages were conducted by diesel powered icebreakers, the rest had nuclear propulsion.⁹⁶ The fact that conventionally-powered icebreakers have conducted successful operations to high latitudes in all regions of the Central Arctic Ocean implies that such voyages are not entirely dependent on nuclear propulsion (see Chapters 4 and 5). New icebreaking technology may enhance the capabilities of diesel-powered ships to operate in the waters around the North Pole.

No commercial ship has ever conducted a voyage across the Central Arctic Ocean. The seven transArctic voyages – all taking place in summer – have been conducted by icebreakers, nuclear- as well as diesel-powered. The first transect of the Arctic Ocean was undertaken by the Canadian icebreaker *Louis S. St-Laurent* and the *Polar Sea* of the United States in July–August 2004.⁹⁷ Both ships started their voyage from the Bering Strait and sailed northward to the North Pole and exited through the Fram Strait between Greenland and Svalbard (see Chapter 2). One year later, the Swedish icebreaker *Oden* and the American icebreaker *Healy* also made a successful transArctic passage (see [Figure 1.1](#)).⁹⁸ It is easy to subscribe to the preliminary AMSA study conclusion: “One of the historic polar achievements of the 20th and early 21th centuries has been the successful operation of icebreakers at the North Pole and across the Central Arctic Ocean.”⁹⁹

The capabilities demonstrated by these voyages are interesting in light of the thinning and diminishing of sea ice in the Central Arctic Ocean. This combination invites for “... an extraordinary future with implications for ice navigation and Arctic ship constructions”.¹⁰⁰ At the same time, one should bear in mind that there will always be an ice covered Arctic Ocean in winter, but the ice will be thinner and contain a smaller fraction of multiyear ice (see Chapter 4).¹⁰¹ In other words: sea ice conditions are changing in all sections of the Arctic Ocean on a year round basis, if not in all respects improving (see above). In light of inter-seasonal sea ice variability, there is still a need for vessels with modern icebreaking capabilities to operate effectively for commercial or other purposes in all regions of the Arctic Ocean. But the dwindling sea ice cover has given some extra impetus and nourishment to the old idea that commercial ships will be able to operate in ice infested waters without icebreaker escort or convoy. This ability was actually demonstrated as early as

1932, when the icebreaking steamship *Alexander Sibiryakov* sailed from the west to the east of the NSR without icebreaking assistance during one navigation season. Today, the idea is coming to fruition and materializing on realistic technological terms. As discussed above, Norilsk Nickel already operates two such ships on the Kara Sea Route, and four more of the same class are under construction in Germany. Thus, Norilsk Nickel will in a short time have a fleet of six operational icebreaking carriers, “all highly capable of operating independently through the winter season to serve the port of Dudinka.”¹⁰² In 2006, these ships began shuttling between Dudinka and Murmansk along the Kara Sea Route independent of icebreaker assistance.¹⁰³ The experiences gained and the technology developed for these operations may in the long-term perspective be applied to the Central Arctic Ocean for route developments.

Actually, regular shipping operations in the high seas of the Arctic Ocean are up against multiple challenges of a nontechnological nature. Among the more obvious is the lack of governmental or commercial salvage response to support shipping in faraway waters. There is also the lack of communications and there are no routinely-produced ice information products at navigation scale for the high seas beyond coastal state waters. Although all Arctic states provide marine weather information for their coastal waters, none has as yet been assigned the responsibility to do so for the high seas regions – although an initiative seems to be under way in this respect. When considering possibilities for the Transpolar Passage, there are few adequate ports in the United States’ or Russian waters near the Bering Strait, which is a crucial chokepoint for any transArctic shipping and for vessels transiting the region. The closest US harbor with deeper water is Dutch Harbor in the southern Bering Sea. On the Russian side, the nearest and largest deepwater port is Provideniya located in the northeastern part of Chukotka (see Chapter 5).¹⁰⁴ These infrastructural shortcomings may partly explain why a sample of 98 shipping companies in a recent study showed a lack of enthusiasm to engage in Arctic transportation. The conclusion being that “although marine traffic in the Russian and Canadian Arctic seems to be definitely on the rise, this is far from being an explosion”. One of the companies, however, cited the possibility of the transpolar route becoming navigable over the long term, “which would make the route passing through Arctic straits obsolete”.¹⁰⁵

