POLICY CONSIDERATIONS AND SUGGESTIONS FOR AN EVOLVING ARCTIC SHIPPING REGIME:

A PRIMER FOR CANADIAN POLICY MAKERS

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Ryan Farrell (student #300075089)

Supervisor: Professor Ross Finnie

ABSTRACT

A popular narrative suggests that climate change-induced year-over-year net sea ice melt will incentivize global shipping traffic to redirect itself en masse through the Northwest Passage. As Canada and foreign states do not agree on whether the Northwest Passage constitutes a legally-defined international strait, the extent to which this theory is true will have consequences for Canada's national interest. This paper analyzes and compares the existing body of climatological and shipping profitability projections in order to assess the likelihood that conflict will increase as a result of this disagreement. It then analyzes these projections in relation to Canada's current policy regime, the interests of major foreign states, and the potential economic effects that increased shipping would have on Canadian Inuit populations. In light of these considerations, it offers policy recommendations tailored to the economic and political circumstances of the Canadian Arctic: that the Government of Canada should recognize the limitations of its current policy regime, advocate for a stricter understanding of international maritime law, increase its Arctic military presence, strengthen environmental regulations, promote Arctic cruise tourism, seek greater cooperation with both the United States and Russia, and adopt a more defensive stance against the Chinese government's attempts to expand its influence in the region.

Keywords: Northwest Passage, Arctic shipping, Arctic sovereignty, Arctic policy

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1. INTRODUCTION

In Canada's far north lies the Canadian Arctic Archipelago, a remote and sparsely-populated constellation of islands jutting out from the North American continent into the Arctic Ocean. Between these islands lie a spiderweb of straits that together make up the fabled Northwest Passage, an artery connecting the Atlantic to the Pacific that was long sought after by European explorers but which was never successfully navigated until the twentieth century. It, together with Cape Horn and the Panama Canal, is one of only three avenues by which ships might cross from one ocean to the other. Most traffic elects to make this crossing via the latter option, not because the trip is shorter, but because conditions within the Northwest Passage have historically rendered it virtually innavigable. Circumstances in recent years, however, have cast this reality into question, and a greater number of vessels have chosen to ply the waters of the Northwest Passage each summer.

The Canadian interpretation of longstanding international law considers the waters of the Northwest Passage to be Canadian internal waters, transitable only with the Crown's permission. Certain other states interpret the law such that the Northwest Passage is an international strait, implying that any vessel has a right to unfettered access — whether the Crown grants permission or not. Until now, this difference in interpretation has been largely academic. But climate change has led to a gradual melting of the dangerous Arctic sea ice that keeps traffic away, and media reports are abuzz with the notion that a significant proportion of international shipping will reroute itself through the Northwest Passage in the decades to come.

Will the Arctic sea ice really melt to such an extent that shipping through the Northwest Passage becomes not only feasible, but commonplace? If so, how much more competitive might

the Northwest Passage be, relative to more traditional routes through the Panama Canal? Why might the Passage *not* be competitive for shipping, despite its apparent advantages? To what extent will demand for Northwest Passage shipping truly materialize? What could Canada gain from this, and what does she stand to lose? How could Canada's Indigenous populations in the Arctic benefit, and how might it harm them? Which states are most involved in this area, and what are their motivations? Is the current policy arrangement sustainable? These questions exist at the crossroads of economics and international relations, and their answers have profound implications for Canada's sovereignty. In this paper, I will attempt to deconstruct each of them.

2. INTERNATIONAL WATERS: THE REGIME TO DATE

Discussion of the legal regime over Canada's archipelagic waters must necessarily be informed by the international framework governing sovereignty over ocean waters in general. Historically, the anarchic system of international relations had been governed (or not) by Dutch political theorist Hugo Grotius' principle of *mare liberum*, or 'freedom of the seas.' Under this principle, sovereignty over the open ocean was held by no state in particular, save for a 3-mile strip extending from the shoreline, as this was generally held to be the range of a cannonball at the time. The seas "were free to all nations but belonged to none of them," as Grotius put it (Tufts University, 2018). In the first half of the 20th century, some countries began to extend this boundary in order to protect fish stocks and enforce laws in waters they considered to be important to their national interest. However, such extensions of sovereignty were unilaterally proclaimed and did not come about from any kind of universal treaty system (Tufts University, 2018).

In 1956, the United Nations met in order to negotiate just such a treaty, which they would call the United Nations Convention on the Law of the Sea, or UNCLOS. This first iteration of the conference, referred to today as UNCLOS I, established certain rights enjoyed by states, such as the freedom of navigation over the high seas and exclusivity over resources within a certain distance from one's coastline. However, it did not conclusively establish the rules surrounding precisely what waters a state may claim as its own territorial waters (Tufts University, 2018). UNCLOS II, for which negotiations began in 1960, did not meaningfully further the development of this regime. Negotiations for UNCLOS III, the third iteration of the conference, began in 1967 and finally concluded in 1982. It produced the set of universal rules that persists to this day governing states' powers over ocean waters. As Tufts University (2018) describes it, "[this] Convention was consciously written as a comprehensive articulation of the rights and responsibilities of states with respect to, among other things, navigation, exploitation of resources, and exploration of the world's oceans. Additionally, the Convention covers governance over the sea and related disputes." With a few notable exceptions, which will be discussed later in this paper, nearly all countries have formally signed onto UNCLOS III.

Under UNCLOS III, waters are divided into several categories (United Nations, 1982). A state's *internal waters* are made up of all those on the landward side of the average low tide mark. For all intents and purposes, these waters are legally synonymous with that state's land-based territory. A state's *territorial waters* extend 12 nautical miles (22 kilometres) from that line, and are also considered that state's sovereign territory with one caveat: foreign vessels are entitled to *innocent passage* through them. This means that they can travel through those waters freely, but must do so expeditiously and, in the case of military vessels, must do so in a non-threatening manner (e.g. with weapons in a non-ready position). It also means that submarines must travel on

the surface. In the *contiguous zone,* which extends another 12 nautical miles or 22 kilometres, the state may enforce customs, taxation, immigration, and pollution laws, but this zone is not considered part of that state's territory. The e*xclusive economic zone,* or EEZ, encompasses the others and extends a full 200 nautical miles or 370 kilometres from the low tide mark. Inside the EEZ, the state enjoys a monopoly on all natural resources. With some restrictions, this resource monopoly may be extended over the *continental shelf* should one exist beyond the predefined extent of the EEZ, but this can never exceed 350 nautical miles or 650 kilometres in total (United Nations, 1982). See Figure 1.

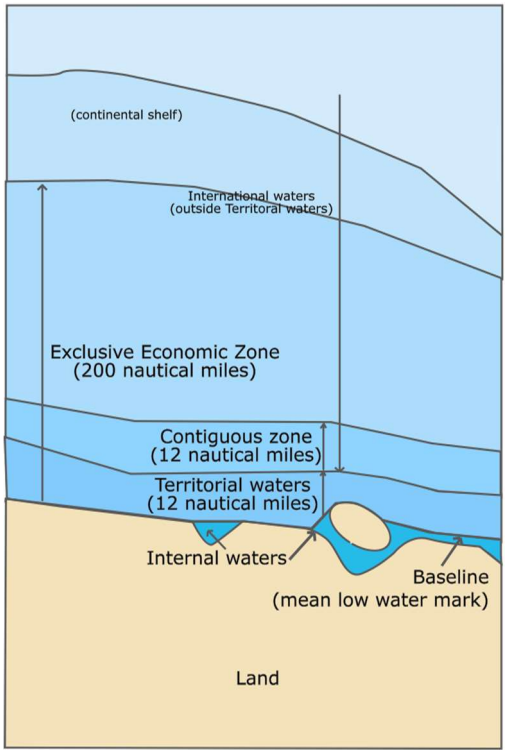

Figure 1 - A public domain illustration of UNCLOS maritime zones (Wikimedia Commons, 2006)

UNCLOS III provides for several special circumstances by which claims may deviate from this framework. In particular, Article 7 states that "in localities where the coastline is deeply indented and cut into, or if there is a fringe of islands along the coast in its immediate vicinity, the method of straight baselines joining appropriate points may be employed in drawing the baseline from which the breadth of the territorial sea is measured," (United Nations, 1982). In plain English, this means that states with offshore islands or especially jagged coastlines have the ability to draw, within reason, straight lines connecting low tide points. Everything contained within these lines would then take on the status of internal waters, over which, as previously described, the state would exercise absolute sovereignty. While UNCLOS III formalizes the drawing of straight baselines, this practice actually predates the convention, having been recognized by the

International Court of Justice in the resolution of the Anglo-Norwegian Fisheries Case of 1951 (Evensen, 1952).

In another exception to the rules outlined above, a special legal status applies to *international straits*. An international strait is a passage used for navigation between one body of international waters (or exclusive economic zone) and another. Even if an international strait is made up of waters that would otherwise be considered a state's internal waters, foreign vessels and aircraft enjoy the right of *transit passage* through such straits (United Nations, 1982). Transit passage resembles innocent passage in that it must be conducted expeditiously, but without the provision that it must be conducted in a non-threatening manner. This means, for example, that military submarines have no obligation to travel on the surface through international straits. Whether or not the Northwest Passage meets the legal definition of an international strait is the core point of contention in discussions of Canada's sovereignty over the Northwest Passage, and it is a discussion that has dire policy implications for Canadian security.

In 1996, the eight Arctic states — the United States, Canada, Russia, Denmark, Norway, Sweden, Finland, and Iceland — formed an intergovernmental forum called the Arctic Council. This council serves as a conduit for international cooperation on a number of issues such as scientific research, sustainable development, Indigenous rights, pollution monitoring, emergency preparedness, and others. While it has developed into the premier forum for consensus-driven Arctic governance, the Arctic Council was explicitly designed not to deal in the realm of geopolitical and security issues. Thus, while some of the secondary considerations of Arctic shipping — environmental regulation, search-and-rescue, or spill preparedness, for example — are tied to Arctic Council initiatives, the primary considerations at the core of the discussion (i.e. sovereignty and the law of the sea) exist outside of the forum's purview.

3. THE ANTARCTIC LEGAL REGIME

An understanding of the special international legal regime governing Antarctica is important for Canadian policy makers to grasp, as it is sometimes (wrongly) cited as a model that can be replicated in the Arctic. Although the circumstances of these two regions may seem similar at a superficial level, closer examination reveals that they are in fact fundamentally different, and policy makers should be rhetorically equipped to explain why.

The legal arrangement that persists in Antarctica today originally took shape in the 1950s. In the wake of the Second World War, there existed seven countries — France, the United Kingdom, New Zealand, Norway, Australia, Chile, and Argentina — that had at some point or another laid claim to portions of Antarctica, the oldest claim dating back to 1840. Claims were made on the basis of "sectors": a country in the above list would consider all Antarctic territory between two given longitudinal lines to be its sovereign territory (Rothwell, 1996). However, several of these sectors intersected with one another, implying the existence of territorial disputes. See Figure 2. While none of the above-mentioned countries had ever attempted to violently enforce their own territorial claim above that of another, it was an unresolved issue in the realm of international law that the great powers of the post-war era sought to remedy.

To the negotiating table in the late 1950s came those seven claimants, in addition to the United States and the Soviet Union, the two superpowers of the time. Together they came up with an innovative compromise which came to be called the Antarctic Treaty System. Under this treaty system, the existing seven territorial claims are neither affirmed nor denied, but the seven countries in question each agree not to *enforce* their claims. Any country signing onto the treaty system thereafter (with the exception of the United States and the Soviet Union, now the Russian

Federation) also relinquishes its prerogative to lay a claim of its own in the future. The treaty system forbids military activity or the extraction of resources in Antarctica and surrounding waters (i.e. south of 60° latitude), and prohibits certain activities that would degrade the environment, but confers upon signatories the right to conduct peaceful scientific research on any part of the continent (Rothwell, 1996). This regime persists to date and had amassed 54 signatories as of 2019.

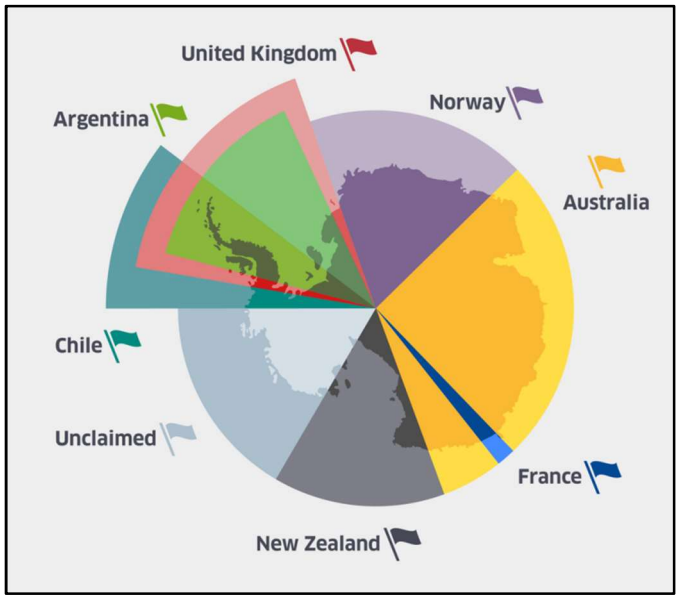

Figure 2 - Map of overlapping Antarctic territorial claims (UK Foreign and Commonwealth Office, 2016)

While the Antarctic Treaty System has been, for the most part, successful, there are several notable differences that make the Arctic fundamentally different from the Antarctic. One reason that the Antarctic Treaty System has prevailed to the extent that it has is that any given country, even a non-signatory, has little incentive *not* to comply with it. The seven claimant countries have much to lose from actively fighting over their purported territories, and little to gain. Unlike, for example, the United Kingdom's island-based overseas territories, there is little strategic benefit to either civilian or military occupation of Antarctica.

