



Increased maritime traffic in the Arctic: Implications for governance of Arctic sea routes

Brandon M. Boylan^{*}

Department of Political Science, and Arctic and Northern Studies, University of Alaska Fairbanks, USA

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ABSTRACT

Climate change is producing maritime navigation opportunities in the Arctic. Melting sea ice in the summer months is increasing shipping and other vessel traffic. A well-developed body of literature investigates the viability of the two main shipping routes: the Northern Sea Route (NSR) and Northwest Passage (NWP). This article explores the impact increased maritime traffic will have on the governance of these routes. Despite lying within the Arctic region, each route has its own geophysical, legal, and political features that will shape the character of its governance regime. The NSR lies within Russia's exclusive economic zone (EEZ). Although international reconciliation on the level of authority that Russia should have over the NSR is preferable, the route's future political viability is not at risk as much as the NWP's. Russia has long exerted, and will continue to exert, control over the NSR in accordance with its established governance system and in the name of environmental stewardship. In contrast, the legal status of the NWP in the Canadian archipelago, currently debated, will continue to be important to resolve as traffic increases. The viability of the NWP rests on international agreement, particularly since the entire route passes through the EEZs of multiple countries – the United States, Canada, and the Kingdom of Denmark. Russia exerts authority over NSR traffic regardless of legal and political contentions, while Canada does not exercise a similar level of control over the NWP due to the ongoing conflict over the legal status of the route.

1. Introduction

The Arctic region is warming twice as fast as the rest of the world [1]. As a result, Arctic sea ice is melting in the summer months, creating opportunities for maritime navigation in the region. To be sure, Arctic navigation depends on a number of factors: the trajectory of climate change, the level of cooperation among Arctic states, infrastructure investments, emergency management, advancements in technology, demand for Arctic natural resources, among others. Nonetheless, all types of maritime traffic in the Arctic are on the rise, with destination shipping and intraregional activity increasing more than cross-Arctic transits. (For assessments on the current and near-future viability of the routes, see [2].) At present, Arctic voyages require icebreaker escorts, but projections show that as early as the 2030s, unescorted navigation in the Arctic in the summer months might be possible, and by the 2050s it is likely [3]. By the end of the twenty-first century, the Northern Sea Route (NSR) should be ice free for three to six months per year, while the Northwest Passage (NWP) should be ice free for two to four

months per year [4]. The world is gaining a new navigable ocean, bringing significant opportunities and risks for commercial enterprises and coastal communities in the region. As traffic increases, pressure will mount on states and international institutions to evolve governance systems to accommodate this new reality.

The United Nations and Arctic Council are the bedrock of international efforts to address the various legal, political, environmental, cultural, and technological concerns related to navigation in the Arctic. The United Nations Convention on the Law of the Sea (UNCLOS) is the preeminent international treaty on maritime domains and activities. Importantly, it defines national jurisdictions of waters. It also delineates the rights and responsibilities that states have with regards to the use of oceans, and it establishes policies for regulating maritime traffic, protecting the environment, and managing marine natural resources. A UN specialized agency, the International Maritime Organization (IMO) regulates shipping and has recently established the International Code for Ships Operating in Polar Waters (the Polar Code), which sets requirements for ship design and ice navigation to promote maritime

^{*} Correspondence address: Department of Political Science, University of Alaska Fairbanks, Gruening Building, Room 603C/D, 1747 South Chandalar Drive, Fairbanks, AK 99775, USA.

E-mail address: bmboylan@alaska.edu.

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safety (for a discussion on the types of ice class vessels recommended to navigate the Northern Sea Route safely and successfully, see [5]). The Polar Code has also emerged as an instrument for improving ship insurability and aiding underwriters in their risk appraisals and vessel insurances, even if only in limited ways [6].

The Arctic Council is a forum in which the eight Arctic states and six Permanent Participants representing Indigenous communities discuss issues related to the Arctic, like human security and environmental concerns. It has also served as a venue for Arctic states to negotiate legally binding agreements related to aeronautical and maritime search and rescue (SAR), marine oil pollution prevention and response, and the enhancement of cooperation on scientific research [7]. In its working groups, states, Indigenous groups, non-governmental organizations, and scientists collaborate to collect and analyze data related to Arctic problems and challenges and make recommendations to policy makers for positive change. As one example, the Protection of the Arctic Marine Environment (PAME) focuses on sustaining the marine environment and advocates accordingly, thus contributing to the governance of maritime traffic.

In addition to these international efforts, Arctic states have established national policies towards the Arctic region. As the area continues to open up, states must decide if they will continue to follow the well-established ethos grounded in the constructed “zone of peace and fruitful cooperation,” as Gorbachev envisioned in his 1987 Murmansk speech [8] and codified in Arctic institutions, or if they will digress from this norm and secure their interests through unilateral action in a zero-sum worldview. The direction states take in their Arctic policies impacts the future use of the Arctic routes and governance of maritime traffic.