1.1.7 Connecting corridors in southern waters

On the Atlantic side of the Arctic Ocean there are three corridors: the *Northern Maritime Corridor*, connecting the NEP to Europe and North America; the *Fram Corridor* connecting the TPP to the North Atlantic and ultimately to the NMC and the Arctic Bridge; and the *Davis Corridor* connecting the NWP to the western branch of the NMC and the east coast of North America. On the Pacific side, the three Arctic corridors connect with one joint southern corridor: the *Northern Pacific Corridor* going through the Bering Strait connecting to the west coast of North America and northeast Asia and ultimately to the Great Circle Route. These corridors are two-way corridors made up by resupply and destination-Arctic shipping and possibly, in the long term, transit shipping.

1.1.8 The Northern Maritime Corridor

The Northern Maritime Corridor stretches from the Whites Sea in the north, with partners

in Murmansk, Nenets and Archangel regions, to multiple ports in the North Sea.¹⁰⁶ This corridor – also called the “new motorway of the sea” was approved as an inter-regional project by the European Union (EU) in 2002, involving partners in 22 regions in eight countries. The NMC is by western analysts regarded as a most important linkage to north-west Russia, connecting “... the NMC to the ... Northern Sea Route which connects North West Russia to the Pacific Ocean” (see Chapter 2).¹⁰⁷ From a natural and geographical point of view using the NMC, NEP and NPC from London to Yokohama it is seldom necessary to negotiate more than 400 nautical miles of difficult ice conditions, i.e., 5–6 percent of the total freight distance (see Chapter 7). Well over half of the route goes through ice free waters and about 40 percent through navigable ice. The bulk of the route runs through international waters not legally disputed by anyone. Thus, in a geopolitical perspective the physical and political challenges of these interconnecting corridors apply only to a small part of the total distance in the Arctic proper (see Chapter 2).

In our definition of the NEP, the NMC overlaps with the latter in the White and Barents Seas. In this definition, the NMC overlaps with the traditional geographical conception of the NEP, making the Barents Sea a definitional venue of four overlapping routes: the NEP, the NMC, the Kara Sea Route and the functional extension of the NSR (see Figure 1.10).

Marine transport of Russian oil through the NMC has been going on for some years, but increased dramatically in 2002. The oil comes from production sites in Western Siberia. As the existing pipeline from Siberia to southern Russia was oversubscribed at the time, oil was instead shipped by train to the White Sea, transferred to tankers and shipped on to the European market through the NMC. Oil production in Russia’s Arctic deposits is expected to increase – some suggest a production level by 2021 of 55–65 million tonnes (see Chapter 3).¹⁰⁸ Crude oil, bunker oil and refined products are shipped out on small ice strengthened tankers from different ports in the White Sea to Murmansk where it is transferred to large tankers for export. The transport capacity was originally about 5.4 million tons a year, but is expected to triple and quadruple over a short period of time (see Chapter 3).

Also the transAtlantic branch of the NMC, which connects the NEP to the east coast of North America has been activated for transport as the first load was delivered to the US east coast in February 2008. Since transport costs from Murmansk to North America are comparable to those from the Middle East, this trade is expected to increase rapidly.¹⁰⁹ By 2020 the estimate is that 20 million tonnes of LNG will be transported from Russian Arctic gas fields to North America.¹¹⁰ In this perspective, Siberia is linked to Washington via two or three Arctic routes and the transoceanic blue water branch of the NMC.

Due to Iceland’s geographical location en route to the North American east coast, Icelandic authorities and shipping companies have plans to service the transoceanic branch of the NMC by offering deep ocean ports, repair facilities, reloading of cargo from small to large tankers, etc. The idea is to establish a transshipment port at Isafjörður in northwest Iceland. Previously, the harbors at Reykjavík and Reyðarfjörður in East Iceland have been suggested.¹¹¹ The government points out that the deep fjords in west Iceland, like Hvalfjörður, offer good natural conditions for ports for big ships and even “better than other options in the northern part of the Atlantic.”¹¹² The Icelandic government does not only suggest Iceland to be a transshipment country for the east coast of North America, but also for Northern Europe. The geopolitics of this scheme is that Iceland can serve international trade “... as a transshipment hub ... between the continents of Europe ... North America and



Source: Ocean Futures Maps: The Northern Maritime Corridor (2006)

Figure 1.11 The NMC–NEP connection.