Furthermore, the continent's climate and remoteness confer a cost to the extraction of its mineral resources that make them uncompetitive with comparable deposits elsewhere. It would have been (and continues to be) relatively easy for the territorial claimants to agree to disagree, but simultaneously agree not to do anything about it, and for the rest of the world to simply go along with that arrangement. Antarctica is cold, barren, and remote. It is an island that nobody has

much use for, save scientific research, surrounded by water that few have a reason to wade into. The Arctic, however, is entirely unlike this — particularly if climatological predictions of widespread sea ice melt come to fruition. The Arctic is *water* (that people *do*, or at least *will*, have reason to enter) surrounded by *land* (the sovereignty of which is undisputed and upon which people do actually live), and, unlike pre-treaty Antarctica, the existing international legal regime — i.e. UNCLOS — dealing with sovereignty over Arctic waters at least purports to be comprehensive, even if parties' interpretations of it differ.

What makes the Antarctic legal regime so particularly frustrating for the Canadian discussion is that, even though the circumstances surrounding these two regions are vastly different, the Antarctic arrangement has created an expectation among certain parties (particularly mainland China) that the legal regime surrounding the Arctic will mirror that of its antipodal sibling. The behaviours that illustrate this attitude among Chinese government officials will be described in Section 9.

4. CANADA'S ARCHIPELAGIC CLAIM

Historically, there was little debate regarding sovereignty over the Northwest Passage. What is now Canada's Arctic Archipelago was first claimed by the British as the "British Arctic Territories" in the sixteenth century, based on expeditions conducted by Sir Martin Frobisher. The region was eventually transferred to post-Confederation Canada in 1880 and incorporated into the Northwest Territories (Smith, 1961). During that era, interest in the Northwest Passage's navigability existed only in the curiosity of explorers. In 1906, Norwegian explorer Roald

Amundsen made history when he became the first to successfully make transit at the end of a three-year expedition aboard his personal ship, the *Gjøa* (Marsh, 2013). At the time, the journey was considered so treacherous, and the region so remote, that none would likely have imagined the strait might present any commercial usefulness.

The next traversals would not be made until the 1940s and 1950s, when RCMP and Canadian Coast Guard ships transited through (Headland, 2020). In 1957, with permission from the Government of Canada and escorted by the Royal Canadian Navy, three United States Coast Guard ships also made transit. However, controversy arose in the late 1960s when oil was discovered in Prudhoe Bay, Alaska (Bryant, 2012). Exxon posited that it might be more profitable to ship the oil from Prudhoe Bay to the east coast of the United States via the Northwest Passage, rather than build a pipeline through Alaska and ship to the west coast. With the support of the United States government in 1969, Exxon loaded a single token barrel of Prudhoe Bay oil onto the SS *Manhattan*, the United States' largest merchant vessel and icebreaker at the time, and successfully sent it through the Northwest Passage (Bryant, 2012). In the end, Exxon scrapped the idea due to the route's unfavourable seasonability. However, the *Manhattan*'s proof of concept sent shockwaves across the Canadian political establishment, raising alarms that Canada's sovereignty in the Arctic was under threat.

No such challenge would be made again until 1985, when the United States sent its Coast Guard icebreaker *Polar Sea* through the Northwest Passage, without asking permission and in direct defiance of Canada's sovereign claims. In response, the Government of Canada invoked Article 7 of the then-recently established UNCLOS III, and drew straight baselines around the entirety of the Arctic Archipelago (Killas, 1987). See Figure 3. In 1988, the United States and Canada signed an "Arctic Cooperation" agreement by which the United States agreed to seek

permission before sending Coast Guard vessels through the straits. However, the agreement stipulates that the United States' asking of permission does not imply acceptance of Canada's Article 7 sovereignty claims. Tensions flared again in 2005 when it was reported that United States nuclear submarines had secretly traveled through Canadian Arctic waters without asking permission from the Government of Canada (Dowd, 2006).

While Canada continues to claim that the archipelagic waters are internal waters by virtue of the Article 7 baselines, the United States and certain others continue to label the Northwest Passage an international strait. Whether the Passage in fact meets this legal definition is at the heart of the argument, because if it does, then the special privileges granted under Article 7 do not apply (United Nations, 1982). Controversy arises from the fact that the criteria to be considered

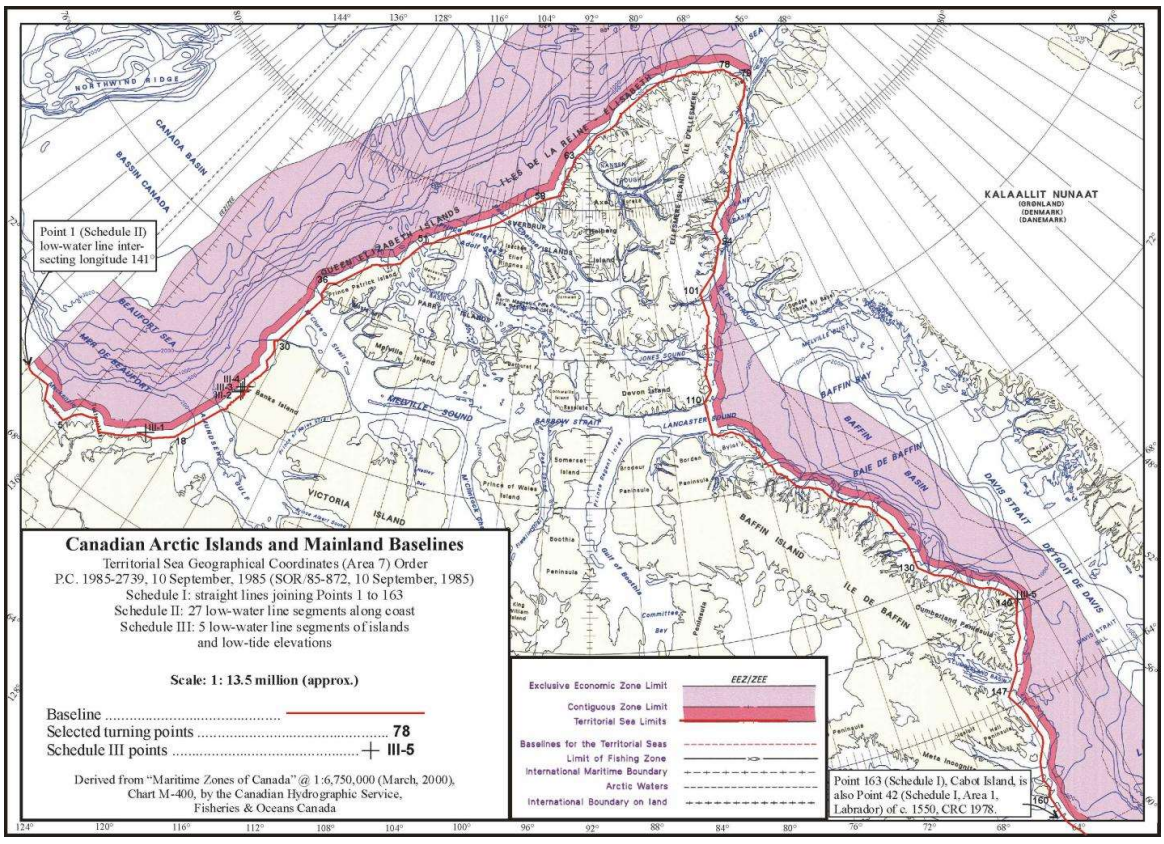

Figure 3 - Territorial baselines applied to the Arctic Archipelago as per UNCLOS Article 7. Canada considers waters within the baseline to be internal waters (Radio Canada International, 2016)

an international strait not only include the geographical situation, as described above, but *historical use as* an international strait (Killas, 1987; Pharand, 1988).

As there have only ever been three recorded crossings conducted in all of human history without prior permission sought from the Government of Canada (the *Gjøa*, the SS *Manhattan*, and the USCGC *Polar Sea*), Canada argues that a pattern of common historical use as an international strait use has not been established. Conventional international law provides for the establishment of "historic title" over waters that have consistently been controlled by one government to the exclusion of all others (Pharand, 1988). As the Crown has maintained exclusive control over the archipelagic waters to the exclusion of all others (barring the three incidents described above) since claiming the territory in the sixteenth century, Canada argues that the convention of historic title indeed applies (Pharand, 1988).

The transit of foreign vessels through the Archipelago thus exists in a legal grey area. The Government of Canada allows foreign craft to transit through the straits, so long as permission is sought beforehand and regulations are followed. From the Canadian perspective, this trend of permission-seeking bolsters Canada's historic claim — if foreigners truly perceived the Northwest Passage to be an international strait, they would not seek permission to exercise what they believe is a right conferred upon them by international law. From the perspective of foreign governments who do *not* recognize Canada's claim, permission-seeking is technically unnecessary but widely performed anyway if only to avoid confrontation. This agree-to-disagree arrangement has a profound effect on discussions of the Northwest Passage's future, as it creates, legally, less "middle ground" on which a compromise could be found should the popularization of shipping through the region result in a clash of interests.

5. THE CASE FOR PROFITABILITY

The business case for directing shipping through the Northwest Passage instead of the Panama Canal is quite simple: many high-volume routes that are currently directed through the Panama Canal would be made much shorter by doing so. In the shipping industry, a decrease in distance traveled (so long as speed remains constant) equals a decrease in time consumed, as well as a decrease in direct costs like fuel and crew. This phenomenon can be visualized using *SeaRoutes,* an online tool that allows shipping firms to plot the most efficient route between any two ports in the world. With this tool, one can measure the distance traveled between ports using either the Panama Canal or the Northwest Passage. As can be seen in Figures 4 and 5, most routes between East Asia and the east coast of North America, and many routes between northern Europe and the west coast of North America, are as much as one-quarter shorter when directed through the Passage. This imputes significant savings, not only in terms of the time and money required to

		Route	
		Panama Canal	Northwest Passage
Distance (nautical miles)	Yokohama to New York City	9719	7493
	Hamburg to Seattle	9159	7355
	Ho Chi Minh City to Corpus Christi	11594	11550
	London to San Francisco	8088	7704

Figure 4 - This table, compiled using online routing tool *SeaRoutes* (2020), illustrates the time savings offered by the Northwest Passage. Although the Ho Chi Minh to Corpus Christi route is likely unrealistic, its inclusion serves to illustrate that the path between virtually any East Asian and east coast North American city north of these two, respectively, is shorter via NWP.

ship any given load of goods, but in the additional opportunity of firms being able to ship a greater number of loads within a given timeframe.

The reason firms virtually always use the Panama Canal, even when the Northwest Passage would be more efficient, is because the Northwest Passage has historically been blocked by sea ice in both summer and winter. As it stands, so little shipping makes its way through the Northwest Passage that the crossing of even a single commercial vessel often attracts media attention. According to a document compiled by the Scott Polar Research Institute at the University of Cambridge, there had been a cumulative total of 313 transits of the Northwest Passage, via any route, from the beginning of recorded history to the end of the 2019 navigation season (Headland, 2020). This number includes all vessels ever known to have made the crossing, including military ships, pleasure craft, cruise ships, and others. Only a small minority of crossings have been commercial in nature.

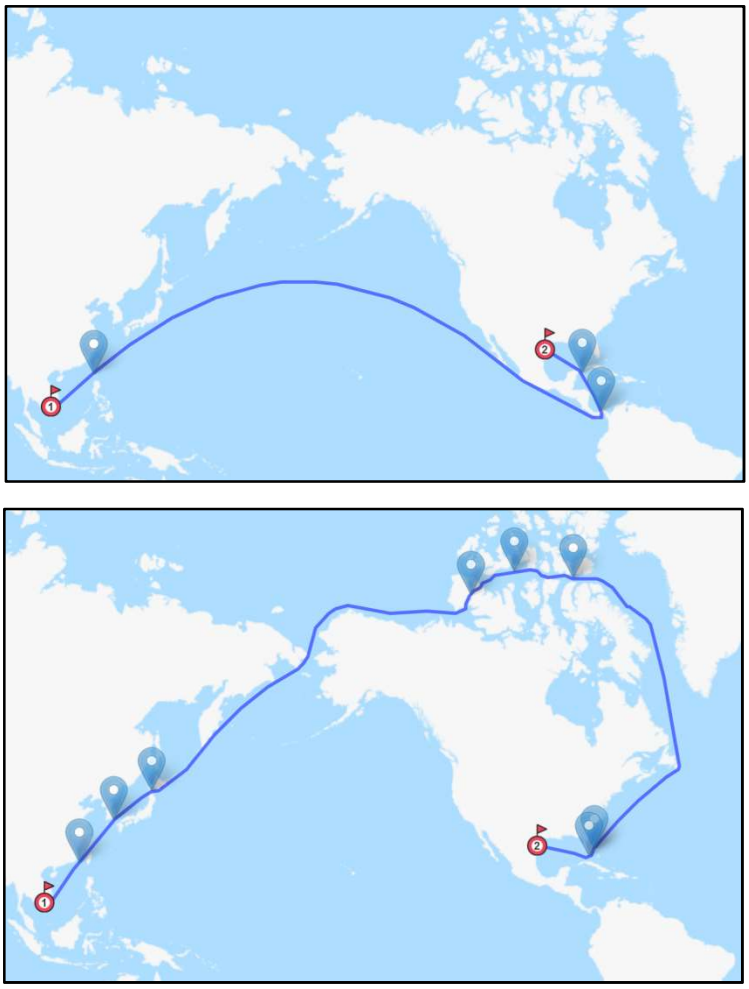

Figure 5 - Routes between Ho Chi Minh City, Vietnam, and Corpus Christi, Texas. Although the Panama Canal route (above) appears faster when projected on a flat surface, the Northwest Passage route (below) is slighter shorter in reality. This is due to the curvature of the Earth. (Rendered using *SeaRoutes* online routing tool, 2020.)

