An Evaluation of Oil Pollution Prevention Strategies in the Arctic

Devon E Thorsell

A thesis

submitted in partial fulfillment of the

requirements for the degree of

Master of Marine Affairs

University of Washington

2015

Reading Committee:
Thomas M. Leschine, Chair
Scott Radnitz
Craig Allen

Program Authorized to Offer Degree:
School of Marine and Environmental Affairs
University of Washington

Abstract

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Devon E Thorsell

Chair of the Supervisory Committee:
Thomas M. Leschine, Ben Rabinowitz Professor of the Human Dimensions of the Environment

Climate change is profoundly impacting the Arctic and increasing accessibility to new resources and uses. Average temperatures in the region continue to rise and observations of sea ice loss through 2012 outstripped the most pessimistic scientific projections (Snow and Ice Data Center, 2013). If the current rate of sea ice loss is sustained, the Arctic could experience an "ice free" summer within the 21st century (Laidre, et al., 2015). The Arctic is often described as a cohesive region of states, however there is great regime diversity among them. Given this reality, what explains regime diversity in the Arctic? How is rapid climate change influencing emerging approaches to environmental governance and management? Recognizing the Arctic regime as the intersection of many overlapping governance systems, this research compares two national approaches: the Northwest Passage region of Canada and the Bering Strait region of the United States. The paper explores the similarities and differences between the two governance regimes' pollution prevention and response mechanisms and investigates the relationship between prevention and response exhibited in each regime especially in regard to adaptation to threats

posed by climate change. Findings characterize the Canadian regime as more preventative and the U.S. regime as more responsive. Findings illustrate that states with greater legal authority and sovereign rights are able to exceed generally accepted international standards and offer a more preventative framework. Likewise, states that strongly tie regional and national identities to unique environments may be more likely to enact measures that will protect those environments from degradation.

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Acknowledgements

I would like to offer my utmost thanks the members of my committee: Tom Leschine, Scott Radnitz, and Craig Allen for their guidance and support over the last year. I would also like to extend my gratitude to the UW faculty members who have encouraged and assisted me during my research and writing process: Sara Curran, Dave Fluharty, and Sabine Lang. I also must acknowledge the College of the Environment, the JSIS Canada Center, and the School of Marine and Environmental Affairs for their generous financial support. Finally, thank you to my family, friends, and classmates for their feedback and encouragement.

Introduction

Climate change is impacting the Arctic in a more extreme way than any other ecosystem or region on Earth. Average Arctic surface temperatures have increased by almost 2°C since 1970 (IPCC, 2014). The observed rate of sea ice loss is outstripping some of the most pessimistic projections – threatening habitat, creating unsafe conditions for subsistence hunting, and attracting international attention from industries such as oil and gas, shipping, and commercial fishing (West, 2008; Byers, 2013). In other words, climate change has brought the Arctic onto the geopolitical stage (Ebinger and Zambetakis, 2009). The Arctic boasts one of the most unique ecosystems on the planet, which increases the value of its resources for conservation and protection, while also creating challenges for regulators who must create rules that balance access and prioritize uses of the regions. The loss of sea ice in particular has incited interest in Arctic resources from public and private actors. For example, the Royal Dutch Shell Oil Company recently received an important set of permits from the United States government, putting them one step closer to extracting oil from the U.S. marine Arctic (Schlanger, 2015) although recent developments have led to Shell discontinuing its drilling for the time being.

The 2009 Arctic Marine Shipping Assessment (AMSA), conducted by the Arctic Council's Protection of the Arctic Marine Environment (PAME) working group, found that Arctic shipping poses a serious threat to the region's ecosystems and furthermore, that oil pollution is the most significant threat associated with shipping activity (AMSA, 2009). Increased activities related to shipping and maritime operations increase the occasions in which vessels are exposed to the unique risks of the Arctic including deck and equipment icing, strong winds, cold temperatures, remoteness and a general lack of infrastructure (EPPR Gap Analysis, 2013). Climate change has exacerbated some of these risks and has contributed to less

predictable weather conditions, while also contributing to the overall loss of sea ice and increased accessibility to shipping routes through the Arctic. The AMSA report contends that the threat posed by increased shipping can be effectively mitigated through effective regulation.

