CHAPTER 4

Shipping along the Northwest Passage: A Historical Overview

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Abstract

This chapter furnishes an overview history of booms and busts in Arctic shipping, with a focus on the bubbles created by successive defence and economic crises and opportunities in the twentieth century. The first significant non-Indigenous maritime activity centered on furs and whale oil. The Second World War and early Cold War saw fleets of American naval, coast guard and merchant marine vessels move into the region to construct installations. In the 1970s, resource extraction attracted the attention of southern companies, and the North seemed to be the next great development frontier. By the 1980s, surging oil and gas prices raised hopes for a bonanza, with government estimates forecasting hundreds of Arctic transits by resource carriers as early as the 1990s. Instead, fleets of icebreaking tankers remained on the drawing board at century's end—where they remain today. In between these booms, Arctic shipping did not disappear, with community resupply and government operations continuing on a predictable basis.

Keywords

Arctic shipping – Northwest Passage – marine transportation history – Canadian Arctic – Second World War – Cold War – oil and gas development

1 Introduction

In 1921, Canadian Arctic explorer Vilhjalmur Stefansson published *The Friendly Arctic*, an account of his time in the North and his views on the region's future. Stefansson made the dramatic prediction that the Arctic would soon become a region of great strategic and commercial importance. Crisscrossed by international air and sea traffic, the polar basin was to be the Mediterranean of

the modern age.[1] It was a bold prediction and one that fit into the pattern of Arctic shipping: a pioneering spirit imbued with optimism. That optimism has proven fleeting over the past century, however, as Arctic shipping has followed a boom-and-bust pattern. Each boom was driven by a strategic or economic catalyst, only to end with changing circumstances. The first significant European maritime activity centered on furs and whale oil, surging and then declining in line with those industries. The Second World War and early Cold War saw fleets of American naval, coast guard, and merchant marine vessels move into the region to construct weather and radar stations as part of a larger system of continental defence. When those sites were completed and strategic circumstances changed, that activity declined. In the 1970s, resource extraction attracted the attention of southern companies and the North seemed to be the next great development frontier. By the 1980s, surging oil and gas prices raised hopes for a bonanza, with government estimates forecasting hundreds of Arctic transits by resource carriers as early as the 1990s.[2] Instead, commodity prices put paid to these visions. The hundreds of millions of dollars invested in oil and gas returned few rewards, and the fleets of icebreaking tankers remained on the drawing board at century's end—where they remain today.

This chapter furnishes an overview history of these booms and busts in Arctic shipping, with a focus on the bubbles created by successive defence and economic crises and opportunities. In between these booms, Arctic shipping did not disappear, with community resupply and government operations continuing on a regular and predictable basis (often below the radar of anyone outside the Arctic).[3] Our focus is on shipping into and out of the region and excludes local small-craft maritime activity. The routes that make up what is commonly called the Northwest Passage have served as highways for Inuit since time immemorial, and this maritime activity lies at the heart of Canada's claim to sovereignty over these waters.[4] This important facet is covered in the chapters by Claudio Aporta and Leah Beveridge in this volume.

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1 Vilhjalmur Stefansson, *The Friendly Arctic: The Story of Five Years in Polar Regions* (MacMillan, 1921).

2 Memorandum for Cabinet, "Status of Arctic Archipelagic Waters," 1 June 1982, Library and Archives Canada (LAC), RG 12, vol. 5561, file 8100-15-4-2(s), pt. 4.

3 For statistics on marine transportation in the Canadian Arctic, see Christopher Wright's comprehensive study *Arctic Cargo: A History of Marine Transportation in Canada's North* (self-published, 2016).

4 See for instance External Affairs Minister Joe Clark's statement during the *Polar Sea* crisis: Canada, House of Commons, *Debates*, 10 September 1985, 33rd Parliament, 1st session, p. 6463.

2 Whalers and Traders

Early exploration in the North American Arctic by the Norse and then English using rudimentary navigation instruments yielded important 'discoveries' for Europe but had limited impact on the Arctic itself. Furthermore, the coveted northern maritime route to the riches of Asia proved elusive—and commercially unfeasible. Instead, until the middle of the eighteenth century, the fur trade provided the basis for the Canadian economy and shipping in Arctic waters. For a century, the Hudson's Bay Company built its empire around a business model exploiting a chain of posts at the mouths of rivers flowing into Hudson Bay. Each year, three to four sailing ships would carry trade goods through Hudson Strait and into the bay, and then return to England with furs. Competition with the Northwest Company after the conquest of New France stimulated an increased focus on terrestrial and riverine networks until the two companies merged in 1821, but explorers continued to search for a Northwest Passage by sea and land. The fur trade would persist as a significant economic force in the Arctic well into the twentieth century, with posts established along the Arctic Ocean coast where they were resupplied by sea.[5]

The whaling industry dramatically increased the scale of shipping activity in the Canadian Arctic. Dutch, German, English, and Scottish whalers plied their trade along the eastern (Greenland) side of Davis Strait in the seventeenth century. After British explorers John Ross and W. Edward Parry crossed Baffin Bay and proved the route into Lancaster Sound in 1818 and 1819, these activities extended into the Canadian archipelago. Dominated by British whalers, this activity in what is now the eastern Canadian Arctic peaked from 1820–1840, when nearly one hundred ships operated in and around Davis Strait area (typically from April to October). In 1840, Scottish whaling Captain William Penny and his assistant Eenoolooapik explored Cumberland Sound and it soon became one of the most important whaling grounds in the eastern Canadian Arctic. With the advent of intentional overwintering on Baffin Island in the 1850s, interactions between the whalers and Inuit intensified, with the latter supplying crews with food, clothing, and labour. This contact also led to the emergence of permanent shore stations at Kekerton and Blacklead Island,

5 Harold Innis, *The Fur Trade in Canada* (Toronto: University of Toronto Press, 1930); E.E. Rich, *The Hudson's Bay Company 1670–1870* (Winnipeg: Hudson's Bay Record Society, 1958); Daniel Francis and Toby Morantz, *Partners in Furs: A History of the Fur Trade in Eastern James Bay, 1600–1870* (Montreal & Kingston: McGill-Queen's University Press, 1983); Arthur J. Ray, *The Canadian Fur Trade in the Industrial Age* (Toronto: University of Toronto Press, 1990).

with the in-migration of Inuit making them the largest settlements in the Sound until the end of the whaling era in 1915.[6]