However, climate change has had a dramatic effect on this historical reality. According to Environment and Climate Change Canada (2019), the Canadian Arctic is warming at twice the global average rate. Increased temperatures have caused the Arctic sea ice, which traditionally would partially melt each summer and reform each winter, to melt slightly more and reform slightly less on average with each passing year. This phenomenon has made it such that the straits of the Northwest Passage, which would historically "open up" only rarely and sporadically, to do so with greater frequency. Many speculate that as this trend continues, shipping will reroute itself en masse from the Panama Canal to the Northwest Passage in order to shorten voyages and thus increase profitability.

It is difficult to quantify exactly how much the shipping industry stands to save by doing so, but patterns in the industry can offer clues. Although container shipping makes up only one part of the global shipping industry, the relative ease of quantifying the per-tonne costs and volumes involved makes this sector attractive to analyze. Findings can then, to an extent, be extrapolated to the rest of the industry. Constructed of aluminum, the standard shipping container is twenty feet long, and the size of a larger container is expressed as a multiple of this number: the twenty-foot equivalent unit, or TEU (Routley, 2019).

According to the United Nations Conference on Trade and Development (2019), or UNCTAD, a total of 28.2 million TEUs were shipped between East Asia and North America in 2018, of which 20.9 million of which were eastbound and 7.4 million were westbound. A further 8.0 million TEUs were shipped between North America and Europe, of which 3.1 million were eastbound and 4.9 million were westbound. Simply examining the effect that an open Northwest Passage would have on East Asia to east coast United States routes gives one an idea of the magnitude of economic gain that is theoretically possible. According to IHS Markit (as cited in

Mongelluzzo, 2017), a compiler of U.S. seaborne import and export data, 30% of container volume flowing from East Asia to the United States crosses the Panama Canal to be delivered to ports on the east coast. Applied to UNCTAD numbers for 2019, that amounts to approximately 6.3 million TEUs. Although per-TEU costs on these routes change each year and are different for each port, according to UNCTAD (2019) data, they generally fall between 1000 to 1500 USD per TEU. See Figure 6. (These numbers were higher in the past, but have decreased significantly due to an expansion to the Panama Canal that was completed in 2016. This will be discussed in greater detail later in this paper.)

Table 2.10 Container freight market rates, 2010–2018

Freight market	2010	2011	2012	2013	2014	2015	2016	2017	2018
Trans-Pacific	(Dollars per 40-foot equivalent unit)								
Shanghai–United States West Coast	2 308	1 667	2 287	2 033	1 970	1 506	1 272	1 485	1 736
Percentage change	68.2	-27.8	37.2	-11.1	-3.1	-23.6	-15.5	16.7	16.9
Shanghai– United States East Coast	3 499	3 008	3 416	3 290	3 720	3 182	2 094	2 457	2 806
Percentage change	47.8	-14.0	13.56	-3.7	13.07	-14.5	-34.2	17.3	14.2

Figure 6 - Shipping costs from Shanghai to the North American coasts. Shanghai makes for a convenient example, as it is centrally located on the East Asian coast. Note that numbers cited are per 40-foot equivalent unit, which is equal to 2 TEUs (UNCTAD, 2019)

If a given route between East Asia and the east coast of the United States is, for example, 23% shorter via the Northwest Passage (using Yokohama to New York; see Figure 4), shipping firms could potentially deliver somewhere in the range of 130% as much product (i.e. 100/77) at 100% of current inputs, or 100% as much product at 77% of current inputs, or somewhere in between. At the existing 1000 to 1500 USD per TEU market rate, and a per year volume of 6.3 million TEUs, the value imputed is somewhere in the range of 6.3 to 9.5 billion USD on the East Asia to United States east coast routes alone. Of course market rates per TEU delivered would fall

significantly if this were to happen, but this number does not even include traffic in the other direction, nor traffic to or from northern Europe, nor the rest of the (non-containerized) shipping industry at large. It does, however, give one a rough sense of the magnitude of potential involved, and explains the stars in the eyes of those who advocate for utilization of the Northwest Passage.

Additionally, shipping firms' profit margins could also increase thanks to the avoidance of Panama Canal fees. Firms must pay the Panamanian government to move a ship through the canal. The fee structure varies based on the size of the ship, the number of TEUs it is actually carrying, and the total number of TEUs the firm moves throughout the year, but range between 85 and 100 USD per TEU (Leigh, 2017). For the 6.3 million U.S.-bound TEUs crossing the canal eastward, that would amount to somewhere between 535.5 million and 630 million USD saved.

Discussion of the Panama Canal fees raises the question of whether Canada might charge fees to traverse the Northwest Passage, which would in turn decrease shipping firms' profit margins and raise revenue for the Government of Canada. In short, the potential for Canada to institute such a system seems unlikely. Although the literature occasionally mentions the hypothetical possibility of Northwest Passage access fees coming into being at some unspecified point in the future, it is likely that the authors who mention such are not familiar with UNCLOS or the tenuous 'agree-to-disagree' political arrangement in place.

UNCLOS states that foreign vessels enjoy the right to transit an international strait unimpeded (United Nations, 1982), and although Canada does not technically consider the Northwest Passage to be an international strait, the institutionalization of a fee-charging scheme in order to utilize the Passage *as* an international strait *would itself imply* that the Passage *is* in fact an international strait — in which case, fees cannot be charged. At least with the current permission-seeking scheme, Canada can maintain the argument that permission to enter internal waters is granted on an ad hoc

basis and is technically not guaranteed. A fee-charging scheme would hypothetically guarantee any vessel access so long as environmental regulations are adhered to and fees are paid, which would in turn establish a pattern of common international usage *as* an international strait — which itself defines an international strait. There does not seem to be a way around this Catch-22. Thus, the discussion of potential profitability is likely limited to shipping firms and would likely not include the Government of Canada.

Despite the rosy picture painted by cursory looks at shipping volumes, market rates, and distances involved, the reality is not so simple. Certain academics attempt to use more sophisticated modeling to project profitability by factoring in variables unique to Arctic shipping that would detract from profit. Lasserre (2014a), for example, conducted a comprehensive meta-analysis of 26 models of Arctic shipping profitability, 20 of which were published relatively recently (i.e. after 2006). Lasserre is generally critical of studies that take an optimistic view of commercial viability, as he argues that such studies do not account for the numerous variables that would detract from profitability. He then attempts to construct his own model that accounts for what he perceives to be the shortcomings of others. Lasserre (2014a, p. 145) analyzes as many variables as he feasibly can, but, in the end, admits that his own review "underlines the difficulty of defining credible parameters to build up a model that could assess the profitability of Arctic shipping." Those numerous variables will be discussed in detail in Section 7.

However, the entire premise of this enterprise is predicated upon the assumption that the Arctic sea ice will melt to the extent that shipping is feasible in the first place — this must therefore be discussed first.

6. CLIMATOLOGICAL STUDIES

Often, the popular media treats it almost as a given that polar sea ice will melt to the extent that Arctic shipping will become a 'new normal.' However, there is not such a clear consensus in the scientific literature. Among predictions of the extent to which Arctic sea ice might melt in the coming decades, there exists a considerable deal of variation. In the following literature review, I will compare several notable studies that attempt to forecast this phenomenon. Although a great number of studies have been conducted, I have selected these studies in particular in order to showcase the spectrum of conclusions arrived at by the academic community.

Smith and Stephenson (2013) attempted to predict the future navigability of Arctic sea routes by applying two potential climate change scenarios ("medium-low" and "high") to seven existing sea ice circulation models. This study is limited in scope, as it concentrates its analysis on the month of September when Arctic sea ice is at its yearly nadir.

Smith and Stephenson (2013) found that for the Northwest Passage, under either climate change scenario, the route presents a 100% chance of transitability in any given year for ice-strengthened vessels by mid-century. For open water vessels, they predict the odds will be between 53% and 60%, making it a viable route more often than not. However, this only applies to the month of September; any other month of the year is expected to present significantly lower odds of transitability. For comparison, the historical trend for any given September was 15%, though this had increased to 27% by 2015. They also found that although the potential for true commercial shipping through the Arctic is limited by other factors such as economics, infrastructure, safety, and the environment, the likelihood of open water ships being able to freely transit the Northwest Passage "heighten[s] the urgency for a comprehensive International Maritime Organization

regulatory framework to ensure adequate environmental protections, vessel safety standards, and search-and-rescue capability in this unique and challenging polar ecosystem." This study represents a 'moderate' outlook for transitability.

Sigmond et al. (2018) applied several climate model simulations to existing sea ice patterns and calculated the probability of ice-free conditions by mid-century. Specifically, the simulations that they fashioned are modeled after potential warming thresholds foresighted by the Paris Agreement: the 'agreed-upon' goal of limiting global temperatures to 2°C above pre-industrial levels, the 'ideal' of further limiting this increase to only 1.5°C, and a less-than-ideal increase of 3°C. Like Smith and Stephenson's study, Sigmond et al. focused their calculations on the month of September for any given year. What makes this study unique is that they attempt to account for a factor that other authors usually do not: while other studies "only consider the period prior to global temperature stabilization," Sigmond et al. (2018, p. 408) argue that "ice-free probabilities [will] continue to evolve thereafter." In other words, they hypothesize that sea ice extent will

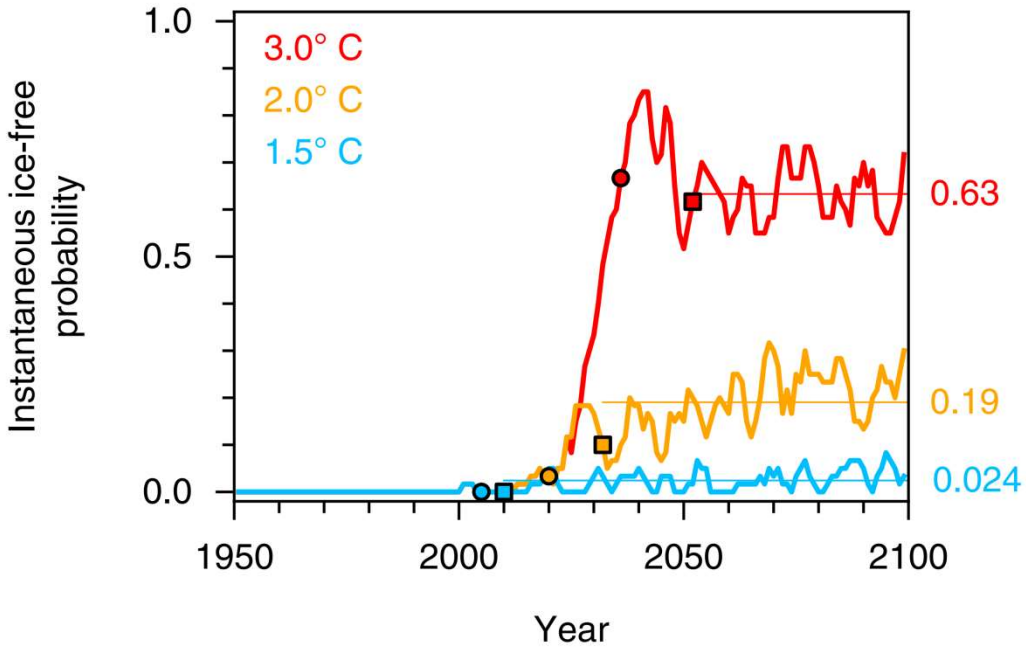

Figure 7 - Projections by Sigmond et al. illustrating the odds of an ice-free Arctic summer in any given year, under three potential climate change scenarios (2018)

continue to wane even after the global temperature reaches one of the Paris Agreement thresholds, and account for this factor, whereas others end their projections at that point.

Sigmond et al. (2018) found that before accounting for the above-mentioned variable, the probability of September sea ice-free conditions in any given year at the 1.5°C threshold would be 13%, and at the 2.0°C threshold, 50%. However, after accounting for the way that they predict sea ice will continue to melt even after the global temperature stabilizes, they predict a probability of sea ice-free conditions in any given year of 24% at 1.5°C, 19% at 2.0°C, and 63% at 3.0°C. See Figure 7.

While entirely sea ice-free conditions are not a prerequisite for transitability (sea lanes could be transitable even if the entire Arctic is not ice-free), if the calculations presented by Sigmond et al. prove to be correct, this study imports a 'lower-end' projection for transitability.

Diebold and Rudebusch (2019) utilized different methods for their predictions, and came to a different conclusion. While many other projections are based on the application of large-scale climate models to existing sea ice patterns, Diebold and Rudebusch argue that previous climate models had generally underestimated the amount of sea ice loss because they attempt to extrapolate big-picture scenarios from granular calculations. Taking a different approach, they chose to study decades of satellite photography dating back to 1978. As the satellites use a special type of microwave photography unaffected by cloud cover, they allow for consistent and quantifiable data over a long period of time.