The importance of prioritizing prevention over response in the Arctic cannot be overstated. There is a lack of response infrastructure and capabilities among coastal Arctic states, which is certain to persist given the extreme conditions in the region. In the case of ship-based pollution, which is the focus of this paper, national legislators and policymakers have limited ability to regulate vessel operators in waters off their coasts. This is especially true for foreign flagged vessels. Nevertheless, the priorities of the state lie in measures to prevent pollution from ships in the first instance that are robust in the face of changing environmental conditions. These measures also seek to simultaneously increase response capabilities to spills in order to mitigate their impacts when they do occur.

Comparative studies of the disparate responses of Arctic states to the risks associated with shipping in the Arctic are conspicuously lacking. This research seeks to fill that gap. By examining national responses to increased shipping risks and conducting a comparison across countries, I delve into aspects of complex governance regime(s) and evaluate the Arctic regime through the lens of prioritizing prevention over response.

Beginning with a description of the Arctic region, this research situates itself by summarizing the existing regime literature. The paper then moves to discuss the impacts of climate change on the Arctic region in a number of key areas, focusing on the increase in commercial shipping, before introducing two cases that illustrate the approaches to oil pollution regimes in the Arctic. The paper concludes with a comparison of the two cases and my conclusions.

Background

The Arctic Region

The Arctic Region can be defined in a number of ways (Koivurova, 2005): geographically, climatically, and politically. Geographically, the Arctic is denoted by the Arctic Ocean surrounding the North Pole and continues south to the Arctic Circle, which is the parallel latitude line located at 66.56° N and marks the latitude above which the sun does not set on the day of the summer solstice and does not rise on the day of the winter solstice. This region is 20 million square kilometers (7.7 million sq. mi). Climatically, the Arctic is often denoted by the region in which the average temperature in the warmest month (July) does not exceed 10°C. This

Figure 1. Map of Arctic Region (NOAA, 1999)

is called the 10°C isotherm. Geographically, the isotherm includes everything north of the Arctic Circle, the Bering Sea, all of Greenland and Iceland, and dips into Hudson Bay in Canada. Politically, the Arctic can be described in two ways: the Arctic Five and the Arctic Eight. The Arctic Five (Canada, USA, Russia, Greenland/Denmark, and Norway) are the states whose territories border the Arctic Ocean. The Arctic Eight are those states with territory above the Arctic Circle and members of the Arctic Council; the Arctic Eight include the Arctic Five plus Sweden, Iceland, and Finland.

During the Cold War, the Arctic was a critical geopolitical space, dominated by the Cold War military complex. The United States and the Soviet Union conducted mapping, surveillance, and military exercises in the region (Koivurova, 2010). However, in 1987, Mikhail Gorbachev visited the Arctic city of Murmansk and delivered a speech that would change the conception of the Arctic region. Gorbachev's speech initiated the demilitarization of the Arctic and aspired to transform it into a 'zone of peace' (Åtland, 2008). In particular, the Murmansk Initiative encouraged confidence-building measures among the Arctic states, which evolved into negotiations to establish a cooperative governance regime in the region.