Asia across the Central Arctic Ocean through trans-arctic sea routes.”¹¹³ The reference to Asia has among other things to do with the close cooperation that has developed between Iceland and China in the course of the three last years on Arctic shipping (see Chapter 2).¹¹⁴

1.1.9 The Northern Pacific Corridor

The Northern Pacific Corridor on the Pacific has not yet been established or for that matter got an official name. For simplicity and for the purpose of this study we call it the *Northern Pacific Corridor* (NPC), which starts out in the Bering Strait, overlapping with the functional definition of the NSR on the Pacific.

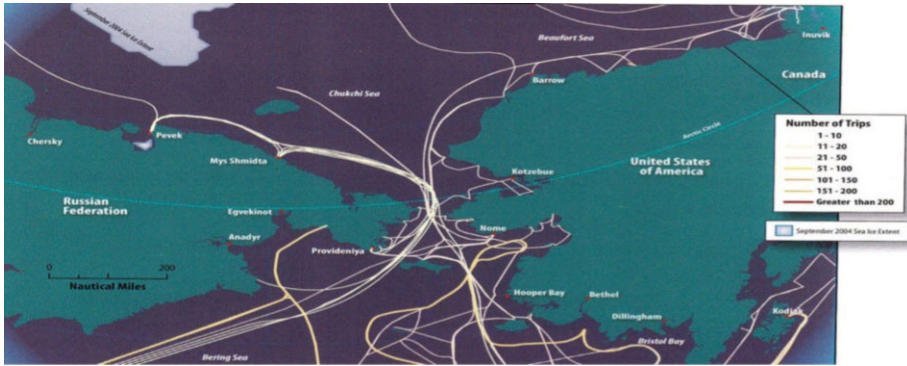
The Bering Strait is a narrow international strait that connects the Arctic Ocean to the North Pacific Ocean. It is the geographical venue of the NWP, NEP, TPP and NPC – a choke point through which all vessels have to pass to exit or access the Arctic Ocean on the Pacific (see Figure 1.12). At the strait’s narrowest point, the continents of North America and Asia are just 90 km apart. The biggest depth is 60 meters. In the midst of the strait are two small islands belonging respectively to the USA and Russia – Little and Big Diomedé.

Seasonally, dynamic sea conditions are found in this natural bottleneck labeled by some the “navigator’s nightmare” clogged as it is with first-year sea ice more than 4 feet thick. Multiyear sea ice is known to move through the strait at speeds approaching 27 nautical miles per day.¹¹⁵ In the land territory surrounding the strait there are three US ports: Nome, Kotzebue and the Red Dog mine harbor. Also on the Russian side the ports are located to the south of the strait. These are: Provideniya, Anadyr and Egvekinot. The water depth in all these ports is less than 10 meters.¹¹⁶ The closest US harbor with deep water is Dutch Harbor at the Aleutians in the Southern Bering Sea. On the Russian side, the nearest deep water port is Provideniya. Thus, the regional shortage of suitable and effective infrastructure is striking and in need of cost-intensive improvements (see [Figure 1.12](#)). Current shipping activity in the area is based on community resupply and destination-Arctic traffic.