Diebold and Rudebusch (2019, p. 7) found that, observed from above, Arctic sea ice losses since 1978 have followed a largely linear pattern. They acknowledge that "linearity is not assured by the physical science," that "there are a variety of climate feedback mechanisms that could hasten or retard the pace of sea ice loss," and that "long-range sea ice extent projections from

large-scale global climate models appear dominated by feedback mechanisms that slow the rate of September sea ice loss over time," (2019, p. 8). When adjusting their initially linear predictive model to a quadratic model (see Figure 8) upon accounting for those assumed feedback mechanisms, Diebold and Rudebusch (2019) actually come to the conclusion that the pace of Arctic sea ice loss will *increase,* not level off, eventually reaching zero around 2045.

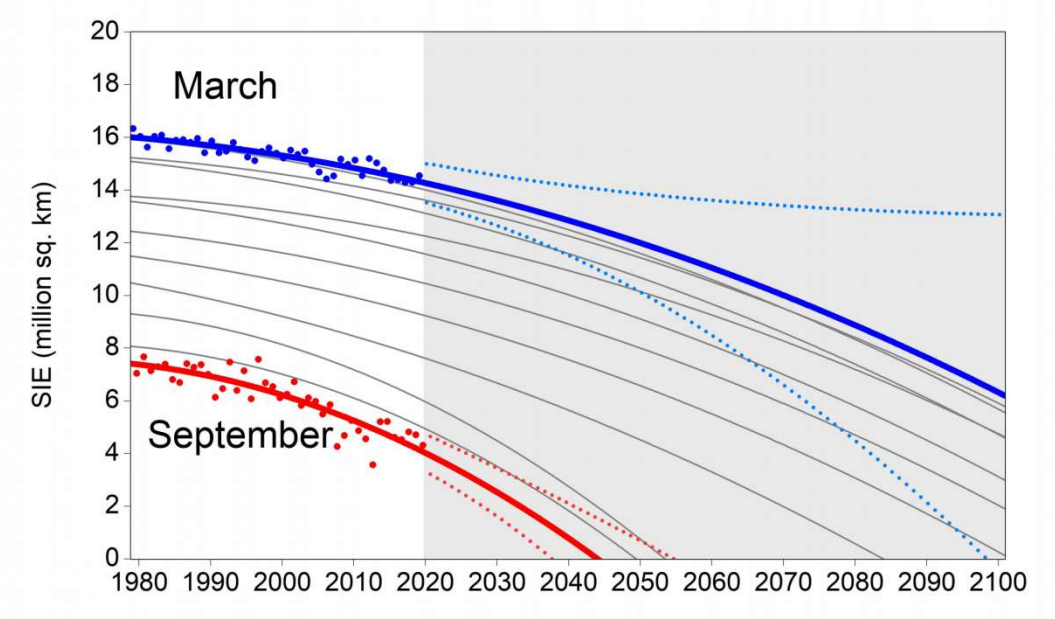

Figure 8 - Diebold and Rudebusch project lower Arctic sea ice extent (SIE) in any given year than most other researchers (2019)

This is markedly different from most other predictions. Diebold and Rudebusch do highlight the fact that climate-based models applied in the past had significantly *over*predicted the extent of sea ice that would exist in recent years, potentially lending credence to their calculations. If they are correct, there is no question that the Northwest Passage would be transitable by mid-century, regardless of a vessel's iceworthiness. This study represents a 'higher-end' projection for transitability.

7. FACTORS LIMITING THE VIABILITY AND PROFITABILITY OF ARCTIC SHIPPING

As can be seen from the climatological projections, the extent to which the Arctic sea ice will "open up" the Northwest Passage is a subject of debate — and beyond that, there are a number of economic variables that must also be taken into account. As identified by Lasserre (2014a), many of the more optimistic projections fail to account for a slew of factors, both practical and political, that would limit the viability of commercial shipping through Canada's Northwest Passage.

In maritime shipping, fuel is normally the single largest cost involved in any transit, often accounting for 45 to 50% of operating costs (Drewry Shipping Consultants, n.d.). Most large ships use a type of fuel called Heavy Fuel Oil (HFO), which is the thick, tar-like oil left over when lighter hydrocarbons such as gasoline or kerosene are distilled from crude oil. HFO is by far the most polluting type of fuel, but it is the cheapest. This makes it attractive to marine freight companies, which burn it on the open ocean where environmental regulations are relatively lax, or, in the case of international waters, may as well be nonexistent. As Lasserre (2014a) notes, most studies assume that transits through the Northwest Passage will utilize HFO, and integrate its low price into their calculations. As cited by van Luijk et al. (2020), the International Maritime Organization concluded that between 2010 and 2018, 37% of ships in the Arctic representing 45% of miles traveled in that region ran on HFOs, and nearly all of those vessels were cargo-bearing.

According to Lasserre (2014a, p. 150), "[HFO] may be widely used but it is not well-suited for very cold temperatures that will keep prevailing in winter in the Arctic." The Canadian Coast Guard uses a more expensive — but more suitable — 'naval distillate' fuel for all its summer operations in the Arctic, and an even more expensive distillate for winter operations. The use of HFO biases one's calculations toward profitability, but this may not be the case if commercial

vessels find the need to use more expensive distillates for considerations of safety and reliability. These fuels normally carry a >30% premium over HFO (Lasserre, 2014a, p. 150) — not an insignificant difference for the largest single cost incurred by an industry whose profits are made at the margin.

Furthermore, even if HFO were to prove practical for Arctic shipping, it may soon be disallowed for use in the Arctic altogether due to mounting environmental concerns. In recent years, calls for an international ban on the use of HFOs in Arctic waters have been multiplying. In February 2020, the Government of Canada stated that it would support a ban (as quoted in Maritime Executive, 2020), and observers widely believe that such a ban will indeed materialize by 2024. If and when it does, shipping companies will have no choice but to accept the higher price of distillate fuel should they wish to ship through Arctic waters, and will have no choice but to factor that increased cost into their cost-benefit analyses.

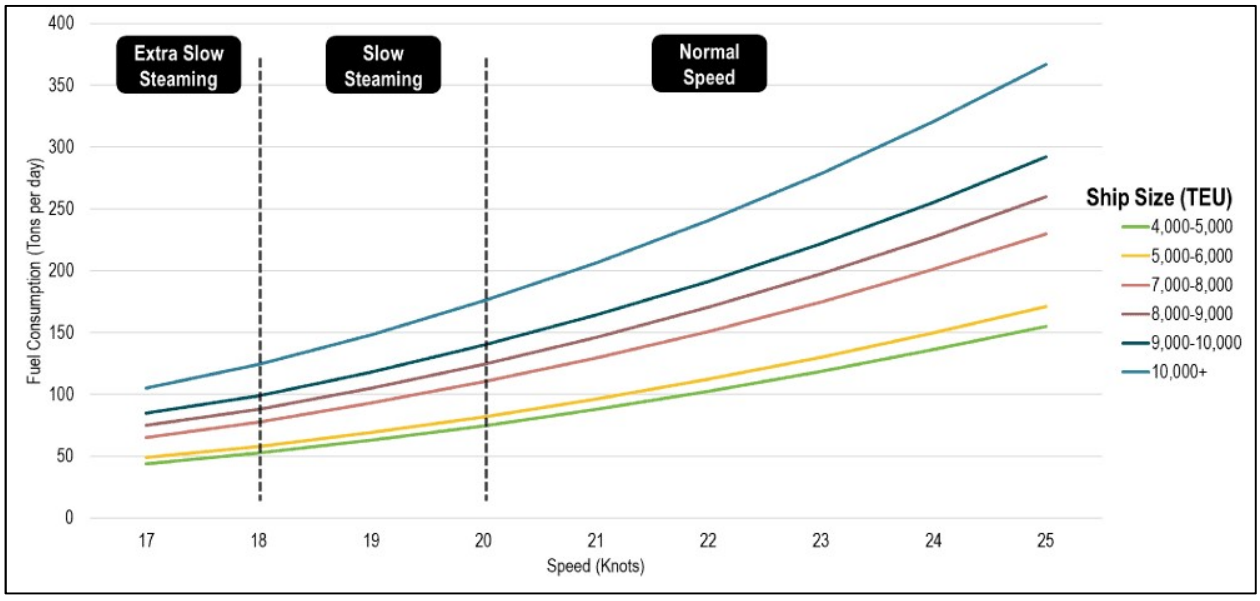

Figure 9 – A ship's fuel efficiency is inversely related to the speed at which it travels. The difference between 24 nautical miles per hour and 21 nautical miles per hour, for example, amounts to a 21% change in fuel use per mile (Transport Geography, 2020b)

Lasserre (2014b) points out another deficiency in the body of literature in that studies vary wildly in their estimates of vessels' travel speed through the Arctic. Some estimate average travel speeds as low as 7 knots (markedly slow) and others as high as 28.5 knots (faster than most cargo ships over the open ocean). These numbers differ by a factor of four. This is significant, as the average travel speed could have a make-or-break effect on the route's profitability. The purpose of traveling through the Northwest Passage is to save both time, which in turn allows for a greater number of trips to be made, and per-trip ancillary costs like fuel, crew, and insurance. Most containerships are designed to travel at speeds around 24 knots (Transport Geography, 2020b). It is reasonable to assume that, even if sea ice melts to the extent that the Northwest Passage is navigable, the presence of leftover drift ice, icebergs, and 'growlers' (dense, barely-floating ice chunks one or two metres in diameter) might force ships to travel below this speed. While slower speeds will save on fuel — a drop from 24 knots to 21 knots, for example, will save approximately 24% on fuel costs per nautical mile (Transport Geography, 2020b) — they will also lengthen a journey's duration, increasing costs in other ways. See Figure 9. Furthermore, variability in speed could have negative effects on the just-in-time aspect of international commerce.

In 2014, the International Maritime Organization, or IMO — the United Nations agency tasked with regulating shipping — published the International Code for Ships Operating in Polar Waters, also known as the Polar Code (IMO, 2017). The stipulations put forth by this Polar Code will increase capital outlay for companies that wish to ship through the Arctic by forcing them to use ships that meet certain design parameters within that region. Although these requirements only became mandatory as of 2017, they evolved from earlier guidelines for "polar class" vessels created in the 2000s, so a body of literature does exist on what kind of premium these ships might carry. If one excludes outliers on both the low and high ends, most estimates place this premium

between 20% and 40% (Lasserre, 2014a) — a considerable margin, as even a moderately-sized containership can cost upwards of $100 million. Considering that money now is generally worth more than money later, one must also factor in the opportunity cost imposed by this increase in up-front costs. Polar class ships are also heavier than non-polar class ships capable of carrying an equivalent load; they are thus slightly less fuel-efficient. Should shipping firms choose to go this route, the increased costs imposed by a Polar Class ship's lesser fuel efficiency would be carried year-round, while the advantage of being able to send that ship through the Northwest Passage can only be enjoyed for part of the year.

Another cost factor for which researchers have trouble agreeing on estimates is that of insurance (Lasserre, 2014b). The Northwest Passage presents many challenges that insurance companies will no doubt factor into the cost of policies for ships plying those waters. Not only does the presence of sea ice and growlers have the potential to damage a ship, the Northwest Passage is often plagued by dense fog that makes navigation around those obstacles difficult, resulting in increased risk. Should ships be damaged or otherwise run into trouble, there are no deepwater ports along the way to which they can retreat, unlike on Panama Canal routes. And should the worst happen, a search-and-rescue operation, salvage operation, or spill cleanup will likely be much more expensive than in other regions, given the Canadian Arctic's remoteness and ecological fragility. With this many factors to consider, scholars' estimates of the potential cost of insurance for such voyages vary widely. Some suggest such a policy might cost as low as 16.7% more than the cost to insure a similar voyage routed through the Panama Canal, and some suggest a premium as high as 100% more. Furthermore, insurance companies will likely demand that ships traversing the Northwest Passage be equipped with more experienced crews than would be

required elsewhere. Based on interviews with executives from Lloyds of London, Guy et al. (2016) estimate that the resultant increase in crew costs could fall anywhere between 20% and 100%.

Draft height requirements are also a concern, as many of the narrow channels that make up parts of the Northwest Passage can be quite shallow. Ships have become larger and larger as economies of scale have improved. In the 1960s, the average container ship only held about 500 TEUs (Guy et al., 2016). In the 1980s, economies of scale pushed ship sizes up to the maximum dimensions that the locks of the Panama Canal could accommodate (Transport Geography, 2020a). These ships, dubbed *Panamax* ships, could have a maximum draft height of 12 metres and could carry about 4,000 TEUs (Autoridad del Canal de Panamá, 2005). While larger *post-Panamax* ships continued to be constructed and used on other routes in the decades thereafter, only ships at or below the Panamax dimension limits could pass through the Panama Canal, bottlenecking further improvement on the route's economies of scale. This changed in 2016 when the Canal Authority finished an ambitious expansion project that introduced larger locks. Ships designed according to these new maximum dimensions, called *Neopanamax* ships, can carry up to 14,000 TEUs with a draft height of up to 15.2 metres (Autoridad del Canal de Panamá, 2009).