The cooperative regime in the Arctic works via an intergovernmental forum called the Arctic Council, which consists of eight member states (the Arctic Eight), six permanent participants (who represent the region's indigenous groups), twelve observer states, eleven NGO observers, and nine intergovernmental observers. The Arctic Council was founded in 1996 and merged with its predecessor: the Arctic Environmental Protection Strategy (AEPS), which was established in 1991. Decisions made by the Arctic Council are taken by consensus of the eight member states with full consultation with the permanent participants. Decisions are non-binding, but are meant to apply to both members and observers. Arctic Council activities are carried out

by six working groups (Contaminants, Flora/Fauna, Emergency Response, Sustainable Development, Environmental Protection, and Monitoring and Assessment) and are funded by the member states (Molenaar, 2012). Before 2010, the Arctic Council predominately issued technical recommendations, guidelines and scientific assessments (Koivurova, 2010). The most influential of these were the Arctic Climate Impact Assessment (ACIA) and the Arctic Marine Shipping Assessment (AMSA). The ACIA introduced the 'Arctic in change' paradigm, which prompted the Arctic Council to focus on strengthening its own capacity (ACIA, 2005). AMSA predicted an increase in commercial shipping through the Arctic and identified oil pollution as the greatest threat associated with Arctic shipping (AMSA, 2009).

A 'Framework for the Strengthening of the Arctic Council' was adopted in 2011, which led to the negotiation of two legally binding agreements, new observer rules, and the establishment of a permanent secretariat (Molenaar; Kao et al., 2012). The new agreements, which were negotiated under the auspices of the Arctic Council and adopted by the individual member states, are recognized as a significant divergence from the soft-law regime of the past (Kao et al.) and signal a shift in the Arctic Region, which is receiving increased international interest. The agreements address Arctic Search and Rescue (2011) and Oil Pollution Preparedness and Response (2013). The increased international interest in the Arctic stems predominately from the impacts of climate change, which both pose significant threats and unlock new opportunities. The literature on the Arctic addresses some of these risks and challenges including: sea ice loss; impact to local and indigenous communities; national security and sovereignty concerns; thawing permafrost and its impacts on infrastructure; availability of and access to marine resources (hydrocarbons – oil and gas, minerals, fisheries, and shipping); conservation of those resources as well as conservation of endangered species; user rights for

non-Arctic states; and the implications of increased international interest in the region (De La Fayette, 2008; West, 2008; Ebinger and Zambetakis, 2009).

The Arctic Council exists as part of a greater regime complex of governing instruments including bilateral and multilateral agreements (e.g. The Agreement on the Conservation of Polar Bears, 1973), national laws and policies (e.g. Arctic Waters Pollution Prevention Act, 1970, Canada), and other intergovernmental fora (e.g. the Barents Council) as well as international law: most notably, the UN Convention on the Law of the Sea (UNCLOS, 1982). The regime complex in the Arctic has been best defined by scholar Oran Young (2012) as a network of distinct, yet overlapping governing institutions that operate simultaneously in the broad issue area of Arctic governance, which incorporates resource management, international communication and coordination, and future planning.

There are few maritime boundary disputes extant in the Arctic. They include the Beaufort Sea (U.S./Canada), the Barents Sea (Russia/Norway), and the Bering Strait (U.S./Russia). The Barents Sea boundary was resolved through bilateral agreement in 2010. The Bering Strait boundary has been successfully negotiated, however, the Russian Duma has not yet ratified the treaty. Additionally, there is disagreement over the legal status of the Northwest Passage through the Canadian Archipelago, which is claimed as internal waters by Canada, but recognized as a set of international straits used for navigation by the United States and European Union. However, the U.S does accept that its vessels are subject to Canadian Arctic waters legislation (McDorman, 2014). In comparison to the rest of the world, Arctic maritime boundaries are not contentious: more than half of the world's maritime boundaries are unresolved (Hoel, 2009) and it is likely that the potential for conflict over the Arctic boundaries is very low (De La Fayette, 2008).