Several studies examine the viability of Arctic routes for shipping [9]. The aim here is not to contribute to this well-established scholarship. Rather than investigating if and when ships will routinely use the routes to cut shipping costs and distance, this article argues that an increase in shipping and other traffic – regardless of the speed at which it occurs – will apply pressure on states, institutions, and an array of other actors in the region to evolve Arctic governance. It considers the governance regimes of the two main Arctic shipping routes – the Northern Sea Route and Northwest Passage – and how they might adapt to more maritime traffic. Although the Transpolar Sea Route (TSR) will likely be another viable route through the Arctic, less traffic navigates it now; its full development is expected after the NSR and NWP’s; and much of it lies outside states’ exclusive economic zones (EEZs) (for reviews of the Transpolar Sea Route, see [10]). Thus, it is not considered here.

The assumption is that despite lying within the Arctic region, each route has its own geophysical, legal, and political features that shape its evolving governance regime. The NSR lies within Russia’s EEZ. Although international reconciliation on the level of authority that Russia should have over the NSR is optimal, the route’s future viability is less at risk than the NWP’s. Russia has exerted, and will continue to exert, control over the NSR and its traffic in a predictable, albeit challenged, fashion. Accordingly, it has developed a number of ports and icebreakers to facilitate traffic in the route. In contrast, the currently debated legal status of the NWP in the Canadian archipelago will likely become untenable as traffic increases: Vessels will need to know whether to follow Canadian or international rules. The future viability of the NWP rests on international cooperation, particularly since the entire route passes through the EEZs of multiple countries (the United States, Canada, and the Kingdom of Denmark). Also, compared to Russia, Canada has fewer ports and icebreakers to support vessel traffic (for a discussion of the development of ports in the Arctic, see [11]). Russia exerts authority over NSR traffic regardless of legal and political contentions, while Canada does not exert the same level of control over the NWP. Moreover, although companies are far from consistently using either route, if they more routinely use the Arctic region as an alternative to the Suez and Panama Canals for the shipment of goods, a

competitive and oppositional dynamic could develop between Russia and the NSR on the one side and the United States, Canada, and the NWP on the other.

2. Increasing maritime traffic in the Arctic

The Arctic is warming precipitously, with sea ice coverage declining over time. The Arctic’s surface air temperature is at a record high, with temperatures from 2014 through 2018 all exceeding previous records [12]. The average annual global surface temperature is expected to increase by 4–13 °C by the year 2100 [13]. Currently, the Arctic Ocean has a polar ice cap consisting of multi-year ice that remains frozen year-round, but in parts of the ocean and surrounding seas, the ice thaws during the summer, making icebreaker-escort navigation possible during the late summer and early fall. Based on the Arctic sea ice trend from 1979 to 2012, the entirety of the Arctic Ocean is expected to have an ice-free September before 2050 [14]. By 2100, the Arctic Ocean is projected to be ice-free for half of the year [15]. The ice along both the NSR and NWP is diminishing at the highest rate across the Arctic, making the routes easier to navigate. Although certainly not the only influencing factor, as ice-related barriers and dangers decrease, shipping and other traffic will likely rise.

Climate change has brought navigational opportunities to the Arctic [16]. The 2009 Arctic Marine Shipping Assessment (AMSA) evaluates Arctic maritime traffic based on 2004 data (the baseline year) [17]. The report considers a multitude of maritime vessels: tankers, bulk carriers, offshore supply vessels, passenger ships, tug and barge combinations, fishing vessels, ferries, research vessels, and government and commercial icebreakers [18]. AMSA’s objective is to create the first baseline database of all ships (except for naval vessels) operating in the Arctic during a single year, to better understand maritime traffic and pollution over time. The report reveals that the majority of the traffic is in fact destinational (vessels traveling to or from the Arctic region) or intraregional, rather than transiting the region to deliver goods from one side of the world to the other. Destinational and intraregional traffic comes primarily from fishing, resource extraction, tourism, scientific voyages, and community resupply [19].