Figure 10 - A public domain illustration of routes through the Northwest Passage. There are three routes through the western end of the Passage. In the north is the McClure Strait; in the south, the Union Strait; the Prince of Wales Strait lies in between (Wikimedia Commons, 2005)

Ships transiting the Northwest Passage can choose between several straits on the western end of the crossing. See Figure 10. Guy et al. (2016) note that the more southerly option through the Union Strait is thought to be capable of safely accommodating ships with a draft height of only 13 metres or less. While the more northerly McClure Strait is capable of accommodating much larger vessels, it is exposed to dangerous drift ice throughout the summertime, even in years when other parts of the Passage are open. As discussed previously, only eleven commercial cargo crossings of the Northwest Passage had ever been made by the end of the 2019 navigation season. The document compiled by the Scott Polar Research Institute not only lists each of these crossings, but details exactly what route each vessel took as it made its way through the Archipelago, allowing for closer analysis (Headland, 2020). Not a single one of those vessels opted for the McClure Strait, even though in most cases such would have made for a shorter journey.

Lu et al. (2014) agree that the Union Strait can be as shallow as ten metres in some places, and that the McClure Strait should generally be avoided due to severe ice conditions. They recommend a third option through the Prince of Wales Strait that allows for larger ships to transfer between the northern and southern routes, bypassing the pitfalls of both. Indeed, several of the cargo crossings detailed by the Scott Institute (Headland, 2020) utilized this method and traversed successfully. However, Lu et al. (2014) fail to take into account this route's drawbacks. The Prince of Wales Strait is at the moment the more viable option for larger vessels, but it presents its own challenges. While it has a depth of over 30 metres at its southern end, several sources note that it becomes shallower toward the north, though just how shallow does not seem to be well-established. It is also under 10 kilometres wide (Ostreng et al., 2013), which Guy et al. (2016) note is a concern for larger ships traveling in numbers, especially if there is drift ice to avoid.

These questions of navigability raise concerns, as the proliferation of Panamax and Neopanamax ships within the industry shifts the discussion from one of technical feasibility to one of real-world practicality. If the McClure Strait is perennially unsafe, if the Union Strait can only accommodate midsize vessels with shallower drafts, and if questions exist about the ability of the Prince of Wales Strait to safely and reliably accommodate multiple larger vessels simultaneously, then there is a bottleneck on the extent to which Northwest Passage shipping can scale. It might be reasonable to assume that ships of Panamax dimensions or smaller (i.e. approximately 4,000 TEUs or less) could safely navigate the straits in numbers due to their shallower draft heights, but economies of scale have moved the industry away from the Panamax standard toward post-Panamax, Neopanamax, and post-Neopanamax sizes.

According to the United Nations Conference on Trade and Development (2019), "at the beginning of 2019, 25 per cent of capacity deployed on the Trans-Pacific route was accounted for by container ships of more than 12,000 TEUs of capacity, up from 19 per cent at the start of 2018

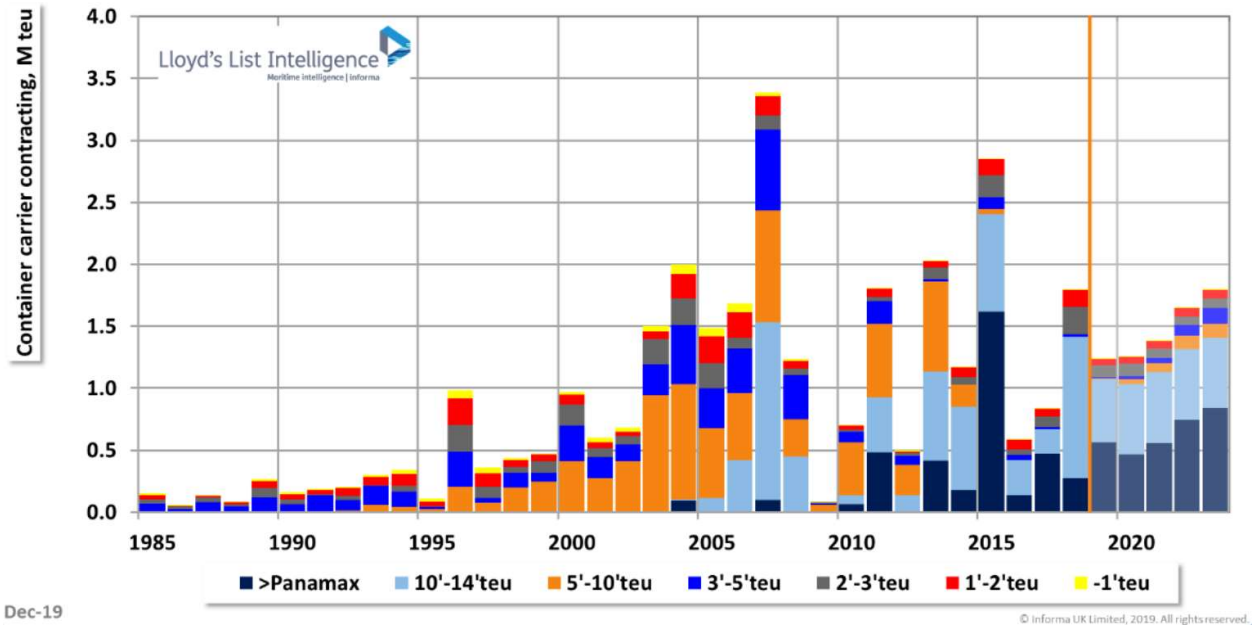

Figure 11 - Volume of containership contracting by tonnage bracket (Lloyd's, 2019)

and 7 per cent at the start of 2016." The JOC Group, a trade association that compiles intelligence on international transportation and logistics, reported a precipitous fall in the secondhand prices of Panamax size ships as soon as the Panama Canal expansion was completed in 2016 (Barnard, 2016) — implying that the industry's interest in these smaller vessels has waned. JOC has also reported (Mooney, 2017) that 95% of global capacity exists in the vessel range larger than 4,000 TEU (i.e. larger than Panamax).

Furthermore, Lloyd's of London maintains statistics on orders placed for new ships across the industry, and according to their data, this trend is only expected to accelerate. See Figure 11. Lloyds (2019) predicts that for ships delivered in 2021 through 2023, fully half will be of post-Neopanamax dimensions, and the vast majority will be at least post-Panamax. Only a minority will likely fall within the approximately 4,000 TEU limit — and therefore have the shorter draft heights demanded by the Northwest Passage — discussed earlier. And, while it is difficult to measure, it is likely that only a fraction of those ships on order will be Polar Code compliant. It is easy to see why the industry is moving in this direction. The cost of transportation per TEU per

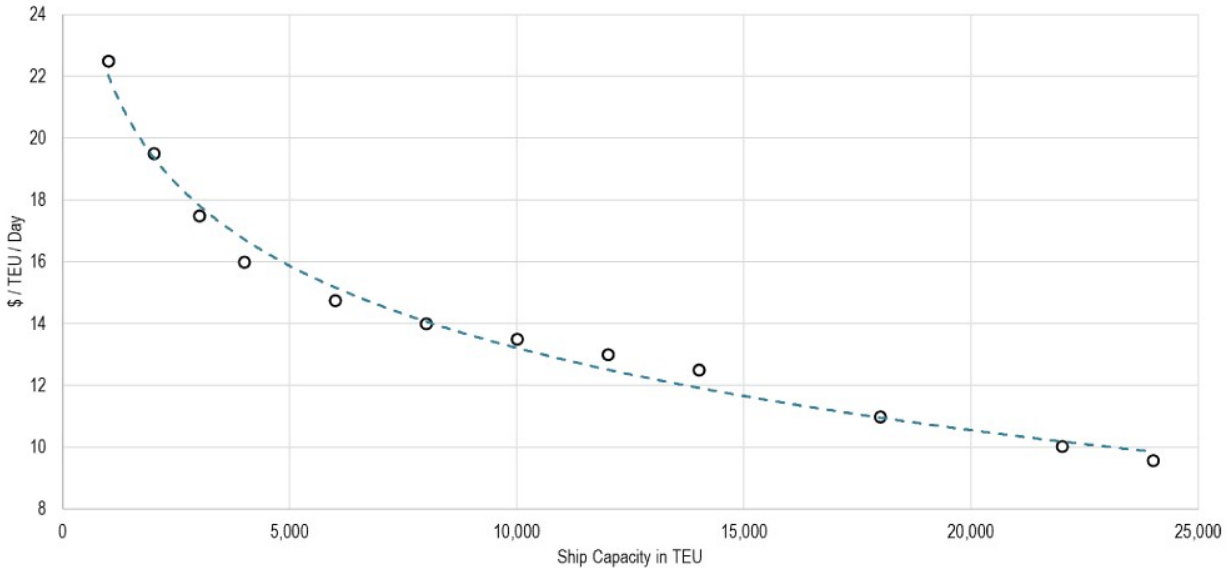

Figure 12 – Cost to operate containership in dollars per TEU per day (Alphaliner, 2020)

day is lower for ships with higher capacities, and the greatest savings are made at the lower end of this curve. According Alphaliner (2020), a 4,000 TEU ship costs on average $16 per TEU per day to operate. For a Neopanamax vessel at 14,000 TEU, this drops to somewhere between $12 and $13 per TEU per day. See Figure 12.

Should the Northwest Passage be unfavourable for larger vessels, as much of the literature suggests, this cost factor alone would be enough to suggest that at best a minority of Panama-bound traffic would better be rerouted through the Arctic. If one takes into account that the Northwest Passage would compete not only with the Panama Canal but with intermodal ship-to-inland-rail options (by which goods are shipped to the less-convenient coast, then transported cheaply by train), which can accommodate even larger post-Neopanamax vessels with even greater economies of scale, the competition against the Northwest Passage appears strong.

Finally, there is the general concern regarding the Northwest Passage's overall reliability. Even if the route is seemingly navigable, conditions can change without notice, and unexpected drift ice, fog, or other unforeseen challenges could contribute to delays. Much of the Northwest Passage is, after all, uncharted waters — both literally and figuratively. As of 2012, only 6% of Arctic waters had been charted to international standards, and only 11% had been mapped at all (Trauthwein, 2012). This stands in contrast to the reliability of the Panama Canal, where precise timeslots are booked in advance and Canal Zone authorities assume control of larger ships to ensure a smooth transit. Should difficulties arise, costs would be incurred down the line due to the just-in-time aspect of modern supply chains. If one takes into account the fact that Panama Canal routes are more expensive but more reliable than the competing intermodal rail options, it is likely that this just-in-time aspect is even more important for goods shipped via the Canal than it is for goods shipped otherwise, hence why customers are willing to pay the premium that it commands.

For shipping firms weighing the Northwest Passage against the Panama Canal, the potential costs imputed by these additional risks would need to be built into their pricing schemes.

When all of these factors are viewed in unison, one can see that there are serious questions about the true profitability of shipping through the Northwest Passage. In the absence of real-world market activity, some of these limitations are more quantifiable (fuel costs, capital outlay, draft height requirements) than others (insurance costs, reliability of just-in-time). However, as the body of literature shows, even these 'quantifiable' costs are in fact far from precisely estimated.

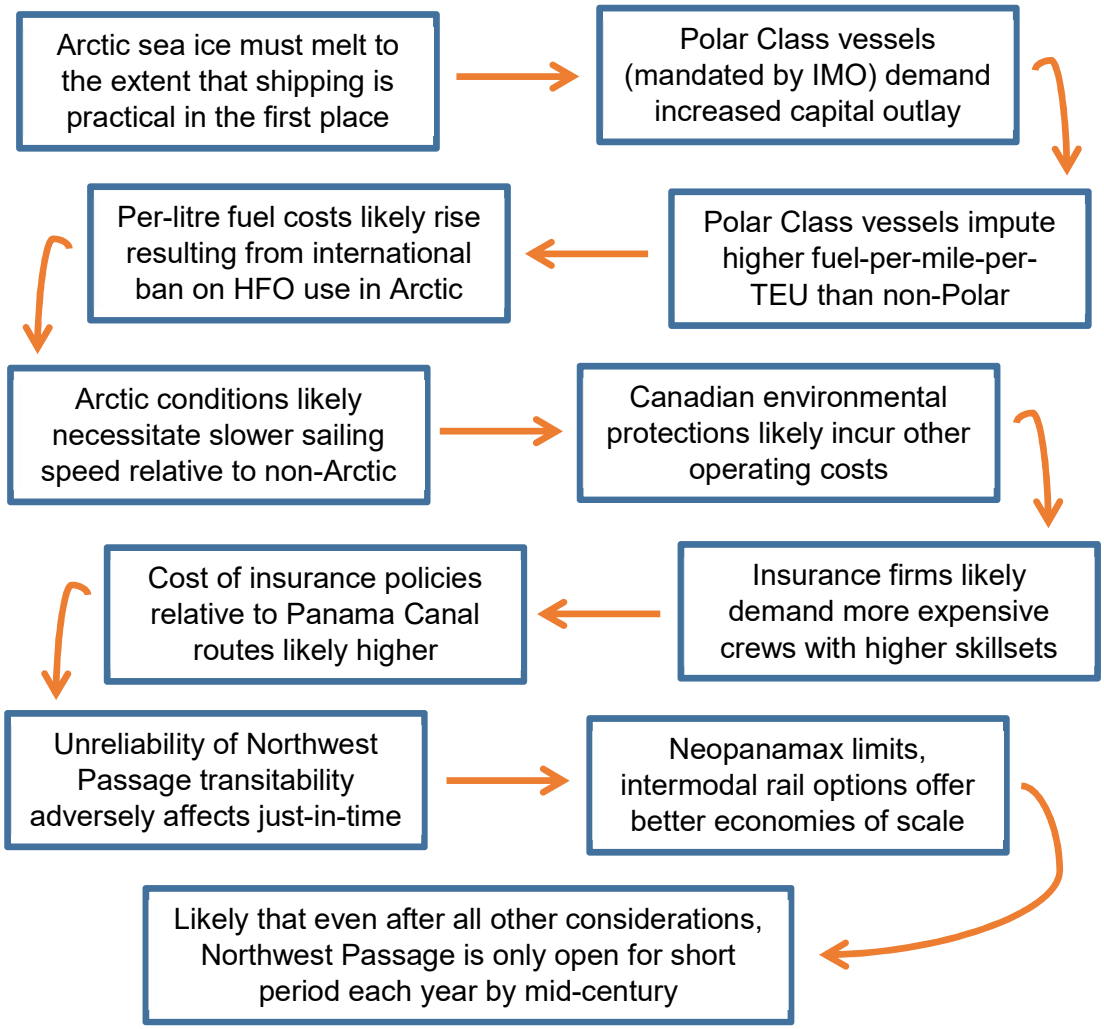

Figure 13 - A spatial illustration of each of the risks and additional cost factors that shipping firms might face. In order to choose the Northwest Passage over the Panama Canal or another route, a shipping firm would have to consider the Passage's savings in terms of time and distance to outweigh the cumulative costs imputed by each of these factors.