Arctic Governance Regime Literature

Arctic regime scholars have asked whether the current regime is sufficiently capable to confront the emergent challenges associated with rapid climate change. These scholars can be distilled into two schools of thought. One school of thought argues that the emerging environmental threats to the Arctic will be best managed through the existing regime because it provides a flexible framework founded on collaboration and the principles of environmental protection. Authors that have argued that the existing Arctic regime is capable of handling the emerging challenges in the region include: Bert, Chaddic and Perry (2009), Brosnan, Leschine, and Miles (2011), Dodds (2010), Ebinger and Zambetakis (2009), Hasanat (2012), Hoel (2009), McDorman (2009), Pedersen (2012), West (2009), and Young (2011). These authors highlight the importance of the existing UNCLOS frameworks and its components such as the Commission on the Limitation on the Continental Shelf (CLCS). They also cite regional organizations including the Arctic Council, the Inuit Circumpolar Council (ICC) Northern Forum, and the Barents Council, which set Arctic policy and facilitate cooperation in their respective regions. For the most part, these authors agree that the existing institutions are successfully managing regional Arctic cooperation, scientific and technical research and assessment, and regulation where needed. Although some of the authors listed above call for the strengthening of the existing institutions, they generally agree that the regime is sufficient without major institutional changes.

The other school of thought argues that, for various reasons, the existing regime is insufficient to properly manage this rapidly transforming region. Scholars who maintain that the existing Arctic regime is not equipped to deal with the region's emerging challenges include: Balton and Thomas (2013), De La Fayette (2008), Elliot-Meisel (1998), Koivurova (2010),

Kikkert (2012), Larson (1989), Molenaar (2012), and Stokke (2007 and 2013). These authors suggest further multilateral and bilateral agreements to address specific Arctic issues such as conservation, fisheries management, and shipping. Many of them recommend the implementation of a legally binding treaty regime that would augment and perhaps eventually replace the existing regime in the Arctic – however, it has become clear in recent years that this alternative to Arctic governance is probably not politically feasible at present. Most notably the Ilulissat Declaration (2008) published by the Arctic Five, which asserts that the Arctic requires no new treaty governance arrangement and that the existing legal regime in the Arctic is sufficient. Authors in this school contend that a new or adequately transformed regime would better serve the interests and needs of a broader coalition of actors, including non-Arctic states, and would be capable of regulating and managing new uses of Arctic space and resources.

Although the questions regarding the sufficiency and effectiveness of the existing regime are important and relevant to the future governance of the Arctic, they overlook the current diversity of regimes among Arctic states. Each state in the region addresses industrial development, environmental protection, and social issues differently based on their national interests, state capacity, and relationship to the Arctic region. This research, while focused on the Arctic regime and situated within that literature, seeks to highlight the region's diverse approaches to a singular threat (oil pollution from increased shipping traffic) and to compare and contrast national strategies.

Diverse Conceptions of the Arctic

Assessing Arctic governance is complicated partially because of the number and strength of the stakeholders involved in managing and regulating the region. The interests of nation-states, indigenous communities, industry users, and non-users must all be considered in order to

evaluate the effectiveness or sufficiency of the regime. However, these actors evolve over time and often adapt to the changes observed in the Arctic. However, in recent years the Arctic Council itself has written and adopted binding legal instruments, somewhat changing its own mandate. Individual Arctic states each have their own approach to Arctic governance. For example, Canada's leadership of the Arctic Council included the establishment of the Arctic Economic Council, which incorporates business interests in favor of greater economic development in the North. In contrast, the U.S. chairship highlights climate change and environmental stewardship (U.S. Arctic Strategy, 2013).

Diversity in the Arctic can be partially attributed to the differing conceptions of the Arctic. Kestikalo (2012) argues that the Arctic has been framed as a frontier region inhabited by a low density of indigenous peoples – a conception that is only true for Alaska, northern Canada, Russia, and Denmark (Greenland). Conversely, Finland, Norway, Sweden, and Iceland have very different conceptions of Arctic life, which are often not communicated through regional agenda setting. Thus, there may exist a divide between Scandinavian conceptions of their own Arctic territory and resources, and the conceptions held by the other Arctic states (Kestikalo, 2012 and Osherenko, 1992). Osherenko (1992) discusses the policy goals of the U.S. in the 1990s as one of balanced development, in which the environmental protection was second to economic growth. In contrast, she argues that Canada and the Nordic countries have pursued policies of sustainable development, which put economic development and environmental protection on more equal ground, in order to meet present needs without compromising future generations.