While the British dominated the whaling industry in the east, Americans dominated in Hudson Bay and the west. American ships opened the fishery in the northwest corner of Hudson Bay in 1860, and the Pacific whaling fleet pushed eastward past Point Barrow in the Beaufort Sea in 1889. Although the whaling era in the Beaufort Sea and Amundsen Gulf spanned a relatively limited period of time (1889 until about 1914), several hundred American seamen overwintered in the region, and this presence had transformative effects on local populations. During voyages that typically spanned two or three years, whalers congregated in sheltered harbours such as Pauline Harbour on Herschel Island, where Inuit and First Nations worked as pilots, hunters, dog drivers, and seamstresses in exchange for European trade goods and liquor. Whaling crews introduced measles, typhus, scarlet fever, tuberculosis, and sexually transmitted infections that swept through Indigenous populations, with epidemics decimating the Mackenzie Delta Inuit population and the Sadlermiut of Southampton Island in Hudson Bay.[7]

Foreign whaling activities in Canadian waters ultimately spurred the Canadian government to assert its sovereignty over the Arctic Archipelago. Canada had acquired whatever rights Britain had in the area in 1880, but Ottawa had done little to act upon them. After all, Sir John Franklin's ill-fated 1845 expedition and the search parties that had followed in its wake had proven the existence of an Arctic maritime route while also demonstrating its lack of utility. After Confederation in 1867, southern Canadians invested their resources and energies into establishing east-west linkages to consolidate the Dominion of Canada; securing its northern limits seemed a distant, future consideration.[8] Accordingly, the absence of Canadian official presence in the Arctic left foreign whalers to operate without any regulation. At the turn of the century, rumours

6 See, for example, W. Gillies Ross, ed., *Arctic Whalers, Icy Seas: Narratives of the Davis Strait Whale Fishery* (Toronto: Irwin, 1985); Daniel Francis, *Arctic Chase : A History of Whaling in Canada's North* (St. John's: Breakwater, 1984); Anne Keenleyside, "Euro-American Whaling in the Canadian Arctic: Its Effects on Eskimo Health," *Arctic Anthropology* 27:1 (1990): 1–19; Dorothy Eber, *When the Whalers Were Up North: Inuit Memories from the Eastern Arctic* (Montreal & Kingston: McGill-Queen's University Press, 1996).

7 W. Gillies Ross, *Whaling and Eskimos: Hudson Bay 1860–1915* (Ottawa: National Museum of Man, 1975); W. Gilles Ross, ed., *An Arctic Whaling Diary: The Journal of Captain George Comer in Hudson Bay, 1903–1905* (Toronto: University of Toronto Press, 1984); Francis (n 6); Keenleyside (n 6).

8 For a sweeping overview, see Shelagh Grant, *Polar Imperative: A History of Arctic Sovereignty in North America* (Vancouver: Douglas & McIntyre, 2011).

circulated that the United States might use the activities of American whalers as a pretext to annex parts of the Canada's Arctic. Thus, sovereignty concerns prompted Ottawa to act. In 1903, the North-West Mounted Police established detachments at Herschel Island, off the north coast of the Yukon, and at Cape Fullerton, in the northwest corner of Hudson Bay, to collect customs, regulate the liquor traffic, impose whaling licences, and maintain order.[9]

Official Government of Canada expeditions into the Northwest Passage, matched by flag planting and asserting a Canadian 'sector claim' up to the North Pole, sought to assert authority in and over Arctic lands and waters.[10] Between 1904 and 1911, Captain Joseph-Elzéar Bernier led several voyages to the eastern Arctic on the government ship *Arctic*, culminating in the placement of a cairn and plaque on Melville Island claiming the entire Arctic Archipelago for Canada. To give practical weight to this claim, the federal government established more Mounted Police posts along the Arctic coast and on the Arctic islands, eventually extending to Craig Harbour (1922) and Bache Peninsula (1926) on Ellesmere Island. Resupply of these remote outposts was conducted by the annual Eastern Arctic Patrol, inaugurated in 1922. Led by a civil servant, the maritime patrol transported doctors, scientists, court officials and police to visit coastal camps and later settlements across the Eastern Arctic. After a short hiatus following the sinking of HMCS *Nascopie* in 1947, the patrol resumed in 1950 with a particular focus on testing Inuit for tuberculosis, many of whom were evacuated to southern hospitals—a practice that continued until 1968 and is also discussed in Leah Beveridge's chapter in this volume.[11]

3 The Second World War

The Second World War brought the Canadian Northwest into new strategic focus, imprinting the novel idea that the region also constituted a military frontier. Although the dramatic highway, pipeline, and airfield projects in the Canadian Northwest did not have an ocean shipping component, other

9 William R. Morrison, *Showing the Flag: The Mounted Police and Canadian Sovereignty in the North, 1894–1925* (Vancouver: UBC Press, 1985).

10 On sovereignty in the Canadian Arctic before the Second World War, see Gordon W. Smith, *A Historical and Legal Study of Sovereignty in the Canadian North: Terrestrial Sovereignty, 1870–1939*, ed., P.W. Lackenbauer (Calgary: University of Calgary Press, 2014) and Janice Cavell and Jeff Noakes, *Acts of Occupation: Canada and Arctic Sovereignty, 1918–25* (Vancouver: UBC Press, 2011).

11 See C.S. Mackinnon, "Canada's Eastern Arctic Patrol 1922–68," *Polar Record*, 27:161 (1991): 93–101.

activities in the Eastern Canadian Arctic did. The Crimson Staging Route, a series of airfields and depots that the United States established (with Canadian approval) to facilitate the transfer of planes and other material from North America to Europe, established footprints in Fort Chimo (Kuujjuaq), Frobisher Bay (Iqaluit), and Padloping Island. By 1943, Goose Bay, Labrador (then part of the separate colony of Newfoundland) boasted the largest airfield in the Western Hemisphere. As the region's first large-scale development project, the military base changed life in Labrador. Radio sites were also established throughout the Canadian North, greatly facilitating communications over vast distances. In the words of Malcolm MacDonald, the British High Commissioner to Canada, the Americans "treated … with indifference the obstacles which Nature—whose sovereignty in the Arctic is even more supreme than that of the Canadian Government—put in their way."[12]

Establishing these sites required surveys and supplies. For example, trawler convoys carried north five separate construction crews, weather station personnel, food, and building materials in late September 1941. As a result, the three 'Crystal' weather and radio stations were completed by mid-November.[13] The following summer, a convoy of cargo ships and trawlers carrying men, equipment and supplies set out for Fort Chimo, Frobisher Bay, and Southampton Island. Lieutenant Command Alexander Forbes and veteran Arctic explorer Captain Bob Bartlett were sent on ahead to chart the waters of Frobisher Bay and to pilot the supply ships safely to the base site. Near Resolution Island aboard *Effie M. Morrissey*, Forbes recounted:

> Entering the ice floes we dodged the larger pans and steered a more torturous course as the pack ice became thicker. It was an old story to this seasoned crew. The man in the barrel at the foremast head picked the lanes through the ice and directed the man at the wheel, and as he yelled "Port" or "Starboard," the schooner zigzagged dizzily. When feasible, he followed leads of open water; when these didn't serve, the schooner simply rammed the pans with a jarring crunch …, leaving a streak of red bottom paint on the ice as it floated away on the quarter. These men knew what the ship could take and they let her take it.[14]

12 Quoted in Shelagh Grant, *Sovereignty or Security? Government Policy in the Canadian North, 1936–1950* (Vancouver: UBC Press, 1988), 275.