8. ECONOMIC EFFECTS ON CANADA'S ARCTIC INDIGENOUS POPULATIONS

Policy makers in Canada have a legal obligation to consider the perspectives of Indigenous peoples when crafting policies that affect their land claims territories. While about half of the overall population of Canada's territories is Indigenous, this number is 84% in Nunavut, the territory that encompasses the vast majority of the Northwest Passage and which would be most affected by increases in shipping.

Among the world's ecosystems, the delicate balance of the Arctic biome is particularly fragile. The Inuit, who make up almost all of the Indigenous population of Nunavut, depend on a thriving population of marine mammals to meet their nutritional needs. Before they were settled into permanent communities by the Government of Canada in the mid-century, the Inuit diet was made up almost entirely of marine mammals, fish, caribou, and other wild game. In the modern era, most of their food is imported from southern Canada — but meat harvested from the land, called *country food,* still makes up an important dietary component in this region where food insecurity is rampant. Food insecurity is defined as a deficiency in the quality or quantity of available food such that one may be forced to go without eating regularly (Statistics Canada, 2018).

According to Statistics Canada (2018), 57% of Nunavut households were food insecure in 2017. This number increases to 66% among households with children under the age of 18, and, according to the Nunavut Food Security Coalition, 70% when measuring only Inuit households. These figures are by a wide margin the highest in Canada, which as a whole experiences a household food insecurity rate of 12.7%. According to the Government of Nunavut (2017), imported food items found in Nunavut grocery stores are multiple times more expensive than their equivalents in southern Canada. In 2017, for example, the average cost of one kilogram of cheddar

cheese in Nunavut was a staggering $34; ground beef, $16; chocolate, $56; bacon, $25; and potato chips, $30. High-quality perishable food is particularly expensive and hard to come by, and household budgets are limited, so marine mammals provide the local population an important source of fresh, unprocessed proteins and fats. Furthermore, the process of procuring country food — the hunt — is an important cultural tradition to the Inuit. Should its viability come into question as a result of external forces like shipping, it would likely transcend the issue of economics in becoming an issue of Indigenous rights as well. To an extent, it already has.

Both scientific studies and Inuit traditional ecological knowledge, called *Inuit Qaujimajatuqangit,* describe how the viability of the hunt is threatened by shipping through the Northwest Passage. According to the Arctic Monitoring and Assessment Programme, or AMAP (2018), "Ship traffic and associated activities may create numerous disturbances in the marine environment, ranging from direct injury, death, or displacement from key habitats to more subtle behavioral changes." Hauser et al. (2018) conducted an assessment of the threats posed by vessel traffic to eighty populations of seven species of Arctic marine mammals. They found that more than half of those populations (42 out of 80) are directly exposed to open-water transits, and that geographic bottlenecks (i.e. straits "serving as obligatory pathways for both vessels and marine mammals") were characterized by two to three times higher vulnerability than more remote regions. Narwhal, a species of significance to traditional Inuit hunting, was identified as particularly threatened.

The literature notes that marine mammals are not only vulnerable to the potential of vessel strikes, but to the loud and constant noise emitted by the cavitation of a ship's propellers. As noise travels much farther in water than it does in air, mammals can be deafened by this noise, and Inuit hunters have complained of deafened seals since as early as the 1970s. One Inuit hunter described

seals so “deaf [that a hunter] could almost go right up to the seals and puss was coming out of [their ears],” (Williams, 2016). Although the particular seals he described were suspected to have been deafened by seismic blasting and not propeller cavitation, the risk posed by the latter is widely thought to be significant.

Carter et al. (2017) conducted a survey of Inuit hunters and fishermen in order to identify, through Inuit *Qaujimajatuqangit*, their greatest concerns regarding the effects of Arctic shipping on game populations. They noted that the noise created by ships causes sea mammals to flee from their usual habitats, that mammals are affected by ships’ smells as well, that the use of sonar shocks or stuns sea mammals, and that seals in particular do not reproduce as well and do not taste as good when affected by constant propeller noise, among other phenomena.

Although the literature has not been able to objectively quantify the extent to which marine mammals would be negatively affected by mass shipping through the Arctic, as such has not yet taken place on a large scale, this theme is a constant. If shipping significantly affects Inuit hunters’ abilities to provide food for their families and communities in this region where food insecurity is already so high, it will exacerbate Inuit people’s financial situations by forcing them to devote a greater share of their budget to store-bought imported food. This is in addition to the damage that would be done to their cultural heritage if traditional hunting activities become more difficult.

Inuit well-being would also be affected by environmental factors such as air quality. According to Aliabadi et al. (2015), “while there are economic incentives to develop resources in the north, there are environmental concerns that increasing marine traffic will contribute to declining air quality in northern communities.” Increases in Arctic shipping have led to increases in pollutants such as nitrogen oxides, ozone, sulfur dioxide, and PM2.5 in areas adjacent to Northwest Passage shipping lanes (Aliabadi et al., 2015). While the increases have been small in

an absolute sense, given the region's geographical breadth and the low volume of shipping that actually passes through it, this trend is concerning. Aliabadi et al. (2015) note that concentrations can be expected to intensify significantly should traffic continue to increase, and as the Arctic ecosystem is more fragile than others, such increases could disproportionately affect that region.

Another pollutant, related to air quality in general but of particular concern in the Arctic, is black carbon. Black carbon is a sooty component of the fine particulate matter that is released when fossil fuels combust. What differentiates black carbon from other such particulate matter is that it eventually settles out of the air, accumulating in fine deposits on the sea ice. As ice is whitish in colour, it normally has a high *albedo,* the percentage of sunlight that it reflects back into the atmosphere (Brewer, 2015). When the ice takes on a grey or blackish colour due to black carbon deposits on its surface, its albedo increases substantially, causing it to absorb more solar radiation than it otherwise would. This in turn causes the ice to melt faster, exacerbating the existing trend of year-over-year net melt (Brewer, 2015). Such melting carries implications not only for the environment but for the continued viability of traditional Inuit hunting practices, which are made difficult, dangerous, or impossible when once-reliable ice shelves become fragile or unstable. And, as the accumulation of black carbon visibly sullies what would otherwise be pristine and untouched Arctic vistas, this phenomenon carries a special potential to cast a negative light, both literally and figuratively, on policies that allow or encourage the shipping that directly causes it.

However, not all the effects of increased ship traffic would or could be deleterious to Inuit well-being. Cruise ship-based tourism is one area that has the potential to bring considerable economic benefit to local communities. In years past, Arctic cruises were few and far between. This trend has evolved recently, with tourist cruises in that region becoming more frequent. In

2016, the *Crystal Serenity* made history in becoming the largest cruise ship to ply the waters of the Canadian Arctic, with more than 900 passengers onboard (The Associated Press, 2016). The *Crystal Serenity* spent 32 days in the Northwest Passage, and made call at a number of predominantly Inuit communities along the way. Media outlets both lamented the climate change that had made this once-unthinkable phenomenon possible, and remarked optimistically at the potential benefits that well-heeled cruise passengers could bring to the region. Tickets for the *Crystal Serenity* commanded a $20,000 price tag, with premium cabins going for six times that number (Coppes, 2017).

The ship's owners have not replicated the itinerary in the years since, nor do they have plans to do so in the future, leaving the voyage of the *Crystal Serenity* a one-off — at least for the time being. It may be that 2017 was a particularly ice-free year, and similar conditions are yet unlikely in any given cruise season. If so, this would highlight the unreliability of the Passage's navigability. Regardless, smaller cruise vessels do continue to navigate the Passage each year, and have been doing so on an upward trend.

The Government of Nunavut Department of Economic Development and Transportation (2019) reported that in 2018, the territory received eight cruise ships carrying 3,404 passengers over the two-and-a-half month cruise season. Those cruise operators spent an estimated $376,000 to access community services including tours, cultural performances, and logistics support. This number increased to $677,000 in 2019, and neither of those figures include cash spent by the ships' passengers within the communities (George, 2020). The hamlet of Pond Inlet alone hosted 17 cruise ships in 2019, and a Nunavut official remarked that any given port call can bring tens of thousands of dollars in passenger spending on items like marine mammal products, prints,

carvings, and hand-sewn items (Neary, 2019). Opportunities exist to expand this sector, and Arctic communities will likely continue to capitalize on them.

However, AMAP (2018) does warn that "cruise ships constitute a special case of shipping because they actively seek out areas of special interest, including superior wildlife-viewing opportunities — often in areas that are poorly charted, off the main navigational corridors. This situation creates risks to vessels and also creates the potential for cruise ships to have greater impacts on high concentrations of wildlife." Policy makers in Canada must thus take care to craft policy in a way that maintains a balance between accessibility for cruise operators and environmental protections.

9. INTERESTS OF MAJOR FOREIGN STATES

Any state with interests in the shipping routes that stand to benefit from being rerouted through the Arctic would in turn have an interest in the Passage's legal status. However, three states in particular stand above the rest both in terms of their interest and their ability to exert pressure on Canada — or, conversely, to come to her aid. Those states are the United States, the Russian Federation, and mainland China, and each merits discussion.

UNITED STATES

Although the United States never ratified UNCLOS — President Clinton signed the convention in 1994, but its ratification died on the floor of the Senate — the United States is,

paradoxically, UNCLOS' strongest proponent (Larkin, 2010). Since the Second World War, U.S. foreign policy has consistently championed the freedom of the high seas and the rules-based nature of territorial delineation, and numerous policy statements reference UNCLOS in their promulgations. The U.S. Department of State (2017), for example, states that:

> U.S. policy since 1983 provides that the United States will exercise and assert its navigation and overflight rights and freedoms on a worldwide basis in a manner that is consistent with the balance of interests reflected in the Law of the Sea (LOS) Convention. The United States will not, however, acquiesce in unilateral acts of other states designed to restrict the rights and freedoms of the international community in navigation and overflight and other related high seas uses.

In asserting these navigation rights, the United States routinely conducts Freedom of Navigation Operations, or FONOPs, by which U.S. military vessels intentionally transit through waters that are claimed by other states in a manner that the U.S. government deems inconsistent with international law. Such FONOPs are carried out regularly in the South China Sea and other disputed waters, but have not been carried out in the Northwest Passage aside from the *Polar Sea* incident in 1985. (The term FONOP was not employed at that time.) From this pattern, it appears that the United States is primarily concerned with enforcing the rules-based international order in its projection of power with regard to maritime law, more so than simply protecting its perceived economic interests.

Under the Trump administration, however, one can see that the United States has adopted a more aggressive attitude toward Canadian sovereignty in the Northwest Passage, if only

rhetorically. In May 2019, U.S. Secretary of State Mike Pompeo (as cited in Blanchfield, 2019) delivered a speech at an Arctic Council event in Finland that labeled Canadian sovereignty over the Northwest Passage "illegitimate," claiming that "the U.S. has a long-contested feud with Canada over sovereign claims through the Northwest Passage." While the Trump administration has not continued to actively challenge Canadian claims since this incident, it raises alarms. Should future U.S. administrations choose not to back down from this more aggressive posture, it could embolden other parties who seek to increase shipping through the Northwest Passage in manners inconsistent with Canadian policy.

RUSSIAN FEDERATION

Russian interests in Arctic shipping lie not in Canada's Northwest Passage, but in Russia's own Northern Sea Route. Sometimes also called the Northeast Passage, this shipping lane off the coast of Siberia connects East Asia with Europe. During the 1980s, the Soviet government invested heavily in icebreaking capacity in order to develop this route, as it was thought that it would be useful in connecting several industrial cities on Russia's Arctic coast with the rest of the country (Lasserre, 2014a). However, development of the Northern Sea Route was abandoned when the Soviet Union collapsed, as the net loss that the route generated would no longer be sustained by the new market economy. Just as it has with Canada's Northwest Passage, though, climate change has rekindled interest in the route's economic viability.