Another, yet similar, approach to conceiving of the Arctic region is put forward by Jantsch in Doubleday (1996). Jantsch offers two approaches to the conceptions of the environment. An understanding of the Arctic in which indigenous peoples live in the

environment is most similar to Jantsch's category of the "mythological" or "I-Thou" relationship. In contrast, the conception of an Arctic where human interests are separate from the environment is described by Jantsch's "I-It" or "rational approach" (Doubleday, 1996). This conception leads to frontier thinking in which outsiders perceive the Arctic as a hinterland, "it," containing resources for the taking. This is in contrast to the people who live in the Arctic and see it as a home whose resources they depend on for subsistence and for whom the conception of the region is much more complex. This approach pits Arctic states and users against non-users, and creates an in-group/out-group dichotomy.

In contrast to the frontier conceptions of the Arctic by non-users is the concept of option value. Option value highlights the non-user benefits of natural resources in the long term. It reflects the payment of an option price by a non-user in order to retain potential future use of the resource. Often this payment is rendered because of uncertainty and lack of information about the resource on the part of the non-user (Smith, 1983). Option value suggests that in the case of expected forthcoming information, development should be postponed or even prohibited. These are only a few of the competing framings of the Arctic, all of which are important in understanding the interface between national and international policies in the region.

Climate Change in the Arctic

Global climate change is impacting the Arctic more rapidly than anywhere else on Earth, primarily through polar amplification and feedbacks (IPCC, 2014). The loss of sea ice in particular poses a serious threat to the Arctic environment: its inhabitants, economy, and the flora and fauna. In recent years, Arctic regional organizations have taken steps to aid adaptation to climate change. These adaptations were made in response to the current and projected changes in the region. Regional changes are not uniform, affecting geographic areas, trophic levels, species,

and communities differently. Of particular interest is the impact of climate change on shipping routes and the potential for commercial shipping in the region.

The Arctic climate is characterized by a number of phenomena specific to the region. Unlike the Antarctic, the ice that covers the Arctic for much of year is predominately frozen sea ice, rather than an ice-covered land mass. This ice can be categorized as either annual ice or