A 2020 PAME report shows that maritime traffic in the Arctic has increased from 2013 to 2019 [20]. The report measures maritime traffic in two ways: 1) the number of vessels and 2) the number of nautical miles that vessels travel. Over this observation period, the number of vessels rose from 1298 to 1628, a 25% increase. The largest category, fishing vessels constituted 41% of the traffic in 2019. Meanwhile, the number of nautical miles has grown from 6.51 to 10.7 million, a 75% increase. Again the largest category, fishing vessels account for 45% of all miles in 2019. Bulk carrier miles also increased by 160% over the period, due largely to the opening of the Mary River Mine on Baffin Island in Nunavut, Canada. Opened in 2014, this massive iron ore mine is one of the northern most in the world, and 3.5 million tons of iron ore ship from it during open water season. From the report, it is likely that destinational and intraregional traffic is increasing more than transit shipping, although this is difficult to determine as the report categorizes by ship type (e.g. fishing vessels, cargo ships) rather than transit type (e.g. destinational, pan-Arctic).

Traffic is increasing in the NSR, a route along the north coast of Russia extending from the Kara Sea in the west through the Bering Strait in the east. The NSR is a large component of the Northeast Passage, which runs from the Atlantic to the Pacific Ocean. The route lies within Russia’s exclusive economic zone (EEZ) [21]. Sections of the route are free of ice for approximately two months in the summer. Since 2011, over 220 vessels have traversed the NSR, including cargo, passenger, and fishing ships from Europe, Central America, and Asia [22]. Most transits are destinational, originating or ending in Russia, or intraregional [23]. Ships use the route to resupply remote communities located along the Ob, Yenisei, and Lena Rivers. Traffic increase comes mainly from the shipping of liquefied natural gas (LNG), crude oil, and coal;

since 2014, exploration of natural resources in Russia's Arctic has resulted in a large increase in cargo volume [24]. Some explore the benefits for economies and ports owing to the development of the NSR [25].

Scholars debate the near future viability of the NSR. Some argue that the route will become a better alternative to the Suez Canal. Faury and Cariou compare a 1 A Ice-Class Panamax tanker vessel using the NSR with a Panamax tanker vessel using the Suez Canal Route and conclude that the NSR provides a competitive advantage from August to November [26]. Bekkers, Francois, and Rojas-Romagosa find not only that the NSR is viable but also causes shifts in trading patterns between Asia and Europe, more traffic in the Arctic, and a drop in Suez traffic [27]. In contrast, some argue that the prospect of routinely using the NSR soon is low. Pruyn concludes that given increased time waiting and slow steaming and extra costs, ships will not find the NSR more attractive than the Suez Canal [28]. Based on data from ship owners, Lasserre and Pelletier find that the bulk shipping sector is hesitant to use the NSR, while the container shipping sector is not interested in the route [29]. Finally, some qualify the route's viability by vessel type. Schøyen and Bråthen argue that the route has more potential for bulk rather than liner shipping, while Zhang, Meng, and Hui Ng contend that the route might be more appealing to small and medium tankers than container ships [30]. In a separate study, Zhang and colleagues further assert that the route is conducive for liquid, bulk, and general cargo ships [31]. Stephenson, Brigham, and Smith argue that although navigation possibilities in the Kara, Laptev, and East Siberian Seas are uncertain, ice will not pose significant barriers for destination shipping to the Barents and Chukchi Seas [32]. Meanwhile, shallow-draft ships may be the only types of vessels able to complete full NSR transits in the near future [33]. Moe sums up the debate well: "Potential users of the sea route will continuously update their assessments of conditions before deciding to use the route. If they are not attractive, they will not show up. And if they do not believe that conditions will be stable over the longer term, they will not invest in ships and equipment that tie them to the NSR" [34].

It is important to differentiate among the types of maritime traffic in the NSR. Traffic includes trans-Arctic transit of goods, destination shipping, and intraregional maritime traffic. Humpert analyzes the types of traffic in the NSR in 2013 [35]. He concludes that of the 71 transits, only 41 vessels traveled the entire NSR (and of these, only 30 carried cargo) [36]. Another 23 counted as destination shipping – departing from or arriving at ports inside the NSR. Seven vessels remained inside the NSR, counting as intraregional activity. Likewise, Gunnarsson provides information on traffic types in the NSR from 2016 to 2019. He finds that all three types of traffic increased: International (what I refer to as trans-Arctic) transits increased from eight to 14; destination transits increased from five to eight; and domestic (what I refer to as intraregional) transits increased from five to 15, over the time period [37]. Humpert and Gunnarsson's studies are two of only few that assess the types of maritime traffic in the Arctic.

Meanwhile, the NWP is also witnessing an increase in vessel traffic. (However, vessel activity decreased dramatically in 2018, owing to extensive icing. See [38].) The NWP is a sea route that extends from the Pacific Ocean, over Alaska, through the Canadian archipelago, and between Canada and Greenland into the Atlantic Ocean. Currently, it is navigable only in late summer months with icebreaker escorts. Annual shipping distances have nearly tripled between 1990 and 2015, with two-thirds of the growth occurring since 2006 [39]. Vessel types that increased in terms of distance traveled include bulk carriers, passenger ships, government vessels, and pleasure craft [40]. General cargo vessels and government vessels including icebreakers constitute most of the ships over the time period, with pleasure craft, such as private yachts, and fishing boats showing the fastest growth among all vessels [41].