When the Russian Navy undertook and planned the Great Northern Expedition to the Arctic in 1733–1743 the objective was to explore the American (Alaskan) coast and to reconnoitre a sea route from Kamchatka to Japan. Although the expedition resulted in 62 maps and charts of these uncharted waters,¹¹⁷ a sea route was never formally set up. Unlike the NMC, the NPC is still only an expanse of water stretching from the Bering Strait southwards through the North Pacific ending up nowhere and everywhere. Or put differently: The NPC has not yet formally been established as an official link between ports in the Arctic and ports in southern waters by any countries or groups of countries. One important reason for this is that “Because of Russia’s European identity, analysts often seems to overlook the Russian Far East (RFE) as an actor in the region when analysing North East Asia. Maps of East Asia list the names and major cities of all the other states in the region, but often let the Russian Far East remain a dark unnamed mass of territory in the north, often cutting the map north of Japan ... There are a host of structural and cultural obstacles to overcome before RFE and its Asian neighbors can in fact reach a level of mutual trust high enough to ensure dynamic cooperative development in the region.”¹¹⁸

Thus, regional cooperation in the northern areas of the RFE is an issue on the absolute fringe of most of the political relations and perceptions in northeast Asia. “For all the stumbling blocks and hindrances ... to be overcome many mutual perceptions and not least realities have to change both in Russia and in Japan, China and the Koreans.”¹¹⁹ Here politics do not reflect commercial needs. To keep up the economy of northern regions like Magadan, Kamchatka, Sakhalin Oblast and the northern areas of the Republic of Sakha and Khabarovsk Krai, “sea transport is practically the only means of cargo haulage”.¹²⁰ Therefore, the waters of the Bering Strait have been used in summertime by US, Russian and Canadian vessels servicing communities and industry in northern Alaska and ports along the NWP and NSR in both directions through the Bering Strait and the Aleutian islands. Overall, approximately 159 large commercial vessels pass through the Bering Strait every year during the open-water period from July to October. These estimates exclude fishing vessels and fuel barges serving coastal communities, in particular in Alaska.¹²¹ The volumes of cargo taken through the Strait are small by any yardstick. In recent decades proposals have been put forward to change the state of affairs and to put the region on political and economic maps through the establishment of interconnecting transportation corridors.

In 1992, the State Advisor to the Russian Federation, Professor Alexander Granberg, suggested that it would be attractive “... to set up a system of food supply to the eastern sector of the Arctic (i.e., the Russian Far East) through regular deliveries from the US



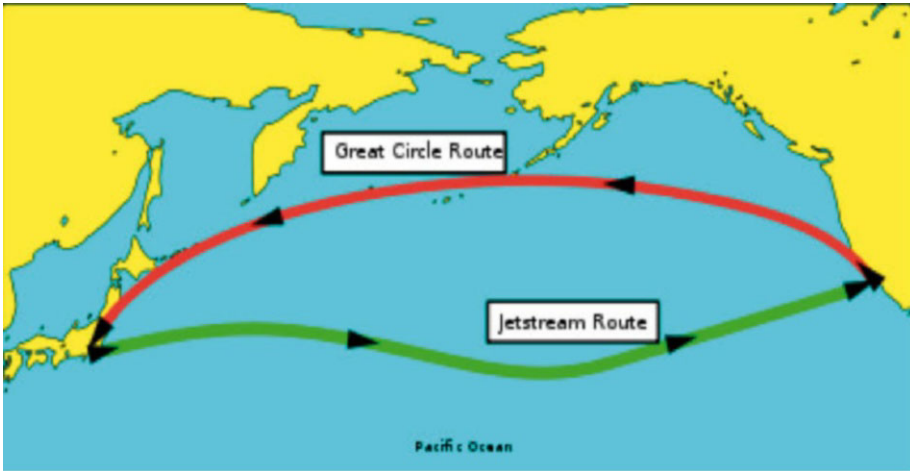
Source: AMSA (2009)

Figure 1.12 Transportation through the Bering Strait and the NPC.

Pacific coast and south-East Asia ... This system assumes particular relevance since many of the former food suppliers to the (Russian) Arctic are now far ‘abroad’ (Ukraine, Belarus, Central Asia)”.¹²² Granberg also suggested to deliver oil from the Russian Arctic to the west coast of the United States in exchange for American food supplies to the Russian Far East through a transoceanic sea lane across the Pacific, connecting with the NSR. In this scheme, the NSR would be used to distribute large portions of US supplies to the Arctic regions through connecting rivers. This suggestion has not yet materialized in interstate politics. However, in 2007 the Canadian firm Broe/Omni Trax announced its intention to collaborate with Russian companies in the international “Arctic Bridge project” for large-scale transport of transit cargoes via the NSR in the west–east direction through the Bering Strait. This company owns and operates the Canadian port of Churchill and is the largest private railway company in the United States (see above).¹²³