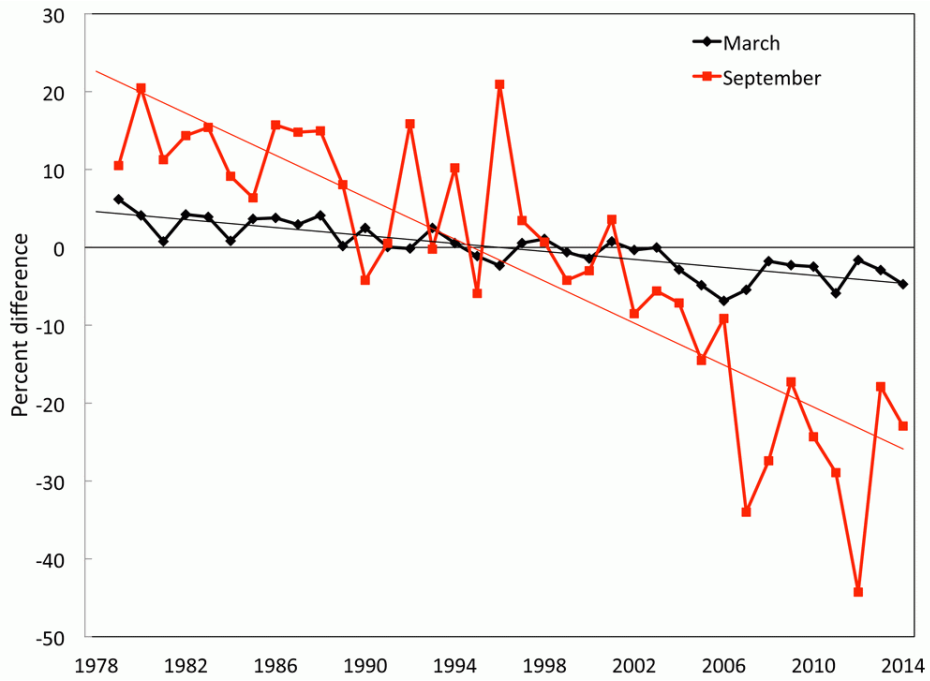

Figure 2. Percent Differences in Sea Ice Concentration (NOAA, 2014).

multiyear ice. Annual ice melts each summer and refreezes in the winter, contributing to the seasonal variation of the size of the ice sheet. Climate change and the warming of the Arctic are disrupting this cycle of melting and refreezing as winter becomes shorter and the spring melt begins sooner. Annual ice can become very thick, but is typically no thicker than 8 feet (National Snow and Ice Data Center). Multiyear ice does not typically melt in the summer and can be up to 20 feet thick (NSIDC, 2015). Observations have recorded losses in both annual ice and multiyear ice, leading to a loss of volume in the Arctic ice sheet and the winter extent of ice (NOAA,

2015). And while the Arctic region is losing ice on average, observations in the Bering Strait region have recorded increases in ice floes and greater concentrations of ice (IPCC, 2014).

Polar Amplification is a phenomenon in which changes in the Earth's radiation budget tend to produce larger changes in temperatures near the poles than the Earth's average. Changes in the radiation budget include increases in greenhouse gases. Climate models demonstrate polar amplification in response to changes in atmospheric CO_2 and in the absence of a slowing of the Atlantic Meridional Overturning Current, the Arctic is projected to warm considerably (IPCC, 2014). Some of the mechanisms of polar amplification in the northern hemisphere include the retreat of sea ice, the reduction in snow cover, changes in atmospheric and oceanic circulation, and anthropogenic soot deposits (IPCC, 2014). This phenomenon explains much of the extreme change taking place in the Arctic. In conjunction with the climate feedbacks, climate change will continue to have an enormous impact on all the components of the Arctic system.

Current information about the Arctic indicates that the speed of melting is heavily influenced by feedbacks, most notably the ice-albedo feedback. Generally, the ice-albedo feedback mechanism prevents melting in the Arctic because ice efficiently reflects solar radiation, therefore inhibiting melting via solar heat. Solar radiation is more easily absorbed by open water, which transfers heat to the ice and contributes to bottom melting. Perovich et al. (2008) and Graversen et al. (2008) examined the ice-albedo feedback in the Arctic and separately determined that the Arctic is experiencing increased melting from higher average temperatures of the surrounding ocean. The ice-albedo feedback mechanism is amplified by bottom melting of the ice by warmer sea water, which increases the proportion of open water to ice-covered water. Markus et al (2009) determined that the melting season in the Arctic has increased by 20 days over the past 30 years and that Arctic ice is on average thinner than it once was. Data from the

U.S. National Snow and Ice Data Center also supports these claims. In addition, the deposition of black carbon or soot, by generators and vessel emissions, on the ice also reduces the natural albedo (reflectiveness) of the Arctic (Arctic Council Task Force, 2013).

Shipping in the Arctic

The potential for arctic shipping has received the much attention in recent years as the Northern Sea Route and the Northwest Passage have become increasingly passable for unescorted commercial vessels. Regular transit commercial shipping in the Arctic is only a few years old, but it is likely to become more popular as it reduces the transit time between Japan and Europe by 40 percent and between the West Coast of the U.S. to Europe by 25 percent. Climate change is projected to increase accessibility to sea routes in the Arctic, although shipping is likely to remain expensive and dangerous in the years to come.