In the period 2008–2018, vessels in the NWP were mainly adventure craft or cruise ships [42]. The *Crystal Serenity*, with a capacity of 980 passengers and over 600 crew members, became the largest passenger

ship to navigate the Northwest Passage, when it completed a voyage from Vancouver to New York in 2016. Of the 222 complete transits in this period, only eight were hauling commercial cargo [43]. The vast majority of traffic on the route is destination and intraregional, primarily resupplying rural communities, with growing fishing and tourism industries. This is in contrast to traffic related to natural resource extraction and exportation, which is prevalent in Russia [44].

Maritime infrastructure in the NWP is currently limited, with no deep water ports (a deep water port is a port which can accommodate large ships (with greater drafts), such as supertankers, post-Panamax vessels, and container ships. For a review of the recent history of the Port of Churchill, see [45]) in Alaska's Arctic, and the future of the only Canadian Arctic deep water port in jeopardy [46]. Coastal communities near the NWP also have ongoing apprehensions about the future of cruise ship tourism and other activity [47]. Most coastal communities are rural villages that lack any capacity to dock large ships or accommodate the hundreds of passengers that flood in with them. The NWP is currently less navigable for trans-Arctic transits than the NSR, owing to the complex network of passages comprising the NWP route [48].

The Bering Sea and Strait, through which the NSR and NWP run, contain extensive maritime traffic. In 2014–2015, the region saw a total of 60,925 transit segments by fishing vessels (many of which support the seafood industry) and 51,142 segments by non-fishing vessels [49]. The most common type of non-fishing vessels were bulk carriers (20,120) and container ships (15,228), numbers unparalleled in the Arctic Ocean itself [50]. Transit through this channel has increased by 250% between 2008 and 2015 – from 220 to 540 transits annually. This increase is largely due to destination shipping for the Yamal LNG project, in which Russia and China have partnered to extract natural gas from the Russian Arctic (for an analysis of the Russia-China relationship in the Arctic, see [51]).

According to an array of accounts, maritime traffic is increasing in the Northern Sea Route, Northwest Passage, and the Bering Sea and Strait. The development of Arctic seaways is driven in part by the potential to bring substantial savings to international shippers. An NSR transit is 40% shorter between Europe and Northeast Asia, and an NWP transit is 17% shorter between Northeast Asia and Northeastern United States, than traditional routes using either the Suez or Panama Canals, respectively [52]. Chou and colleagues discuss the benefits of traveling the NSR opposed to the European Sea Route – not just time and fuel savings but also fewer carbon emissions [53]. Although disadvantages to trans-Arctic transit include the need for ice-breaker escorts, slower travel in ice packs, and higher insurance costs, they will fade as the region continues to warm.

3. Current governance of maritime routes and traffic in the Arctic

The governance of maritime traffic in the Arctic rests on global, regional, and bilateral arrangements and national policies. The United Nations Convention on the Law of the Sea (UNCLOS) is the foremost international treaty that defines the rights and responsibilities of nations with respect to their use of oceans. It also establishes rules for businesses and management structures for marine resources [54]. UNCLOS clarifies that a state's internal waters include a) waters on the side of the baseline of a nation's territorial waters that face towards the land (except in archipelagic states) and b) waterways such as rivers and canals (and sometimes the waters in small bays) [55]. It states that a nation's territorial waters are the first twelve nautical miles from its coastline, over which the nation extends its full sovereignty [56]. A state's contiguous zone includes waters from twelve to 24 nautical miles from its coastline, over which the nation may exert control to "prevent infringement of its customs, fiscal, immigration or sanitary laws and regulations within its territory or territorial sea" [57]. Each nation has an exclusive economic zone (EEZ) extending from its baseline to 200 nautical miles, where coastal states may exercise sovereign rights "to explore, exploit,

conserve and manage the living resources in the exclusive economic zone” [58]. Finally, a state has rights to explore and exploit the seabed, and the natural resources lying on or beneath it, of its continental shelf up to 350 nautical miles from its baseline [59].

A nation may exercise full sovereignty over its territorial waters, but according to UNCLOS, ships of all states enjoy the right of “innocent passage” through territorial seas and beyond, although they must not threaten the coastal state and must abide by the coastal state’s relevant regulations [60]. Waters beyond a state’s territorial zone are international waters (often called the “high seas”). According to the agreement, states have the right to activities like navigation, fishing, and scientific research in international waters [61].