13 Shelagh Grant, "American Defence of the Arctic, 1939–1960," paper presented to the Canadian Historical Association (1990), copy in possession of P. Whitney Lackenbauer.

14 Alexander Forbes, *Quest for a Northern Air Route* (Cambridge: Harvard University Press, 1953), 57. See also William S. Carlson, *Lifelines through the Arctic* (New York: Duell, Sloan and Pearce, 1962).

They succeeded in transferring the men and equipment to the permanent location near the mouth of the Sylvia Grennell River. Although the supply fleet was delayed when a German U-boat sunk one of the cargo ships off the coast of Labrador, it arrived in August with 350 men, building materials, and heavy construction equipment. It was increasingly clear that shipping was a critical enabler for air operations—and, by extension, continental defence.

4 The Cold War

The onset of the Cold War renewed pressures on Canada to balance sovereignty concerns with continental security imperatives. Polar projection maps revealed how Canada's strategic situation had changed when the United States and the Soviet Union became rivals. When the United States pushed for access to Canada's Far North to build airfields and weather stations beginning in 1946, Canadian officials proved apprehensive in authorizing new installations, and journalists began to talk about a looming sovereignty crisis.[15] Some scholars argue that Canadian apathy in the face of American security interests threatened our sovereignty in the late 1940s,[16] while others paint a more benign portrait of bilateral cooperation, with Canadian policy-makers preserving and extending Canadian sovereignty through quiet diplomacy and careful negotiations that extended into the 1950s and beyond.[17] Whatever the verdict,

15 For example, Grant 1988 (n 12).

16 See, for example, Grant 1988 (n 12); Adam Lajeunesse, "Lock, Stock, and Icebergs? Defining Canadian Sovereignty from Mackenzie King to Stephen Harper," CMSS Occasional Paper No. 1 (Calgary: Centre for Military and Strategic Studies, 2007); J.L. Granatstein, "The North to 1968," in *The Arctic in Question*, ed., Edgar Dosman (Toronto: Oxford University Press, 1976), 13–33.

17 See, for example, David Bercuson, "Continental Defense and Arctic Security, 1945–50," in *The Cold War and Defense*, eds., Keith Neilson and Ronald G. Haycock (New York: Praeger, 1990), 153–170; P. Whitney Lackenbauer, "Right and Honourable: Mackenzie King, Canadian-American Bilateral Relations, and Canadian Sovereignty in the Northwest, 1943–1948," in *Mackenzie King: Citizenship and Community*, eds., John English, Kenneth McLaughlin, and P. Whitney Lackenbauer (Toronto: Robin Brass Studio, 2002), 151–168; P. Whitney Lackenbauer and Peter Kikkert, "Sovereignty and Security: The Department of External Affairs, the United States, and Arctic Sovereignty, 1945–68," in *In the National Interest: Canadian Foreign Policy and the Department of Foreign Affairs and International Trade, 1909–2009*, eds., Greg Donaghy and Michael Carroll (Calgary: University of Calgary Press, 2011), 101–120; P. Whitney Lackenbauer and Peter Kikkert, "The Dog in the Manger – and Letting Sleeping Dogs Lie: The United States, Canada and the Sector Principle, 1924–1955,'" *International Law and Politics of the Arctic Ocean: Essays in Honour of Donat Pharand*, eds., Suzanne Lalonde and Ted L. McDorman (Leiden: Brill, 2014), 216–239; Daniel Heidt and

the notion that there were "no boundaries upstairs" when it came to North American air defence[18] had entered the military imagination and could no longer be simply ignored, thus initiating a process of military modernization in the region.[19]

In the 1950s, the Americans decided to build extensive air defence systems in the Arctic to secure advance warning to protect the US Air Force's nuclear deterrent and the industrial heartland of North America.[20] The most northern of the radar networks was the Distant Early Warning or DEW Line, a mega-project staggering in both its scale and the speed with which it was constructed. "Stretching for 2,500 miles across the Arctic, it required the biggest task-force of ships since the invasion of Europe and the largest air operation since the Berlin airlift to take in the supplies," Department of Northern Affairs and National Resources official Charles Marshall described in *Geographical Magazine*. "More than 7,000 men laboured through two short Arctic construction seasons to complete the work on schedule. Small wonder that many consider the project one of the most dramatic engineering achievements of our time and a milestone in the development of the Arctic."[21]

Between the end of the Second World War and the completion of the DEW Line, the US Navy and Coast Guard sent hundreds of icebreakers and cargo ships to the waters of the Canadian Arctic Archipelago. Over time, the size and scope of Arctic convoys grew, requiring innovative planning, elaborate preparations, and complex joint (Canada-United States) interdepartmental and interagency coordination that applied lessons learned from previous missions.[22] The scale of activity in Canada's Arctic waters was unprecedented. During the construction phase from 1955–1957, the US Military Sea Transportation Service (MSTS), moved over 460,000 tons of equipment and supplies into the Canadian Arctic, including enough gravel to build two copies of the Great

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P. Whitney Lackenbauer, *The Joint Arctic Weather Stations: Science and Sovereignty in the High Arctic, 1946–1972* (Calgary: University of Calgary Press, 2022).

18 See Joseph Jockel, *No Boundaries Upstairs: Canada, the United States, and the Origins of North American Air Defence, 1945–1958* (Vancouver: UBC Press, 1987). For a recent reflection on this important book, see Daniel Heidt, "Revisiting Joseph Jockel's No Boundaries Upstairs," *International Journal* 70:2 (2015): 339–349.

19 On this theme, see Matthew Farish and P. Whitney Lackenbauer, "High Modernism in the Arctic: Planning Frobisher Bay and Inuvik," *Journal of Historical Geography* 35:3 (2009): 517–544.