According to Japanese experts, “... progress in international specialization and economic globalization has accelerated and broadened the interrelationship between the two regions (RFE and NEA) both socially and economically. It is widely known that oil and natural gas development off the coast of Sakhalin Island provides a wide range of multiplier effects in these areas. And in this way, the globalized face of the economy and industry will play an important role in the sustainable development of the Russian Far East and East Asia for many years to come ... (T)he abundant natural resources in the extreme north area of the Russian Far East will draw (the) ... attention of the international market” (see Chapter 3).¹²⁴

South Korea, being the fourth largest oil importing country and the tenth largest oil consuming country in the world, is dependent on oil deliveries from the Middle East. From a logistical point of view, the security of marine transportation routes for oil between north-east Asia and the Middle East has been seriously threatened by piracy and conflicts among Asian countries, not least threats by Iran to close the Hormuz Strait. Due to piracy, the cost of insurance for ships travelling via the Gulf of Aden towards the Suez Canal increased



Source: http://en.wikipedia.org/wiki/Great_circle

Figure 1.13 The Great Circle Route.

more than tenfold between September 2008 and March 2009.¹²⁵ In response to the threat to these southern supply routes, “it is necessary to exploit various other transportation routes and modes for natural resources ... In addition to the exploitation of transportation routes, naval cooperation among the countries in East Asia should be reinforced to promote maritime safety” (see Chapter 2).¹²⁶ For this reason, Russia “is strategically important to Korea as a new alternative energy source in accordance with Korea’s strategy of diversifying the countries it imports from.”¹²⁷ For these reasons, cooperative measures should be taken into account in order to decrease and eventually remove problems among Asian countries.¹²⁸

Chinese researchers claim that the opening of the Arctic routes “will advance the development of China’s north-east region and eastern coastal area, (and)... it is of importance to East-Asian cooperation as well”.¹²⁹ As has been pointed out, “... non-Arctic states, China, Japan, North Korea and South Korea are all in the same boat” when it comes to the prospects of an ice free Arctic. Each of these countries “... stands to benefit enormously from shorter commercial shipping routes and possible access to new fishing grounds and other natural resources. A unified Arctic strategy would be of their mutual interest. Finding ways to jointly use an ice-free Arctic has the potential to create a genuine win-win situation for both China and Japan, the two East-Asian powers which in so many other areas find it difficult to find common ground.”¹³⁰ Arctic shipping could contribute to economic development in east and northeast China. “Known as the rust belt, China is actively promoting the economic and industrial revitalization of this region, which lags behind other major industrial and manufacturing centers.”¹³¹

Thus, the countries bordering on the northeast Pacific may in due time formally establish a Northern Pacific Corridor connecting the northeast Asian countries to the NEP (NSR), NWP and TPP with a transoceanic branch to the North American west coast. In the meantime, and while waiting for regional cooperation to establish such a corridor, these waters are freely available to increasing international shipping as high seas servicing both transit and destination sailings along all the transportation corridors of the Arctic Ocean.

If and when this route is formally established as a cooperative project between regional states and provinces, the transoceanic branch will interact with the Great Circle Route (GCR) that connects the west coast of North America (including Alaskan waters) to ports in the South Korea, Japan and the Russian Federation through the Panama Canal. This route passes through the Aleutian Islands. In 2004, 2759 vessels passed through the GCR, which was more than all of the shipping traffic in the entire circumpolar Arctic.¹³² For this branch of the NPC to be made into a fully integrated route, the Great Circle Route will have to be extended northward from the Aleutians through the Bering Sea and the Bering Strait (see [Figure 1.13](#)).