Part XII, Section 8, Article 234 of UNCLOS discusses ice-covered areas and thus has direct application to the Arctic. It states:

Coastal States have the right to adopt and enforce non-discriminatory laws and regulations for the prevention, reduction and control of marine pollution from vessels in ice-covered areas within the limits of the exclusive economic zone, where particularly severe climatic conditions and the presence of ice covering such areas for most of the year create obstructions or exceptional hazards to navigation, and pollution of the marine environment could cause major harm to or irreversible disturbance of the ecological balance. Such laws and regulations shall have due regard to navigation and the protection and preservation of the marine environment based on the best available scientific [62].

The article affords coastal states of ice-covered waters the authority to address vessel pollution. Some argue that this article should remain the legal foundation for regulating maritime activities in the Arctic into the future [63]. It could indeed lead to environmental laws and regulations that preserve the opening ocean and its ecosystems. However, the ways in which states can enforce laws and regulations remain ambiguous in UNCLOS (for a detailed review of Article 234, its purpose, scope, and powers conferred to coastal states, see [64]). States could use the article to justify the exercise of unilateral authority over shipping and other traffic within their EEZs, regardless of marine environment benefit. Thus, a discrepancy between the innocent passage clause and the environmental enforcement clause potentially exists.

Working closely with the UN, the International Maritime Organization (IMO) is responsible for regulating shipping, safety and security, environmental issues, and legal concerns on and within international waters. The IMO has also instituted a comprehensive set of regulations for all vessels operating in polar waters: the Polar Code. Entering into force on January 1, 2017, the Polar Code mandates strict safety and environmental regulations, spanning from vessel structure to emergency procedures, for ice navigation. Additionally, the United States and Russia jointly requested that the IMO approve and regulate six two-way routes and six precautionary areas in the Bering Sea and Strait in 2017. (The IMO accepted the proposal.) When following these routes, ships reduce the likelihood of hitting shoals, reefs, and islands [65]. The Polar Code has also been described as a “toolbox” to potentially assist insurance underwriters with risk assessment [66]. The IMO, and its Polar Code, contribute significantly to Arctic governance.

The Arctic Council is the premier international forum in which its eight Member States and six Permanent Participants representing Indigenous communities address Arctic issues. Although the Arctic Council lacks legal status and does not produce international law, it has served as an organizing mechanism in which its Member States have negotiated and passed multilateral agreements related to maritime activity. For example, in 2013, they ratified the Arctic Search and Rescue Agreement, which establishes international search and rescue (SAR) coverage and response in the Arctic and clarifies each state’s SAR responsibility. To continue to apply the Arctic Council to maritime governance, Stokke contends that the forum can build knowledge and foster cooperation, with the aim of advancing regulation through the

IMO and possibly coordinate port-state enforcement mechanisms [67].

Many of the Arctic Council’s working groups relate to shipping in the Arctic – most notably the Protection of the Arctic Marine Environment (PAME) working group but also the Emergency Prevention, Preparedness, and Response (EPPR) and Arctic Contaminants Action Program (ACAP) working groups. These units generate and collect data to offer policy prescriptions to Arctic states with the aim of improving national and international efforts to address Arctic problems.

In addition to UNCLOS, the IMO, and Arctic Council, which apply to the entire Arctic, some focus on the governance of specific waters in the Arctic region. For example, the Beaufort Sea has attracted much attention. Canada and the United States have an ongoing dispute over an area in the Beaufort Sea between Yukon and Alaska. Canada claims that the maritime boundary runs along the 141st meridian west to a distance of 200 nautical miles, following the Yukon-Alaska boundary, while the United States argues that the boundary line is perpendicular to the coast to a distance of 200 nautical miles, following a line of equidistance from the coast. The difference creates a wedge with an area of about 21,000 km² that both countries claim. Baker contends that successful Canadian and U.S. scientific cooperation on seabed mapping can serve as a basis for collecting and sharing data on the Beaufort Sea, in which the two countries share interests, but over which they disagree on the maritime boundaries [68]. She argues that cooperation there can serve as a foundation for a “joint ecosystem-based, integrated management of the triangle” [69]. Thus, data collection and analysis have the strong potential to resolve the maritime dispute in the Beaufort Sea – necessary to strengthen governance of shipping in the region.

Although scholars and policy makers differ on the appropriate level and method of managing transit in the Arctic, these agreements and institutions will serve as a foundation for the evolving governance regime, necessary as traffic in the region increases.

4. Controversies and their implications on future route governance

As climate change increases opportunities for the growth of maritime traffic in the Arctic, legal and political debates on the Arctic’s sea routes will likely intensify. Stakeholders may or may not resolve controversies on the status and use of the routes, and this has implications for their future governance. What follows are concerns related to the development of the Northern Sea Route and Northwest Passage for transit shipping and the implications for the future governance of routes and traffic.