A DNV Risk Assessment projection from 2010 estimated the total transit voyages of the Arctic at 480 for the summer of 2030 and 850 for the summer of 2050 (DNV, 2010). Their projections also suggest that fewer days at sea in smaller vessels (through the Arctic) will decrease overall emissions from ships. However, the AMSA contends that emissions will likely remain at current levels because of the increased power required to navigate through ice infested waters (AMSA, 2009). Arctic shipping is still unpredictable and dangerous. Arctic vessels must be prepared to handle very low temperatures, lack of support from VHF radios and navigation aids, incomplete mapping, stormy seas, ice in the water and aboard the ship, and a number of other threats. These hazards are likely to delay the potential gains for commercial shipping (AMSA 2009 and CRS, 2015).

Oil Pollution Prevention, Preparedness, and Response in the Arctic

With an increase in shipping traffic comes a greater likelihood for accidental oil pollution caused by collisions, groundings, ice strikes, mechanical failures, weather, and/or lack of training and preparedness for the polar environment among crew (AMSA, 2009). The probability of oil pollution from ships is further amplified by the unique Arctic environment, which is hazardous at best and impassable at worst. Furthermore, oil pollution is more difficult to recover and mitigate in Arctic waters due to the physical properties of oil in cold and ice-covered waters, frequent storms, prolonged periods of darkness, lack of infrastructure including pre-positioned spill recovery equipment, and other factors (NRC, 2014). The Pew Charitable Trust notes that "in the best of conditions, recovering spilled oil is difficult. A response effort is considered successful if 20 percent of the spilled oil is recovered," (Pew, 2012). Michael Byers (2013) characterizes the Arctic as a much more dangerous place for oil pollution than elsewhere, since "oil disperses and degrades very slowly at cold temperatures…Distance, sea ice, seasonal darkness, rough weather, and lack of coastal infrastructure and population centers render the prospects for a successful cleanup even more remote further north" (Byers, p. 200). Mitchell (2010) calls this type of uncertainty regarding the impacts of oil spilled in the Arctic: effect ignorance, because we expect there to be harm to the environment, but we are uncertain of the precise impacts.

A number of international legal frameworks address marine oil pollution worldwide and thus apply to the Arctic region. These include the International Convention for the Prevention of Pollution from Ships (MARPOL, 1973) and its annexes, and the London Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter (1972) and its annexes, the International Convention for the Safety of Life at Sea (SOLAS, 1974) and the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW

1978). Many of these conventions will be amended by the recent adoption of the Polar Code, discussed further below. The Arctic is further regulated by national, and provincial or state rules.

In 2013, the Arctic Council adopted the Agreement on Cooperation on Marine Oil Pollution Preparedness and Response in the Arctic, which implemented regionally the global International Convention on Oil Pollution Preparedness, Response and Co-operation (OPRC) of 1990. The Agreement was negotiated under the auspices of the Arctic Council and was subsequently adopted by each member state individually and incorporated into its national rules. The Agreement focuses on obligations and duties of member states to take steps to cooperate and implement a number of measures to better monitor and respond to oil pollution incidents (Arctic Council Agreement, 2013). In 2015, the Arctic Council member states adopted a Framework Plan for Cooperation in the same field. The Framework Plan applies to petroleum and maritime activities in the Arctic that entail a risk of oil pollution.

The UN Law of the Sea Convention in the Arctic

The UN Law of the Sea Convention (hereafter UN LOSC) was adopted in 1982 and entered into force in 1996. The Convention codifies the international law of the sea and most notably divides the ocean into jurisdictional zones. Coastal state jurisdiction generally decreases as distance from the coastline increases. Waters that are geographically separated from the ocean, such as bays and fjords, are denoted as internal waters. Internal waters are legally described as waters that lie on the landward side of UN LOSC baselines. The baselines denote where the territorial