20 The essential study on this process remains Jockel, *No Boundaries Upstairs* (n 18).

21 C.J. Marshall, "North America's Distant Early Warning Line," *Geographical Magazine* 29: 12 (1957): 616.

22 See Peter Kikkert and P. Whitney Lackenbauer, "Setting an Arctic Course: Task Force 80 and Canadian Control in the Arctic, 1948," *Northern Mariner* 21:4 (2011): 327–358.

Pyramid of Giza.[23] Nevertheless, the maritime task forces that operated in the region faced age-old environmental challenges associated with unpredictable ice conditions, weather, and extreme isolation. Shepherding and then landing enormous loads of construction equipment and material by landing craft over Arctic beaches, after first charting and clearing the approaches, posed enormous challenges. "The work was not glamorous or adventurous," Captain Owen Robertson explained about the Royal Canadian Navy (RCN) icebreaker HMCS *Labrador*'s Arctic voyages. "Most of it was just plain hard work, long-hours, bad weather and monotony; but we did know that what we were doing was important to Canada—that was our reward."[24] The RCN's Arctic foray was brief, however, and the Navy opted out of its Arctic role when it transferred the *Labrador* to the Canadian Coast Guard in 1957.[25]

Nevertheless, the DEW Line and previous military development projects reshaped the socio-economic and cultural geographies of Arctic Canada. Although planners had intended to protect Inuit so that military activities did not disrupt their lives, this proved impossible once airplanes and ships began shipping southern materiel into the Arctic. "Every place a box landed became a beach-head for industrialized society," documentary filmmaker Kevin McMahon later observed. "The boxes soon became the foundation for the Canadian government, which the military had given cause to worry about its sovereignty. Boxes were added, and more of our society—with its various virtues and vices, machines and organizations, ideals, morals, values and goals—were shipped north."[26] On the other hand, opening the North brought benefits from a national development standpoint. "Canada fell heir

23 Western Electric, *The t Line Story* (*c.*1960).

24 O.C.S. Robertson, "Foreword" to T.A. Irvine, *The Ice Was All Between* (Toronto: Longmans Green, 1959), XXII.

25 On *Labrador*, see also J.M. Leeming, "HMCS *Labrador* and the Canadian Arctic," in *RCN in Retrospect, 1910–1968*, ed., James Boutilier (Vancouver: UBC Press, 1982), 286–307; Naval Historical Section, Royal Canadian Naval Headquarters, *HMCS* Labrador: *An Operational History*, eds., P. Whitney Lackenbauer, Adam Lajeunesse, and Lieutenant(N) Jason Delaney (Antigonish: Mulroney Institute on Government, Arctic Operational History Series 1, 2017).

26 Kevin McMahon, *Arctic Twilight* (Toronto: Lorimer, 1987). On this theme, see also P. Whitney Lackenbauer and Ryan Shackleton, "Inuit-Air Force Relations in the Qikiqtani Region during the Early Cold War," in *De-Icing Required: The Canadian Air Force's Experience in the Arctic*, eds., P. Whitney Lackenbauer and W.A. March (Trenton: Canadian Forces Air Warfare Centre, *Sic Itur Ad Astra:* Canadian Aerospace Power Studies Series 4, 2012), 73–94; P. Whitney Lackenbauer, "At the Crossroads of Militarism and Modernization: Inuit-Military Relations in the Cold War Arctic," in *Roots of Entanglement: Essays in Native-Newcomer Relations*, eds., Myra Rutherdale, P. Whitney Lackenbauer, and Kerry Abel (Toronto: University of Toronto Press, 2018), 116–158.

to the by-products of the DEW Line construction," Eyre notes. "Airfields were built, beach landing sites were developed, charts and maps were improved, aids to navigation were installed. These developments significantly improved access to what had hitherto been a virtually inaccessible area. There was some initial anticipation that a flood of mineral exploration would follow in their wake. This notion proved to be as chimerical as Frobisher's search for gold."[27]

5 The Arctic Oil And Gas Frontier: Dreams of a Bonanza

As shipping activity from defence construction was winding down in the late 1950s, a new driving force for northern activity was beginning to emerge. Resource development in the North had historically been limited by the region's inaccessibility, as poor charting and harsh ice conditions had always made large-scale commercial operations a daunting proposition. Some of that perception of impenetrability was stripped away by the successful continental defence operations of the preceding decade, with military infrastructure facilitating a surge of survey work and resource exploration.

Over the course of the 1950s, the Geological Survey of Canada undertook large-scale aerial surveys which outlined promising geological conditions and, by the end of that decade, published estimates defining a wide variety of minerals and hydrocarbon reserves spread across the Arctic Islands.[28] By 1960, the government had issued over 40 million acres of exploration permits to both Canadian and international companies.[29] Small survey teams were flown into all parts of the Arctic Islands, often using defence infrastructure to facilitate the initial work confirming the economic viability of so many reserves. While the geology was promising, the question of transportation remained unsettled and the need for effective and reliable shipping quickly became clear. In a spirit of optimism, Cam Sproule (the chief executive officer of J.C. Sproule and Associates and a pioneer in early Arctic resource exploration) wrote in a 1962 edition of *Oilweek* that "it should not take science long to devise icebreakers that could move more or less at will through the Arctic Islands for at least the greater part of the year."[30] Where only a decade earlier American crews

27 Kenneth C. Eyre, "Forty Years of Military Activity in the Canadian North, 1947–87," *Arctic* 40:4 (1987): 292–299, at 294–295.

28 Gordon H. Jones, "Economic Development – Oil and Gas," in *A Century of Canada's Arctic Islands, 1880–1980*, ed., Morris Zaslow (Ottawa: Royal Society of Canada, 1981), 222.

29 Penelope E. Grey and Laura K. Krowchuk, *Spirit of Success: The Sproule Story* (Calgary: Sproule Associates Ltd., 1997), 223.

30 Id., 62.

were still learning how to work in the polar waters, Sproule now was telling the industry world that large-scale submarine freight traffic was "so far advanced as to be practically assured within the next five to eight years."[31] More than an ambitious outlier, this enthusiasm represented the energy and optimism of the early resource pioneers and their determination to open the Northwest Passage to Canadian shipping.