4.1. The Northern Sea Route (NSR)

The political management of the Northern Sea Route is contentious. Although the route lies within Russia’s EEZ, Russia claims that the NSR is a historically formed single national transportation route [70]. Gavrilov argues that the NSR is a single “traffic artery” that cannot be divided into segments with different legal statuses, therefore necessitating Russian authority over the entire route [71]. He also contends that Russia has historically asserted authority over the route, which from his perspective establishes its waters as “historical” [72]. In fact, no foreign vessel has crossed the NSR without seeking Moscow’s consent since 1965, thereby setting a strong precedent in favor of Russian control [73]. He also claims that the Arctic is a “special” region, and states have distinctive rights and responsibilities, and thus greater authority, to manage their EEZs [74].

Russia claims that some of the coastal areas, including the Kara, Vilkitsky, Sannikov, and Dmitry Laptev straits, through which the NSR flows, constitute internal waters [75]. Because ships do not have the right of innocent passage in internal waters, Russia thus claims it has the authority to mandate permission from these ships if they plan to traverse the route going through these waters. According to Vylegzhanin and colleagues, if ships want to traverse the NSR that does not go through

what Russia deems as internal waters, then they do not need to apply for permission, as the innocent passage principle applies [76].

Nonetheless, citing UNCLOS's Article 234, Russia claims it can regulate ships traveling within its EEZ in the name of environmental protection. It maintains it has authority to prevent, reduce, and control marine pollution in its EEZ; thus, it makes the case that it must exert control over the route to protect the ecosystem. Although the impact of ship emissions in the NSR is significant [77], Russia's control is extensive, if not egregious. It mandates that vessels aiming to navigate the NSR must pay tariffs, provide proof of liability and insurance, and minimize environmental pollution, while also paying for Russian pilots and icebreaker services [78]. Although Russia has not claimed explicitly that the NSR falls under its sovereignty, in reality it controls the navigation of foreign ships and administers the route with expressed terms and conditions applicable to all ships. Russia has *de facto* authority [79].

Stakeholder input in part enables Russia's position. Tseng and Pilcher find that stakeholders whom they interviewed (shipping experts, professors, and a government official) felt that Russia would take the lead on managing the NSR, given its knowledge, expertise in shipping, and geographical proximity to the route [80]. Dremluiga argues that even as ice melts in the Arctic, Russia can exert control over the route in accordance with Arctic 234: "based on treaty interpretation ... there are no legal grounds for changing the Arctic regime based on Article 234 in light of the decreasing ice cover in the Arctic" [81]. Moe and Brigham caution that coordination between Russia and commercial ships will be the bedrock of the future safety and efficiency of the NSR [82]. They contend, "It is simultaneously necessary to have predictable and understandable rules of the game for users of icebreaker services" [83]. The implication is that Russia does and will control navigation in the future.

In contrast, the United States and other members of the international community argue that Russia's authority in the region is not in accordance with international law. According to the UNCLOS innocent passage clause, all states have the right to navigate the route, while Russia maintains the exclusive right to economic benefits from the ocean's resources within its EEZ. The United States disagrees with Russia's position that various straits in the NSR are internal waters [84]; argues that the NSR is an international strait [85]; and challenges Russia's excessive control over the route for environmental protection.

Several authors cite Russia's position as a challenge to the future viability of the route [86]. The controversy over the legal status of the route and the Russia-imposed barriers could dissuade international shippers from utilizing the NSR even if doing so might save travel time and distance. Blunden argues that if the route develops as a major sea route, international tensions will mount, and stakeholders will claim the route as a common resource [87]. The suggestion is that Russia's control over the route is too extensive and violates the innocent passage principle in UNCLOS.

Although stakeholders and scholars dispute the amount of control that Russia should exert over the route, Russia has not declared sovereignty over the passage and uses UNCLOS as the primary justification for its control.

4.2. The Northwest Passage (NWP)

The status of the Northwest Passage is also contested, but the conflict differs from the NSR dispute. The Canadian government insists that the section of the route passing through its archipelago constitutes internal waters, and thus it claims it has full sovereignty over it (for a discussion of Canada's sovereignty over the NWP in its archipelago, see [88]). In opposition, the United States and others in the international community contend that the entire NWP is an international strait, subject to UNCLOS rules.

For now, Canada and the United States have agreed to disagree. They have reached a settlement on the use of the route, while acknowledging their differences on sovereignty in the region. According to the Agreement between the Government of Canada and the Government of the

United States of America on Arctic Cooperation, the United States "pledges that all navigation by U.S. icebreakers within waters claimed by Canada to be internal will be undertaken with the consent of the Government of Canada," while Canada agrees to preemptively approve all requested U.S. transits [89]. However, both countries acknowledge that the agreement does not influence their respective positions but instead allows them to move forward with continued NWP transits without controversy [90].