While international law more or less precludes monetization of access to the Northwest Passage, the Russian government has developed a model for shipping through the Northern Sea Route by which they might profit. Instead of charging shipping firms for access, the Russian

model would see firms charged for the service provided by Russian icebreakers in clearing a path for them through the thinner sea ice that remains in the summertime. Questions remain as to how truly profitable this might be, but the Russian government has committed to an ambitious plan that would see infrastructure and icebreakers built through 2035 in order to service the route (The Moscow Times, 2020). The Russian government states that they have a target of at least 90 million tons shipped through the Northern Sea Route per year by 2030, and have committed to 84 different projects and measures in order to facilitate that (Middleton, 2020).

While the legalities of the Russian model have been challenged by entities such as the United States, it is likely that Russia's ability (or inability) to monetize the Northern Sea Route will in the end be determined by market economics and not by foreign states' argumentation (Todorov, 2017). Still, Russia does depend to some extent on the perceived legitimacy of the numerous projects it carries out in the Arctic in order to be able to profit from them; thus, Russia's sovereign claims in the Arctic could serve to bolster Canada's, especially given their permanent seat on the United Nations Security Council. Russia's voice could also potentially come to Canada's aid should the United States continue to hold the more aggressive posture adopted under the Trump administration with regard to Canadian sovereignty.

MAINLAND CHINA

Chinese ambitions in the Arctic cannot be overstated. In 2013, China joined the Arctic Council as an observer state, one without voting or decision-making rights but whose voice can be heard at Council functions. In 2017, the Chinese government sent its then-only icebreaker, the *Xuelong* (in English, *Snow Dragon*), on a "research expedition" to transit the Northwest Passage.

The vice-captain of the ship told reporters that "by taking [the Northwest Passage and the Northern Sea Route], we can save a lot of time… The large-scale use of the Northwest Passage could boost the development and utilization of the northern parts of Canada," (as quoted in VanderKlippe, 2017). Chinese state media labeled the Northwest Passage "a new sea lane for China," and one of the lead scientists aboard the ship confided in a reporter that the quantity of "academic findings was not very huge." He did state, however, that they collected data on "very decisive factors in judging the fitness of a passage for commercial use," (as quoted in VanderKlippe, 2017). The Chinese government went on to order a second icebreaker in 2017, to be built by a Dutch shipyard (Dixon, 2017). In 2018, the Chinese government commissioned its first domestically-produced icebreaker, dubbed the *Xuelong 2* (Gady, 2018), and commissioned the construction of an even more ambitious nuclear-powered icebreaker (Eiterjord, 2018), which has yet to be named.

Also in 2018, the Chinese government released a new 'Arctic Policy' document in which, despite even the northernmost tip of Chinese territory being more than 1,400 kilometres away from the Arctic Circle, it declared itself a "Near-Arctic State" and promised to earmark $1 trillion in Arctic-related spending (Chinese Communist Party, 2018). The Chinese Arctic Policy document is steeped in the type of liberal rhetoric that one would normally expect from the Trudeau administration, not the Chinese Communist Party. According to Hopper (2018), "China's policy is notable for its apparent overtures to woo liberal Arctic powers such as Norway, Canada and the United States. The document makes repeated references to sustainability, Indigenous rights, wildlife protections and the respect of international law." Joël Plouffe, a fellow at the Canadian Global Affairs Institute, characterized the document as "heavy on politeness because it is attempting to frame China as a responsible player in a region where it has no actual sovereignty," (as cited in Hopper, 2018).

Yet, the document uses its words very carefully so as not to affirm Canadian sovereignty of the Northwest Passage, and to assert a multitude of rights that Beijing purports to enjoy:

> The continental and insular land territories in the Arctic cover an area of about 8 million square kilometers, with sovereignty over them belonging to Canada, Denmark, Finland, Iceland, Norway, Russia, Sweden and the United States, respectively… States from outside the Arctic region do not have territorial sovereignty in the Arctic, but they do have rights in respect of scientific research, navigation, overflight, fishing, laying of submarine cables and pipelines in the high seas and other relevant sea areas in the Arctic Ocean, and rights to resource exploration and exploitation in the Area, pursuant to treaties such as UNCLOS and general international law… all States should abide by international treaties such as the UN Charter and the UNCLOS, as well as general international law.

The Arctic Policy document goes out of its way to specify that the sovereignty of Arctic states applies only to "continental and insular land territories," and goes on to list a number of rights supposedly enjoyed by non-Arctic states not only in the high seas (a legal synonym for international waters) but in "other relevant sea areas" — without specifying what those areas are.

The passages about abiding by the terms of UNCLOS are painfully ironic, as there is likely no state in the world more flagrant in its violations of UNCLOS than mainland China. The Chinese government claims the entirety of the South China Sea, stretching thousands of kilometres from its own coastline, as Chinese territorial waters. See Figure 14. These claims are not only wholly incompatible with UNCLOS (to which China is a signatory) in and of themselves, they impinge on the UNCLOS-delineated territorial waters and exclusive economic zones of a number of

neighbouring countries. In 2013, the Philippines filed suit at the Permanent Court of Arbitration (to which China is a party), claiming that China had infringed upon its territorial waters as per UNCLOS. In 2016, the Court delivered its verdict, stating that "there was no legal basis for China to claim historic rights to resources within the sea areas" in question (Permanent Court of Arbitration, 2016). To the consternation of the international community, China has ignored the ruling and gone on to build numerous military installations on islands in the South China Sea to bolster its claims. Several of those islands it violently annexed from other countries. One need only look at a map of the region to understand the absurdity involved, and the danger in assuming that China will respect UNCLOS in Canadian waters when it does not do so in its own backyard.

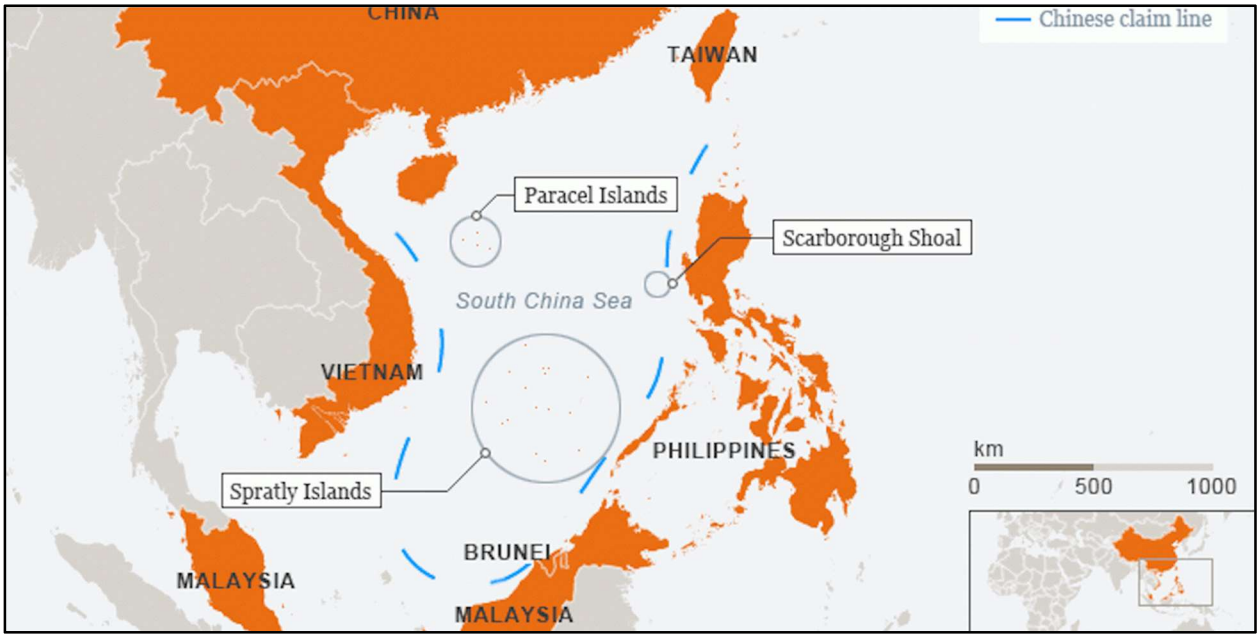

Figure 14 - A diagram of the South China Sea. In flagrant violation of international law, the Chinese government claims all waters within the blue 'nine-dash line' as Chinese territorial waters (Bandurski, 2017)

Alarmingly, the Chinese government enlists its state-owned enterprises in effecting its expansionist goals. In 2014, Chinese state oil companies began drilling inside of Vietnam's exclusive economic zone, prompting a tense military standoff (Kurlantzick, 2016). Kurlantzick

notes that in a world with near-infinite investment opportunities, no profit-driven, risk-averse corporation would naturally make a move so virtually guaranteed to invite military confrontation, and that the state-owned enterprise must therefore have been doing so at the direction of the Communist Party. For the Chinese government, profitability takes a backseat to the projection of Chinese power abroad. Not even the invisible hand of the market will deter a government that routinely weaponizes state-owned enterprises in order to realize its geopolitical ambitions.

Chinese designs on the Arctic are so pernicious that they are not even limited to Canada. In 2016, a Chinese company attempted to purchase an abandoned naval base in Greenland. This offer was rejected by the Danish government, which is responsible for the autonomous territory's foreign affairs. Chinese foreign investment in recent years has been marked by the acquisition of dual-use assets, such as airports and deepwater ports, which could be co-opted by the Chinese government for intelligence or military purposes. The Danish parliament voted in an overwhelming majority to spurn the offer and decided instead reopen the base as a strategic location for storing fuel and materiel, and for training Danish military personnel (Reuters, 2018). In a 2017 bid, another Chinese company sought to finance the construction of several new airports in Greenland. This bid was again rejected by Denmark (Hinshaw, 2019), for fear that if the Greenlandic government defaulted on the loans, the Chinese government might coerce Greenland into relinquishing possession of the property in the same manner that they have done with other geopolitically strategic infrastructure investments elsewhere in the world (Abi-Habib, 2018). In 2019, the Pentagon warned of the likelihood that China could be designing nuclear attack submarines for surreptitious use in Arctic waters (Sevunts, 2019).

Controversy erupted in May 2020 when Chinese state-owned enterprise Shandong Gold announced that it planned to purchase TMAC Resources, owner of the Hope Bay gold mine in the

Kitikmeot region of Nunavut, for $207.4 million dollars. This proposed sale will be among the first scrutinized by the Government of Canada after it announced in April that it would subject attempted takeovers by foreign state-owned enterprises to "enhanced scrutiny," especially in this period when the COVID-19 pandemic has driven down the market value of Canadian companies (Government of Canada, 2020). The mine's geographical situation is of particular concern, as it is located directly on the Northwest Passage. Richard Fadden, the director of the Canadian Security Intelligence Service from 2009 to 2013, stated that Ottawa should examine the proposed takeover with Canada's national interests in mind, and should pay attention to Beijing's strategy of gaining control over the sources of critical metals and minerals (Fife, 2020). Rylund Johnson, a member of the Legislative Assembly of the Northwest Territories, and Cathy Towtongie, a member of the Legislative Assembly of Nunavut, have both spoken out in opposition to the sale, citing the arbitrary imprisonments of Michael Kovrig and Michael Spavor (Neary, 2020). They suggest that Ottawa find a way to facilitate local ownership of the mine.

An admiral in the Chinese military once proclaimed via state media that "the Arctic belongs to all the people around the world as no nation has sovereignty over it," (as quoted in Chang, 2010) and that therefore, as China is home to one-fifth of the world's population, one-fifth of all Arctic resources belong to the Chinese government (as cited in U.S. Naval War College, 2011). While such a statement probably cannot be taken as official Chinese policy, it should certainly raise red flags regarding the attitude and intentions of the Chinese Communist Party vis-à-vis the Canadian Arctic. It would be naïve to take the Chinese government's Arctic Policy document at face value — Canadian policy makers would be wise to pay attention not only to the words of the Chinese dictatorship but to its actions as well, both within Canada and abroad.

10. POLITICAL SITUATION AT PRESENT AND IMPLICATIONS MOVING FORWARD

The Government of Canada has recently updated its policies in the Arctic through the release of its new Arctic and Northern Policy Framework (ANPF). The Trudeau administration announced in 2016 that it would develop a new Arctic policy to replace that of the Harper administration, but put the task off for years (Thurton, 2019). After missing multiple self-imposed deadlines in the summer of 2019, the government finally released the ANPF on September 10, just before the 2019 federal election. Stakeholders were largely unimpressed. The document was released as a wall of text on a webpage, with no accompanying glossy PDF, maps, art, or photo-ops. Despite Crown-Indigenous Relations and Northern Affairs minister Carolyn Bennett's claim that the new policy constituted "a profound change of direction for the Government of Canada" (as quoted in Bell, 2019), the ANPF was, for its prodigious length, largely absent of meaningful or novel content. The editorial board of one northern news outlet stated that the "last-minute delivery look[ed] suspiciously like a document that was issued just in time to avoid any criticism of failing the North by not delivering a promised policy package during the current election campaign" (NNSL, 2019).

Some of the delay can likely be attributed to the Liberals' strategy of "co-development," by which they sought to reach unanimous consensus on the final text with more than 31 partners, including the territorial governments and dozens of Indigenous groups (Bell, 2019). The failure of this strategy was evinced by the fact that the territorial governments and certain Indigenous representatives were, in the end, allowed to pen their own "Partner Chapters" as separate documents — documents linked to by Crown-Indigenous Relations' webpage, but not necessarily representative of official federal policy. At over 16,500 words in the core document alone, the

final product is vague yet all-encompassing, rife with goals and promises but offering few specifics.