Building reliable shipping routes was essential to these development plans, but surveys soon found that transportation costs constituted half of their entire budget. Air freight was frequently relied upon to reach inaccessible areas, but the use of aircraft was five times more expensive that maritime transport.[32] One of the first efforts to distribute costs and develop those shipping routes came in the form of a pooling of resources. Panarctic Oils was a consolidation of 75 corporate and individual land holdings with major support from the Government of Canada, which had a vested interest in the development of the North and the establishment of improved sea lanes.

Launched in 1968, Panarctic was intended to provide affordability through scale. In its first year, the organization sea-lifted 5,000 tons of drilling supplies and 500,000 gallons of fuel to its northern bases.[33] This large-scale shipping effort was central to supporting industry's aggressive plans, which saw over CDN$700 million worth of exploration work undertaken across the Archipelago in 1969 and 1970. Despite the initial industry enthusiasm, the difficulties of supplying Arctic projects became evident very quickly. The high costs of moving supplies, coupled with the lack of any return on those early investments called into question the long-term viability of the many Arctic projects and, by 1970, Panarctic investors were becoming nervous.[34]

Circumstances conspired to give Canadian shipping and resource exploration efforts fresh life. In 1968, Atlantic Richfield and Humble Oil made a major oil discovery at Prudhoe Bay on Alaska's North Slope. The *Anchorage Times* headline read "Arctic Oil Find is Huge" and conservative estimates put the reserve at between five and ten billion barrels of oil, making it by far the largest on the continent.[35] As was the case in the Arctic Islands, the question of transportation was central. From the North Slope, oil had to travel roughly 3,200

31 Id.

32 Richard Rohmer, *The Arctic Imperative* (Toronto: McClelland Stewart Ltd, 1973), 176.

33 Chas R. Hetherington, "A Story of Arctic Exploration," *UBC Business Review* (1971).

34 Jennifer Lewington, "Lessons of the Arctic Pilot Project," in *Politics of the Northwest Passage*, ed., Franklyn Griffiths (Kingston: McGill-Queens University Press, 1987), 167.

35 Ross Cohen, *Breaking Ice for Arctic Oil* (Fairbanks: University of Alaska Press, 2012), 24. In 2009 Prudhoe Bay's reserves were placed at 15.7 billion barrels produced with an additional 35–36 billion in proved reserves remaining (including nearby fields subsequently discovered); National Energy Technology Laboratory (NETL), *Alaska North Slope Oil and*

km to refineries in Washington State or 8,000 to the East Coast (through the Northwest Passage). At the time, the widespread assumption was that tanker transportation would be both easier and cheaper. Calculations varied but some estimates put tanker costs at up to 50 percent less than the pipeline alternative, with projected savings of up to USD$1.2 million per day.[36] Still, this was all speculation and guess work, since no company had ever attempted to run a tanker through the harsh ice-covered waters of the Arctic. Nor had any shipyard built anything like the necessary ice-strengthened vessels capable of year-round operations. What experience existed in Arctic navigation was largely confined to purpose-built icebreakers or seasonally employed cargo ships incapable of handling thick multiyear ice. If tankers were to be considered, a major test would be required, both to ensure that a passage could be made safely and to gather much of the technical data needed to build future fleets.

Rapid progress ensued. Only three months after the Prudhoe Bay discovery, Imperial Oil began working with the Canadian Department of Transport to arrange an Arctic tanker experiment. Requests were naturally made for Canadian icebreaker support and any ice data that the government could provide.[37] The ship which the Americans would send through Canadian waters was the 150,000-ton SS *Manhattan*, a retrofitted tanker and one of the most ice-capable vessels in the world at the time. If these tests proved successful, plans called for the construction of 26 to 30 massive 1,200 feet long icebreaking ultra large crude carriers of 350,000 tons, capable of carrying 1 million barrels of oil each.[38] By the end of August 1969, *Manhattan* was ready to sail.[39]

Overall, *Manhattan's* voyage was a success. The supertanker reached Prudhoe Bay in September 1969 and returned to the Eastern Seaboard the following month. While McClure Strait had proven impenetrable, the more southerly route through Amundsen Gulf was accessible, and transited without incident. While the ship withstood the Arctic ice very well, plans for future fleets were sunk in the Texas boardrooms by spreadsheets and evolving cost calculations. On 21 October 1970, Humble Oil suspended its icebreaker project in a shift

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Gas: A Promising Future or an Area in Decline? Addendum Report DOE/NETL-2009/1385 (April 2009).

36 A.H.G. Storrs and T.C. Pullen, "S.S. Manhattan in Arctic Waters," *Canadian Geographic Journal* 80:5 (1970): 167; Cohen (n 35), p. 29.

37 A.H.G. Storrs to Dr. Claude Isbister, 5 March 1969, LAC, RG 12, vol. 5561, file 8100-15-4-2, pt. 1.

38 Minutes of the 73rd meeting of the Advisory Committee on Northern Development, 19 December 1968, LAC, RG 112, vol. 29803, file 170–80/A6, pt. 7.

39 For the most detailed account of the *Manhattan*'s voyage and the economics and corporate strategy surrounding it see Cohen (n 35) and Whitney Lackenbauer and Adam Lajeunesse, eds., *In Manhattan's Wake*, Arctic Operational Histories (Antigonish: Mulroney Institute of Government, 2019).

towards pipelines. Initial cost estimates, which had given tankers the edge had changed during *Manhattan*'s transit and, by March 1970, were twice what they had been the previous year. By autumn 1970, Humble was assuming costs of US$1.1 billion for new Arctic port facilities, with much of the expense coming from significant dredging needed to deepen sea lanes and build loading facilities in the shallow waters of Prudhoe Bay. American physicist Edward Teller even suggested excavating with H-bombs. The 30 icebreaking tankers would have cost an additional US$2.2 billion.[40] Against the estimated US$1 billion for a pipeline across Alaska to Valdez, the Northwest Passage seemed uneconomical.[41]

While the tanker route to Alaska never materialized, Canadian resource companies were still energized by the North Slope discoveries. The effects of the Arab oil embargo of 1973–74, which quadrupled oil prices from US$3.00 to US$12.00 in less than a year, compounded that interest. By the summer of 1972, exploration activity and shipping in the Arctic islands was surging. In July alone, 17 ships carried 10 million gallons of petroleum, oil, and other lubricants and 100,000 tons of general cargo. Most of this was heading to Panarctic's base of operations at Rae Point on Melville Island, as well as forward stations on Ellef Ringnes, Ellesmere, Axel Heiberg, and Cornwallis islands.[42]

By the end of 1972, Panarctic had drilled 26 wells and discovered eight trillion cubic feet of recoverable gas,[43] with the largest discovery at Drake Point on the southern shore of Melville Island. There, the company's grand plan was to bring 250 million cubic feet of Drake Point gas per day to a liquefaction plant on the south shore. The scheme was ambitious, involving two year-round icebreaking LNG tankers, each longer than three football fields and able to move continuously through up to seven feet of ice, making 32 trips per year to facilities in Eastern Canada. The project was expected to cost CDN$1.5 billion for the ships and infrastructure, with a start date of 1983.[44]

To get the program started, four Canadian and American shipping companies (later reduced to three Canadian companies) formed Melville Shipping. In the words of Michael Bell, the senior Montreal shipping executive assembling the project, "everything depends on the shipping element. He who controls the transportation system controls the Arctic."[45] Control over that

40 Cohen (n 35), p. 135.

41 It should be noted that the Trans-Alaska Pipeline System, completed in 1977, also came in above budget, about US$7 billion over; Cohen (n 35), p. 163.