As traffic increases in the NWP, however, this agreement is likely to become untenable. An increasing number of U.S. vessels could jeopardize various ecosystems in the Canadian archipelago and strain Canada's search and rescue operations. And without an international resolution, or at least bilateral agreements in place, ships from other countries will be at a loss regarding whether to consider the route international or Canadian and the rules they should follow.

Pharand defends Canada's position that the waters in the Canadian archipelago are internal waters and not subject to the right of innocent passage based on three reasons: First, Canada never ratified the 1958 Convention of the Territorial Sea and the Contiguous Zone; thus, he argues that the straight baselines the country established around the outer limits of its archipelago in 1985 enclosed the waters under customary law. Second, the 1958 Convention's innocent passage clause had not become customary law by the time Canada established its baselines in 1985; therefore, he states that it should not apply to Canada's enclosure. Third, Canada did not ratify UNCLOS until 2003; as such, the UNCLOS innocent passage clause should not be applied retroactively to change the legal standing to an international strait. Since vessels do not have the right to innocent passage in a state's internal waters, according to UNCLOS, they would need to seek Canada's permission to navigate the route [91]. Accordingly, he warns that Canada must take adequate preventive measures to preclude unauthorized foreign navigation of the route; otherwise, it might become internationalized and subject to the right of innocent passage by foreign vessels [92]. A disadvantage of establishing the route as an international strait is that Canada will be most affected by vessel pollution, without much control over it.

Nonetheless, the United States and others assert that the NWP is an international strait, which allows for free and unencumbered navigation in accordance with UNCLOS's innocent passage principle. The United States argues that the Northwest Passage connects two bodies of water, thus it contends that the principle of the freedom of the seas applies. The United States also fears precedent setting. In April 1970, the U.S. Department of State released a press statement that said,

We are concerned that this action by Canada if not opposed by us, would be taken as precedent in other parts of the world for other unilateral infringements of the freedom of the seas. If Canada had the right to claim and exercise exclusive pollution and resources jurisdiction on the high seas, other countries could assert the right to exercise jurisdiction for other purposes, some reasonable and some not, but all equally invalid according to international law [93].

Since then, the United States has expressed similar views that if Canada is allowed to exert sovereignty over the NWP, other countries across the world might follow suit. It most certainly would embolden Russia's guardianship of the NSR.

Without recognition of the right of innocent passage or a multilateral agreement to allow for transit through the Canadian portion of the route, the NWP will not be a viable means for trans-Arctic shipping. (Other factors like geophysical conditions and lack of infrastructure also challenge the routine use of the route.) If Canada's section of the NWP is deemed to be internal waters, then the country does not have to grant authorization to any state, in accordance with UNCLOS. Although it will likely grant passage to close allies, there will be no obligation to do so unless codified in bilateral or multilateral agreements. This creates uncertainty about the viability of the NWP as a trans-Arctic shipping route.

Canada and its position will come under pressure as the route opens up and when shipping companies find navigating the route more attractive [94].

Elliot-Meisel argues that the United States and Canada should reach a sustainable compromise [95]. In her estimation, the United States should recognize Canadian sovereignty over the section of the NWP that passes through the Canadian archipelago, but Canada should recognize the U.S. need to access the route. With the United States active in the region, Canada can expend its limited resources on issues like security elsewhere. Nonetheless, a U.S.-Canadian agreement in which the United States recognizes Canadian sovereignty over the section of the route may or may not lead other states in the international community to accept Canada's ownership. Similarly, Gedderd contends that Canada should have jurisdictional power over the Northwest Passage but for the common good of the international community [96]. His vision is that Canada becomes a sovereign steward of the route. Although Kraska also contends that cooperation over the Northwest Passage is the way forward, he comes to an opposite conclusion [97]. Canada's priority should be to harness global support for managing and protecting the NWP, and this is best achieved through the route's designation as an international strait [98]. This option resolves the legal ambiguity and thus permanently grants access to the entire NWP for all countries. Regardless of the strategy, the international community – including Canada – needs to find a path forward if the NWP is to be available, consistently and reliably, to shippers.