Within those 16,500 words, "shipping" appears but four times (Government of Canada, 2019). The first instance notes that the melting of sea ice will create "increased commercial and tourism interests" that "bring increased safety and security challenges." It does not specify what form those challenges will take or how they will be addressed. The second instance mentions that higher levels of shipping will "increase the acute security risks associated with irregular movements of people and goods, the pursuit of foreign interests and human-induced disasters," which "highlight[s] the importance of enhancing situational awareness." The third instance states that increased shipping will "bring new risks for people, infrastructure and ecosystems," therefore, "considerations will need to be taken into account." The final instance is a commitment to "ensure safe and environmentally-responsible shipping" (Government of Canada, 2019). These nebulous proclamations do not inspire confidence, but they do establish a general policy direction in line with what has already been practiced. The Government of Canada seems intent on allowing shipping to grow, but will continue to put in place environmental protections in order to pre-empt its potentially deleterious effects.

The word "environment" and its derivatives appear fifty times in the core text of the ANPF, and the Trudeau administration has certainly shown an inclination toward strengthening environmental protections in the Arctic. Recently, they established two protected areas with special legal status. The first was the Lancaster Sound (or, in Inuktitut, *Tallurutiup Imanga*) National Marine Conservation Area, established in August 2019. Lancaster Sound is the body of water between Baffin Island and the Queen Elizabeth Archipelago in the High Arctic, and virtually any ship traversing the Northwest Passage, regardless of route, must at some point cross the sound.

The restrictions put in place by the area's conservation status are meant to ensure Inuit harvesting rights by protecting at-risk species (Parks Canada, 2019). The second protected area is the *Tuvaijuittuq* Marine Protected Area covering the extent of Canadian waters north of Ellesmere Island, the most northerly island in the Queen Elizabeth Archipelago. While this area would likely never be used for shipping anyway (*Tuvaijuittuq* translates to "the place where the ice never melts"), its designation strengthens the environmental regime in place and builds precedent should the government wish to further expand protections later on (Department of Fisheries and Oceans, 2019).

Together, these two protected areas cover approximately 427,000 square kilometres and account for approximately 7.45% of Canada's coastline. Among some northerners, including some Inuit, there is a sentiment that such large areas of Arctic waters were so quickly designated protected areas because they were seen by the Trudeau administration as an easy and non-controversial way to meet the self-imposed goal of protecting at least 10% of Canada's marine and coastal areas by 2020. It is likely that this is at least partially true — the Department of Fisheries and Oceans' own report on *Tuvaijuittuq* noted that the area experiences no shipping, mining, tourism, or Inuit subsistence harvesting at all (Department of Fisheries and Oceans, 2019). This of course raises the question of what the area's designated status is now protecting it from, given that prior to protection it had been used by virtually nobody for anything at all. Regardless, the continued pattern of incrementally strengthening environmental protections in the Arctic will likely have the effect of contributing even more toward the cost side of the cost-benefit analyses conducted by those who would one day ship through there.

One policy action not mentioned in the ANPF is the Government of Canada's recent construction of a naval refueling station at Nanisivik, an abandoned mining town on the northern

shores of Baffin Island. This station will facilitate the Arctic and Offshore Patrol Ship project, by which purpose-built Harry DeWolf-class ships will conduct armed presence and surveillance operations throughout the Canadian Arctic (Royal Canadian Navy, 2019). In the Arctic, older Halifax-class frigates have a short operating window between mid-August and mid-September. Their range is also constrained by limited fuel capacity and ice conditions. The Arctic and Offshore Patrol Ship project, however, will allow for operations to be conducted from mid-June through late October (Salter, 2019).

11. POLICY CONSIDERATIONS AND SUGGESTIONS FOR AN EVOLVING ARCTIC SHIPPING REGIME

One must recognize that the degree of political pressure that Canada will face is not necessarily synonymous with the degree to which Northwest Passage shipping will *actually* be profitable, whatever that may be. It will be a product of the extent to which the great powers of the world *suppose* it might be profitable, and of the extent to which they wish to project power regardless of profitability. Thus, the pessimistic outlook on actual profitability conveyed by this paper should not lull policy makers into a false sense of security — so long as Arctic shipping might appear profitable in the future, Canada will face political pressure to relax her sovereign claim.

Furthermore, even if shipping *does* turn out to be profitable for the shippers, Canada itself would have much to lose and little to gain. Certain thought leaders in Canada seem to be under the impression that increases in shipping through the Northwest Passage will somehow be

monetizable along the lines of the Panama Canal. This is likely false, as international law, depending on one's interpretation, either considers the Passage an international strait (in which case it is simply not monetizable) or internal waters (in which case it cannot be monetized, lest the act of monetization *make* it an international strait). The Government of Canada could, and likely will, continue to ride the fence on the issue of sovereignty versus openness via the existing permission-seeking scheme — the one by which foreign vessels are free to transit the Northwest Passage so long as they ask permission — but this has no effect on future monetizability.

Certain Canadian policy makers and thought leaders have also made assertions that the current permission-seeking policy arrangement actually *strengthens* Canada's sovereignty claims by virtue of the precedent built by said habitual permission-seeking. This view, painfully naïve, is like a frog, having found itself in an increasingly-hot pot of water, attempting to rationalize its situation by granting the water permission to get hotter. The 1988 Canada-U.S. Arctic Cooperation Agreement has already established the precedent that permission-seeking is explicitly *not* equivalent to an acceptance of sovereignty. And one need only read the transparently equivocal language contained in China's Arctic Policy document to see that that regime too is positioning itself on a footing to exploit that precedent.

The Government of Canada should recognize that sovereignty is not really sovereignty if in effect there is no enforcement of it. In this sense, it should advocate for the Canadian interpretation of UNCLOS' Article 7 in international fora — the interpretation by which the system of delineating straight baselines designates the Northwest Passage internal waters of Canada. Canadian policy makers should also actively deter comparisons between the Antarctic Treaty System and what the future of the Arctic regime will look like. They should highlight the

fundamental differences between the Arctic and the Antarctic, and be ready to explain why the Antarctic model is wholly inappropriate for the North.

If the Northwest Passage really does meet the definition of an international strait under UNCLOS, then foreign vessels have a right to transit, and this right is not easily trumped by unilateral environmental protections. But optics are important. If Canada wishes to limit the amount of shipping that transits the Northwest Passage, states would be much more reticent to push Canada if the optics of doing so put them at odds with the environment and Indigenous rights than if it only put them at odds with the Canadian interpretation of UNCLOS. In this regard, the Trudeau administration's establishment of the *Tallurutiup Imanga* and *Tuvaijuittuq* protected areas were wise decisions. Environmental protections can also be used to influence market forces by further detracting from the potential profitability of Northwest Passage shipping, tipping cost-benefit calculations further toward the Panama Canal. Thus, the Government of Canada should continue to strengthen environmental protections in the Arctic in order to gradually build a regime that deters shipping in these ways.

At the same time, the Government of Canada should work to encourage cruise tourism. This area has great potential to bring economic development to a number of coastal communities in the Canadian Arctic, and its year-over-year increases have proven that the market is willing to pay for it. Environmental regulations can help to ensure that this development occurs sustainably, and there is no reason why Arctic cruise companies, whose business depends on amicable relations with government regulators, would be unwilling to work comfortably within the existing permission-seeking policy regime. Most cruise ships never make a full transit of the Passage in any case.

To give regulations teeth, the Government of Canada should continue to fortify its military presence within the Arctic. The naval refueling station at Nanisivik, together with the new Harry DeWolf-class ships, are a start. However, Canada is falling behind in icebreaking capabilities, and a more proactive approach to ensuring sovereignty in the Arctic — conspicuously absent from the Arctic and Northern Policy Framework — would help in this regard.

For all of Mike Pompeo's bluster, Canada would do well to work more closely with the United States on this issue. The Trump administration has displayed a consistent willingness to fight for the United States' economic interests in areas where they perceive a trade relationship to be lopsided, even when the relationship in question is that of a close ally. It is not unlikely that the United States establishment does perceive the Northwest Passage to be an area of potential economic significance in the future, given the extent to which the popular media assumes melting sea ice will someday open the Passage up to massive shipping. The Government of Canada should attempt to assuage the United States' concerns by communicating the numerous reasons why this is less likely than is popularly depicted. Furthermore, it should highlight to the United States that the type of policy stance exhibited by Mike Pompeo actually works against America's own interests by inadvertently advancing the positions of the Chinese. Even if the United States will not formally recognize Canadian sovereignty over the Northwest Passage, a return to the status quo established by the 1988 Arctic Cooperation Agreement would equitably serve both countries' interests. According to parliamentary records, it appears that the United States had in the past been more acquiescent to this arrangement because it had been seen "as a way of securing the North American perimeter" in the interest of "continental security" (Library of Parliament, 2006). Perhaps with the return of security threats in the form of Chinese submarines, the United States could again be receptive to this line of thinking.

The Government of Canada should seek to build a better relationship with Russia during that country's upcoming chairmanship of the Arctic Council, if only in the areas relevant to this paper. Russia's interests in protecting their own sovereignty, while not analogous to the Canadian predicament, do overlap with Canada's to an extent. As it is unfortunately likely that other countries could eventually follow China and the United States in vocally opposing Canada's interpretation of Article 7, Canada should make use of any ally she can muster.

The government of mainland China is by far the greatest threat to Canadian sovereignty and security in the Arctic Archipelago. The world has witnessed the naked belligerence exhibited by the Chinese government in the South China Sea, buoyed by nothing but their "national interest" — not international law, nor historical fact, nor multilateral convention nor custom — and the extent to which they have weaponized their state-owned enterprises in effecting that belligerence. It would be beyond foolish for Ottawa to allow the Chinese government to purchase another vested "national interest" directly adjacent to the Canadian waters whose sovereignty it is actively positioning itself to undermine, and should thus reject the attempted buy-out of TMAC Resources.

Finally, the Government of Canada should recognize that — however unlikely it may be — the geopolitical and economic circumstances surrounding the Northwest Passage have the potential to foment a crisis in which Canadian sovereignty is decisively challenged. In an international system where precedent matters and the legal status of a body of water is partly dependent on historical use, such crises can be 'make-or-break' moments. The Crown should be prepared for confrontation should other states seek to undermine its sovereignty in these waters. The Chinese in particular are fond of threatening economic retaliation should their expansionist ambitions be challenged, or if they are even simply offended. They have already implemented such retaliatory policies against Canadian pork and canola in response to Canada's arrest of

alleged fraudster and sanctions-buster Meng Wanzhou (Chase, 2019), as well as against countless Canadian allies for any number of infractions that "hurt the national feelings of the Chinese people" (King, 2017). Canada must recognize that the long-term importance of protecting its sovereignty far outweighs the economic retaliation that the Chinese government inevitably doles out when it does not get its way.

12. CONCLUSION

The progressive melting of Arctic sea ice induced by climate change has generated a high degree of speculation that shipping firms will one day come to reroute traffic through Canada's Northwest Passage en masse in order to increase profitability. An analysis of the literature shows that there is not yet an academic consensus on whether the ice will indeed melt to such an extent, and most calculations of additional profitability tend to underestimate a multitude of factors that would detract from that profitability. Such factors include fuel costs, travel speed, the added expenses of Polar Class shipbuilding, insurance costs, crew costs, draft height requirements, and the seasonality and unreliability of favourable crossing conditions.

Even so, the possibility of the Passage opening up has raised questions within Canadian political discourse. While some other states consider the Northwest Passage to be an international strait, Canada's position is that the Passage is made up of Canadian internal waters. The gulf between the two labels is significant, as international law treats these classifications very differently. Mainland China has even pushed for an Arctic policy regime similar to that instituted in the Antarctic, which would be wholly inappropriate for the region.

At present, very little traffic actually traverses the Passage each year, and the Government of Canada has pursued a type of status-quo policy wherein ships are free to cross so long as they seek the government's permission beforehand. This policy arrangement allows for Canada and foreign governments to put aside their disagreements regarding the Passage's legal status for the time being. However, Canadian policy makers should not consider this to be a long-term solution. Should the predictions of sea ice melt come true, and should the Passage become economically viable for shipping firms, international law leaves little room for compromise, and other states will likely pressure Canada to soften or abandon its sovereign claim.

An analysis of the three most interested major foreign powers shows that each has unique motivations and goals. While the United States has become less amenable to Canada's position under the Trump administration, room still exists to find common ground. And although Russia's interests in its own Northern Sea Route are fundamentally quite different from Canada's interests in the Northwest Passage, there is potential for cooperation in that relationship as well. Mainland China, however, through a lengthy pattern of both rhetoric and behaviour, has established that it is the most serious threat facing Canada in the Arctic today.

As Canada — including the Canadian Inuit who largely inhabit the region — has little to gain and much to lose from softening or abandoning its claim over the Northwest Passage, Canadian policy makers should work to reinforce the Crown's sovereignty in those waters. They should do so directly by advocating for international law (and thus Canada's sovereignty) to be respected, and by bolstering Canada's Arctic military presence and regulatory enforcement infrastructure. They should also do so indirectly by continuing to build up the region's environmental protections, and by working with the United States and Russia to the extent that is possible. To promote economic development, Canada should encourage Arctic cruise tourism as well.

Finally, as the mainland Chinese government represents the largest and most insidious threat to Canada's Arctic sovereignty and security, policy makers should adopt a more aggressive line against that regime's attempts to undermine Canadian positions — including, but not limited to, a veto of any takeover attempts on assets in the Arctic. Canada would do well to keep in mind that economically retaliatory measures inevitably have a finite lifespan, but the nature of international law is such that damage to our sovereignty lasts forever.

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