42 Richard Rohmer, *The Arctic Imperative* (Toronto: McClelland Stewart Ltd, 1973), 174.

43 Grey and Krowchuk (n 29), p. 116.

44 Lewington (n 34), p. 168.

45 Id., 166.

future shipping remained an open question, and by the early 1980s it seemed that Dome Petroleum—one of the largest commercial actors in the Arctic offshore—would come to dominate. Financed by debt and government support, Dome operated a significant fleet of icebreaking support and drill ships, managed principally by its drilling subsidiary Canadian Marine (Canmar). Some of these ships represented significant advancements over what industry had at its disposal when the boom began a decade earlier. The 2,000-ton *Canmar Kigoriak*, for instance, was an Arctic Class 3 vessel built in 1979 in less than a year. It spent a decade protecting drill ships in the Beaufort and many of its engineering innovations were incorporated into later icebreaker designs.[46]

Just to the east of the Drake field lay another important hydrocarbon asset. The Bent Horn oil field on Cameron Island was discovered in 1974 and brought online in 1986. Producing roughly 500 barrels of oil per day for Panarctic, it exported its product aboard MV *Arctic* after that ship's conversion into an Arctic tanker. The first cargo, sent to Montreal, totalled 100,000 barrels, with production increasing to 821 barrels per day in 1988.[47] Oil flowed from Bent Horn out through the Northwest Passage for ten years without incident and closed in 1996 after producing 2.6 million barrels of oil. This was Canada's most significant High Arctic hydrocarbon project, and the shipping that surrounded it was seen as both essential to its viability and a symbol of Canadian sovereignty and capability in its Far North. Those political considerations were ever-present for the Canadian government, which subsidized Canadian companies to ensure that this shipping would be done by Canadian vessels.[48]

While that optimism centred on oil and gas, mineral resource exploration and development surged ahead as well. The Nanisivik mine started shipping zinc and lead concentrate in 1977 and the Polaris mine came online in 1982. Resupply and cargo shipping often linked the two mines together, with ice strengthened cargo vessels MV *Arctic*, *Gothic Wasa*, and *Baltic Wasa* doing the lion's share of the shipping.[49] In the heady times that were the early 1980s, new zinc, iron, lead, cadmium, silver, copper, nickel, and other vital minerals were also expected to come from new and expanded mines at Strathcona Sound, Bathurst Inlet, Little Cornwallis Island, and Deception Bay.

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46 "New Powerful Icebreaker Under Construction at Gotaverken Arendal," *Maritime Reporter and Engineering News* (August 1988), 37.

47 Peter McKenzie-Brown, Gordon Jaremko, and David Fitch, *The Great Oil Age: The Petroleum Industry in Canada* (Calgary: Detselig Enterprises Ltd., 1993), 90.

48 Memorandum to Cabinet, "Arctic Shipping Policy and PanArctic's Bent Horn Project," 16 October 1984, LAC.

49 Wright (n 3), p. 183.

While the Arctic Islands saw the most mineral and gas production and shipping activity, the real opportunities seemed to lie further west in the Beaufort Sea. In the early 1970s, a fleet of drilling vessels hunted for more oil and gas, looking to recreate the North Slope successes in the Canadian offshore. New ship designs and technology allowed industry to push into the deeper offshore areas and extend the shipping and drilling season to up to four months. In 1972, Imperial Oil began building artificial islands from gravel dredged from the ocean floor and, over the course of the 1970s and early 1980s, major innovations in icebreaker design enabled a significant seasonal presence in those waters.[50]

This activity seemed to have positioned the Northwest Passage to become a major sea route. Estimates of hydrocarbon reserves across the Canadian North were increasing and oil was trading for 11 times more in 1980 than it had ten years earlier. In 1982, the Canadian Department of External Affairs provided Cabinet with a 15-year estimate of Arctic shipping which anticipated 390 annual full or partial transits of the Northwest Passage by 1987, increasing to 894 full or partial one-way trips by 1995.[51] Corporate forecasts were equally ambitious. In 1980, Dome anticipated commercial production of petroleum to start as early as 1986 and reach up to 1.5 million barrels per day by 2000.[52] To put these figures into perspective, when the government first opened offshore drilling in 1976, the country's oil production amounted to only 479,397 barrels per day.[53] If Dome's estimates were correct, national output would have seen a 300 percent plus increase.

Government tax incentives propelled this boom. The most significant was the Frontier Exploration Allowance, more commonly referred to as "super depletion" or the "Gallagher Amendment."[54] This 1977 amendment meant that 200 percent of expenditures over CDN$5 million per well could be written off against resource income elsewhere, putting companies' net cost below zero for those with marginal income tax rates above 50 percent. This policy was clearly aimed at the Arctic, given that nowhere else did a well cost CDN$5 million to drill. In 1979, the *Calgary Herald* calculated that, of the CDN$150 million spent in the Beaufort Sea in 1978 alone, Canadian taxpayers had covered between CDN$130 and 140 million in deferred taxes.[55]

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50 Id., 208.

51 Memorandum to Cabinet, "Status of Arctic Archipelagic Waters," 1 June 1982, LAC, RG 12, vol. 5561, file 8100-15-4-2 (s), pt. 4.

52 Dome Petroleum, *Beaufort Sea/Mackenzie Delta Development Plan*, Arctic Institute of North America Library, University of Calgary.

53 Statistics Canada, *Historical Statistics of Canada,* Table Q19–25, online: http://www.statcan.gc.ca.

54 So named after Jack Gallagher, the CEO of Dome Petroleum and the man most responsible for the lobbying which resulted in the system.