4.3. Future viability of the routes

The international community is in more agreement on the legal status of the Northern Sea Route than the level of political control Russia have over the route. The route lies within Russia's EEZ. Following UNCLOS's innocent passage provision, many states believe they have the unencumbered right to traverse the route. However, Russia cites Article 234 in regulating the route. Despite this ongoing conflict, the route's future political viability is not at risk as much as the NWP's. Russia does not claim sovereignty over the entire route, recognizing that the route passes through various legal zones, but it will most likely continue to exert control over the NSR and its traffic in accordance with historical precedence. Many acknowledge that Arctic 234 grants Russia at least some level of authority over the route to manage shipping in the name of environmental protection. Although many disagree over the level of Russian control, shipping companies at least understand requirements for traversing the NSR. Thus, Russia's precedent established decades ago will likely continue.

In contrast, the currently debated legal status of the NWP in the Canadian archipelago will likely become untenable as traffic increases. States and companies do not know whether to follow Canada's rules or international rules set out in UNCLOS. The future viability of the NWP rests on international cooperation, particularly since the entire route passes through multiple countries' EEZs. Shipping companies cannot establish a long-term commitment to the use of the route if international law cannot guarantee access. While jurisdictional ambiguity on the route segment in the Canadian archipelago exists, effective and predictable political management cannot be achieved. An internationally acceptable resolution to the issue will likely increase shipping and other traffic, but the level of growth depends on the resolution. As an international strait, the UN would set the rules, and Canada's authority over the route would be limited, but as internal waters, Canada would stipulate the conditions for access and passage. International shippers would prefer the route's determination to be an international strait. If the route falls under Canadian control, countries would need to establish bilateral agreements with or otherwise receive permission from Canada. This resolution would render access to the route dependent on ever fluctuating foreign relations.

Companies are far from consistently using either route. However, if they more routinely use the Arctic region as an alternative to the Suez

and Panama Canals for the shipment of goods, and legal and political disputes are resolved, a competitive and oppositional dynamic could develop between Russia and the NSR on the one side and the United States, Canada, and the NWP on the other. The routes have similar start and end points – from the North Pacific to the North Atlantic. Russia and Canada, but also other states, will eventually vie for traffic and the economic benefits that come with it. Competition might therefore drive investment projects like infrastructure and emergency response capacities to attract business. And a competitive dynamic would further pressure the resolution of the governance regime of each route.

5. Conclusion

Although geophysical barriers, navigation expenses, political agendas, and legal ambiguity challenge the current and future use of Arctic routes, as warming reduces sea ice coverage in the Arctic Ocean, states and companies will continue to be interested in trans-Arctic, destination, and intraregional shipping. Of course, as the governance regimes improve, this will attract more ships and other traffic. Of the Arctic routes, the Northern Sea Route and Northwest Passage are most viable in the near future. Both routes connect the North Atlantic with the North Pacific, thus connecting Europe and Asia, east North America to Asia, and west North America to Europe. As long as states continue to require maritime shipping for international trade, as they historically have, transit shipping across the NSR and NWP will remain attractive. Given that transit through the Arctic will either be along the NSR or NWP in the near future, and given that the majority of other traffic is destination and intraregional, much of shipping governance will not be pan-Arctic but rather specific to each route.

Russia might participate in the exchange of best practices related to shipping and port management, but it is unlikely to share the management of the Northern Sea Route with others states or the international community in the near future. Many argue that Russia does not follow UNCLOS's innocent passage mandate, setting a precedent that it maintains authority over the route. Nations reinforce Russia's position by requesting permission before transiting the route, thereby giving *de facto* recognition of its regional autonomy. Scholars have pointed out that states are dissuaded from using the route in part owing to Russia's strict policies. It is therefore possible that market competition may be more conducive to a Russian policy shift than international political pressure. Although international resolution of the route's status is ideal, the route's usage is likely not in jeopardy with Russia's continued management. Shippers understand the management of the route, irrespective of whether or not they agree with it.

In contrast, as traffic increases in the Northwest Passage, Canada and the rest of the international community, and especially the United States, will need to resolve the route's legal status. Mounting pressure as a result of increased route usage might foster international cooperation and resolution of this dilemma. In any event, the character of the resolution will impact the attractiveness of the route. Indeed, based on the Canada-US Arctic Cooperation Agreement and other agreements, collaboration in the Arctic Council and NATO, and shared economic opportunities regarding use of the Northwest Passage, the states are likely to cooperate. But the route regime must be determined before shipping escalates there, so that ships know whether to follow Canadian or international rules.

As climate change persists, it brings new challenges and opportunities to the Arctic region. Maritime traffic in the Arctic is increasing, and this exacerbates ongoing debates on the institutions, laws, and norms governing shipping routes. Each route's governance regime will likely develop separately from one another, given the differences in geophysical, legal, and political concerns. Russia should cooperate, but its management of the NSR seems to be stable, even if many disagree with it. Meanwhile, Canada and other states must resolve the legal status of the NWP for shipping and other traffic to grow.

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