1.1.10 The “Fram Corridor”

The Fram Corridor has not been formally established and/or baptised with a name of public recognition. It is simply a label provided for the purpose of this study, borrowing its name from the Fram Strait which separates Svalbard and Greenland in the north with a minimum of 540 km and in the south with a maximum of 900 km. The Molly Deep provides the deepest point not only in the Fram Strait but also in the whole of the Arctic Ocean with a depth of some 5607 m. In the center of the Strait, depths in general are around 2000 m, with coastal depths ranging from 100 to 500 m.¹³³ The Fram Corridor in our definition includes the Fram Strait and the Greenland Sea connecting in the south with the transoceanic branch of the NMC north and/or south of Iceland.

Ninety percent of all sea ice that leaves the Arctic Ocean goes through the Fram Strait at high speeds – between 10 to 25 cm per second.¹³⁴ Previously, this strait was the outlet of thick multiyear ice extending down to the Denmark Strait between Jan Mayen, Iceland and Greenland. Thus, among the three connecting corridors, the FC is the only one containing Arctic waters – as defined in the introductory chapter – in its full stretch.

Parts of the Fram Corridor is what whalers and sealers for centuries have called the *West Ice* (Vestisen) outside the east coast of Greenland – a hostile sea ice area of many tragic ship losses. Today, the Fram Strait is mostly the outlet of young and first-year ice with a thickness of up to 1.5 meters. Only on rare occasions has multiyear ice been recorded going through the Strait in recent years. This is due to the rise of the air temperature in the area of 2–3 degrees C in the course of the last decades.¹³⁵ Thus, climate change has made the FC more accessible to surface shipping than before.

Both Denmark and Norway have established 200 nm zones in the Svalbard/Greenland area. Those zones overlapped with some 150,000 sq km. In 2006, the two countries reached agreement to delimit the disputed area on the basis of the median line principle.¹³⁶ The shelf area outside of 200 nm north of the Fram Strait has not yet been delimited between the two countries. In 2010, Norway was the first Arctic coastal state to receive the recommendations of the UN Commission on the Delimitation of the Outer Continental Shelf. Until

Denmark receives her recommendations, probably in 2014, the area will not be finally delimited. Politically and legally, however, the area attracts no disagreements between the two states.

Unlike the Northern Pacific Corridor, the Fram Corridor is not being used on a regular basis for shipping purposes, neither destination-Arctic nor transits. It is known that it has been used by a small number of submarines exiting or accessing the Arctic Ocean,¹³⁷ and as an exit area for the Canadian icebreaker *Louis S. St-Laurent* and the US *Polar Sea* in August 2004 (see above). In addition, a few research ships and even drifting ice stations¹³⁸ have been operating in the area for research purposes, but the volume of this traffic has been limited and is fairly recent. As a connecting corridor of active seasonal use, the Fram Corridor at best belongs to the future, but ice and navigation conditions are in steady improvement for more active shipping.

1.1.11 The “Davis Corridor”

The Davis Corridor (DC) is not a formal name depicting an established transport route between adjacent countries. It is used as a label for the purpose of this study, borrowing its name from the Davis Strait which separates Greenland and Baffin Island with depths varying between 350 and 3600 m. The Strait is known for its fierce tides ranging from 30 to 60 feet, which discouraged many early explorers. A cold ocean current of heavy ice runs southward along the banks of Baffin Island emptying itself into the Labrador Sea in the North Atlantic at speeds of 8 to 20 km a day. This makes the northern part of the Labrador Sea ice-infested and similar to the waters of the Fram Corridor. The DC includes the Davis Strait and the Labrador Sea and extends southward connecting to the western branch of the NMC. It includes the whole of the North American East coast and passes four national territories – Greenland, Canada, Iceland and the USA.

Shipping through the Corridor is modest, counting between 100 to 200 vessels a year. It is seasonal and mostly conducted by Danish, Greenlandic and Canadian vessels. Since 2002 the amount of sea ice in the Strait has decreased, and today there is open water all year round making commercial activities possible. The Strait has a fairly long history of large-scale commercial fisheries (trawling for scallops, Pollock and cod) and has also been subjected to petroleum prospecting.

There have not been any serious political attempts to establish a cooperative Corridor in these waters. The present level of shipping activity is handled sufficiently effective by the informal cooperation that already takes place between the bordering countries.

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Shipping in Arctic Waters

A comparison of the Northeast, Northwest and Trans
Polar Passages

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