55 Jim Lyon, *Dome Petroleum: The Inside Story of its Rise and Fall* (New York: Buffalo Books, 1983).

The possibility of major international traffic along the route was a cause for celebration within the Canadian government, which had long hoped to spark economic growth in the region. Paradoxically, it also rekindled old concerns of sovereignty and control. In direct response to the voyages of *Manhattan*, Pierre Trudeau's Liberal Government instituted sweeping new environmental protection legislation to preserve the fragile Arctic marine ecosystem. Politically, the *Arctic Waters Pollution Prevention Act* (AWPPA) also served to solidify Canadian regulatory power over the region in the face of any potential American challenge to Canada's sovereignty.[56] At the same time, Canada expanded its territorial sea from three to 12 nautical miles to close parts of the Northwest Passage as territorial sea.

Further government efforts throughout the decade sought to strengthen and codify Canadian jurisdiction. In 1976, Cabinet informed the relevant government departments that they should begin applying Canadian law and regulations to the northern waters. How this was to be executed prompted discussion and debate, since existing legislation might render enforcement difficult. Canada's right to apply its customs duties or criminal law to ships or drilling installations outside of the 12-mile territorial limit remained uncertain. The *Customs Act* and the Criminal Code only applied within waters that were officially declared Canadian—thus excluding much of the water in the Arctic Archipelago.[57] Formally claiming sovereignty over these waters was politically sensitive given the ongoing resistance to such claims by the United States.[58] As such, Canada continued to control and regulate Arctic activity outside any explicit claim to sovereignty over what it considered internal waters. In 1977, the *Northern Canada Vessel Traffic Services Zone Regulations* (NORDREG) were established to facilitate vessel reporting and track ship positions for vessels over 300 tons. In short, Canada followed a functional and pragmatic course.

Enforcing Canadian jurisdiction and supporting Arctic development was also a practical consideration. As such, the federal icebreaker fleet expanded. The icebreaker *John A. Macdonald* was completed in 1960, and *Norman McLeod Rogers* and *Louis S. St. Laurent* both launched nine years later. *Louis S. St. Laurent* was the first Canadian icebreaker built primarily for Arctic work and remains the government's largest and most powerful icebreaker. In the late 1970s and early 1980s three medium icebreakers were also completed. CCGS

56 On the AWPPA see Christopher Kirkey, "The Arctic Waters Pollution Prevention Initiatives: Canada's Response to an American Challenge," *International Journal of Canadian Studies* 13 (Spring 1996): 41–59.

57 Memorandum to Cabinet, "Status of Arctic Archipelagic Waters," 1 June 1982, LAC, RG 12, vol. 5561, file 8100-15-4-2 (s), pt. 4.

58 On this dispute see Adam Lajeunesse, *Lock, Stock, and Icebergs: The Evolution of Canada's Arctic Maritime Sovereignty* (Vancouver: University of British Columbia Press, 2016).

Pierre Radisson entered service in 1978, *Sir John Franklin* the following year, and *Des Groseilliers* in 1982, replacing *N.B. McLean* and *d'Iberville* (which were retired in the early 1980s). Displacing 6,600 tonnes, these new ships belonged to the Coast Guard's 1200-class and, while they spent some time in the Arctic, they were not principally intended for polar operations. The Canadian Coast Guard also received several light icebreakers capable of Arctic operations—but which were primarily intended for more southernly waters. CCGS *Griffon* was completed in 1970 and, in 1971, the government started to order its fleet of 3,800 tonne, type 1100 light icebreakers, with deliveries starting in 1985.

Canadian icebreakers supported offshore development by facilitating shipping while also contributing to the ongoing industry experiments into ice dynamics and ship design. Most of their work, however, was in support of local shipping and community activity. While dramatic voyages like that of *Manhattan* dominated the headlines, most Arctic shipping was routine community sealift. From the 1960s to the 1970s, somewhere between 90,000 and 110,000 short tons of supply traveled by sealift.[59] By the 1970s, the Hudson's Bay Company had left the business and this work shifted to private shippers, normally contracted by the Government of Canada. As was the case with industry, community shipping costs were high, ranging from CDN$125–200 per ton,[60] with most of these goods carried by a small number of companies with specialized craft: Fednav, Resolute Shipping, Chimo Shipping, Logistec Nav, and CA Crosbie.[61] By the early 1980s, Fednav emerged as the dominant shipping company in the Canadian Arctic. Primarily a dry cargo carrier, it operated two tankers, MV *Arctic* and *Axel Heiberg*, which supported the DEW Line sites, several mines, and all essential community resupply.

As shipping developed during the 1970s and 1980s, the optimism surrounding it was often tempered by persistent fears of its environmental impacts. The AWPPA had its roots in political concerns surrounding sovereignty and jurisdiction, but was also a genuine effort to stave off a potentially devastating spill. Several major oil spills from the time highlighted the dangers of moving that cargo through the North. The wrecks of the Liberian tankers *Torrey Canyon* in 1967 and *Arrow* in 1970 captured international attention and intensified fears about pollution in icy and often dangerous Arctic waters. Naturally, an exponential increase of large vessels carrying hydrocarbons or minerals across ice-infested, poorly charted passages raised the possibility of catastrophic disaster. After all, during its maiden Arctic voyage, *Manhattan*'s hull was torn

59 Wright (n 3), p. 291.
60 Price corrected to inflation in 1974 dollars.
61 See full table in Wright (n 3), p. 310.

open by the thick ice in McClure Strait—though without serious consequence to the ship or the environment.[62]

The response was a massive research and development program and, over the course of the 1970s and 1980s, Canadian resource and shipping companies developed new icebreaking designs and safety systems that proved highly effective. There were no major oil spills and little real damage to the growing fleet of Arctic capable vessels. The only major loss during the period was the *Finn Polaris*, a cargo vessel that ran into ice and sank in Baffin Bay in 1991.[63]

Engineering work done in the 1980s by industry groups reflected a great deal of confidence that regular Arctic shipping could be done safely. Companies like Dome Petroleum spent significant time and effort in designing new ships and calculating risks, ultimately concluding that the Arctic ships then on the drawing boards would be much safer than a conventional tanker operating in warmer waters, and as much as one hundred times less likely to have an accident.[64]

Maritime safety and environmental preservation were natural concerns for the residents of the Arctic as well. Canada's Inuit communities use Arctic waterways in their homeland for travel, hunting, and fishing. Indeed, the Inuit rely on these waters for their physical and cultural survival. In submissions to the Macdonald Royal Commission on economic development, Inuit spokespersons insisted that government policy recognize not only the value of shipping through the Arctic, but also "the importance of the Arctic seas to the economy of Inuit."[65] The Inuit Circumpolar Council (Canada) made the point even more succinctly in a 2008 publication entitled "the sea ice is our highway."[66]

As some of the major oil and gas projects progressed, Inuit Tapirisat of Canada (now Inuit Tapiriit Kanatami), which represented the 25,000 Inuit in communities across the Canadian North, offered criticism in the 1980s. Many Inuit feared marine pollution or disruption to their hunting grounds by tankers cutting through the ice or scaring away marine mammals. These concerns led to some of the first large-scale scientific studies of icebreaker impacts on

62 See P. Whitney Lackenbauer and Elizabeth Elliot-Meisel, *"One of the Great Polar Navigators": Captain T.C. Pullen's Personal Records of Arctic Voyages, Volume 1: Official Roles,* Documents on Canadian Arctic Sovereignty and Security (DCASS) No. 12 (Calgary: Arctic Institute of North America, 2018).

63 Wright (n 3), p. 183.

64 Ray Lemberg, "Hydrocarbon Transport and Risk Assessment," in *The Challenge of Arctic Shipping*, eds., David L. Vanderzwaag and Cynthia Lamson (Montreal: McGill-Queen's University Press, 1990), 198.

65 Peter Jull, "Inuit Politics and the Arctic Seas," in Griffiths, ed. (n 34), p. 56.

66 Inuit Circumpolar Council, *The Sea Ice is Our Highway: An Inuit Perspective on Transportation in the Arctic* (March 2008).

mammals and Inuit mobility. Inuit also voiced concerns through the Inuit Circumpolar Council (ICC).[67]

In addition to the practical considerations of pollution prevention, the prospect of large-scale shipping and development generated new impetus amongst Canadian Inuit to see a political settlement over their Arctic lands claims before any resource projects moved forward. In the Western Arctic, Justice Thomas Berger conducted the Mackenzie Valley Pipeline Inquiry to investigate the social and economic impact of moving Beaufort Sea gas south via the Mackenzie Valley. In 1976, the Berger inquiry recommended a ten-year moratorium on pipelines to resolve critical Aboriginal land claims issues.[68] In the east, the Canadian government and Inuit began the Nunavut land claim negotiations in 1975. The prospect of Arctic shipping catalysed discussions of Inuit self-government and influenced political discussions that ultimately produced new northern governing structures in the Canadian Arctic.

These political impacts outlived the shipping boom itself. In the early 1980s, Canadian oil and gas companies continued to design massive tankers, bring pilot projects online, expand their acreages, and even buy up shipyards[69] to help fulfill ambitious shipping and development plans. By the mid-1980s, however, industry confronted a new reality: low global prices. Arctic operations had always been premised on high global resource prices and generous government support, and both slipped away. Crude prices began to dip in 1981 and then fell precipitously in 1985. Drilling activity in the North quickly dried up and several of the largest companies folded. Dome Petroleum—the country's leader in Arctic offshore operations—was the most dramatic example, collapsing completely in 1987. Low oil and metal prices effectively scuttled the dreams of an Arctic bonanza so that, by the late 1980s, the oil, gas, and mining industries had largely evacuated the region. What the Canadian government and industry had expected to evolve into a major shipping route quickly reverted to a region of regular sealift and light tourist activity. Arctic scholar Oran Young's portending of an "age of the Arctic" in the mid-1980s proved premature.[70]

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67 Lewington (n 34), p. 174. The ICC is a multinational non-governmental organization representing Inuit across the circumpolar North.

68 Sarah Bonesteel, *Canada's Relationship with the Inuit: A History of Policy and Program Development* (Ottawa: Indian and Northern Affairs Canada, 2006), 55.

69 Dome Petroleum alone operated a fleet of three drill-ships, seven ice-reinforced supply ships and a cargo/base vessel through its subsidiary Canadian Marine Drilling; Dome Petroleum, *Beaufort Sea/Mackenzie Delta Development Plan* (November, 1980).

70 Oran Young, "The Age of the Arctic," *Foreign Policy* 61 (Winter, 1985–1986): 160–179.

6 Conclusion

As the chapters in this volume demonstrate, shipping and related issues in Canada's Arctic waters have returned to the forefront of academic, practitioner, and political discussion and debate in the early twenty-first century. Growing awareness about the effects of climate change on the cryosphere has stimulated both excitement and concern about the prospect of more accessible Arctic waters.[71] New patterns of maritime activity have emerged alongside a heightened tempo of longstanding ones. Nevertheless, one hundred years after Stefansson proclaimed the Arctic to be the 'new Mediterranean,' applying such a descriptor to Canadian Arctic waters remains more hyperbole than reality.[72]

Will Canada retain its resurgent interest in the region, or will it once again follow the boom-and-bust pattern of the last century? Will increased maritime accessibility, owing to reduced sea ice extent and thickness, exacerbate risks related to ship operations? Will new forms of Inuit-Crown partnership represent a break from the Ottawa-centric, colonial decision-making patterns of the twentieth century? Will efforts to designate low-impact shipping corridors, designed in coordination with the local Inuit communities to address concerns about the effects of expanded traffic on marine mammals and ecosystems, bear fruit? While the following chapters discuss these issues, enduring realities remain. Despite melting sea ice, challenges and dangers associated with maritime operations in the Canadian Arctic will persist. So too will the need to temper boosterism around newly 'accessible' sea routes with the sobering realities of oscillating cycles of resource extraction, a fickle and generally risk-averse marine transportation sector, and increasingly confident assertion by Inuit and other Northern Canadians about their desired futures for their homeland.

71 See, for example, Lawrence R. Mudryk *et al.*, "Impact of 1, 2 and 4°C of Global Warming on Ship Navigation in the Canadian Arctic," *Nature Climate Change* 11:8 (2021): 673–679.

72 See, for example, Frédéric Lasserre and Sébastien Pelletier, "Polar Super Seaways? Maritime Transport in the Arctic: An Analysis of Shipowners' Intentions," *Journal of Transport Geography* 19:6 (2011): 1465–1473; Lasserre, "Arctic Shipping: A Contrasted Expansion of a Largely Destinational Market," in *The GlobalArctic Handbook*, ed., Lassi Heininen (Cham: Springer, 2019), 83–100; Jackie Dawson, Alison Cook, Jean Holloway, and Luke Copland, "Analysis of Changing Levels of Ice Strengthening (Ice Class) among Vessels Operating in the Canadian Arctic over the Past 30 Years," *Arctic* 75:4 (December 2022): 2–17.