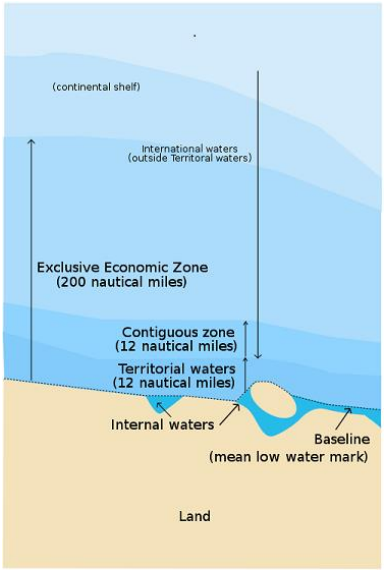

Figure 3. UN LOSC Maritime Zones (American University)

sea begins and typically are located at the mean low water line. The territorial sea begins at the baseline and extends seaward 12 nautical miles. The exclusive economic zone (EEZ) extends to 200 nautical miles from the coastal baseline. Beyond 200 nautical miles lies the high seas or international waters.

Each zone is associated with a right to passage for foreign flagged vessels under the principle of the freedom of the seas. In internal waters, there is no such right and the coastal state has full jurisdiction and sovereignty (much like on land). Access to internal waters is regulated solely by the coastal state. Innocent passage exists in the territorial sea and archipelagic waters, where foreign flagged vessels may proceed expeditiously through the waters in a manner that is not prejudicial to the peace or the security of the coastal state. Vessels in innocent passage are prohibited from acts of willful and serious pollution, conducting economic activities (such as fishing or research) or using weapons (UN LOSC, 1982). Submarines must surface in innocent passage. In transit passage, applicable only in international straits, foreign flagged vessels may proceed with fewer restrictions from the coastal state; submarines may remain submerged. Vessels in transit passage must comply with generally accepted international standards (GAIS) and make no threats of force against the coastal state (UN LOSC, 1982). In the EEZ and the high seas, all vessels have full rights to passage. These zones are compared in Table 1.

Table 1. UN LOSC Maritime Zones and Passage

UN LOSC Zone	Demarcation	Type of Passage
Internal Waters	Landward of baselines	No automatic right to passage
Territorial Sea	12nm seaward from baselines	Innocent passage
International Straits	Sea channel connected EEZs or high seas	Transit passage
Archipelagic Waters	Baselines surrounding archipelagic states	Innocent passage
Exclusive Economic Zone	12-200nm seaward from baselines	Full rights to passage
High Seas	Beyond 200nm from baseline	Full rights to passage

The Polar Code

The International Code for Ships Operating in Polar Waters (Polar Code) is a set of harmonized construction, design, equipment and manning (CDEM) standards applicable to the Arctic and Antarctic, to be implemented by the International Maritime Organization (IMO). It is a risk-based set of requirements intended to increase safety, prevent loss of life and property, and protect the environment (Cressey, 2014). Canada led the effort to shape this harmonized code in order to better regulate how ships are constructed and operated in ice-covered waters (Kikkert, 2012).

Development of the Polar Code began in the 1980s as interest in Arctic petroleum in the Beaufort Sea drew new actors to the region. By 1990, three major pollution incidents in polar or sub-polar waters ((Exxon Valdez, T/M Maxim Gorky, and the Finn Polaris) reinforced the need for a stronger and more uniform standards regime (AMSA, 2009). Canada submitted a draft of the text in 1998 as a set of guidelines for the Arctic (Rayfuse, 2014). These guidelines were adopted in 2002 as non-mandatory standards. In 2006, requirements for vessels were released

under the International Association of Classification Standards of Unified Requirements for Polar Ships (Rayfuse, 2014). These guidelines were updated once again in 2009 to include the Antarctic and were submitted to committee for evaluation. The Polar Code was officially approved as a mandatory set of standards by the IMO Maritime Safety Committee and the Marine Environment Protection Committee in November 2014 and after approval from the general assembly (likely in 2015 or 2016) the Code will come into force in 2017 for new ships and 2018 for existing ships (IMO, 2014).

The Polar Code outlines the functional requirements of and regulations pertaining to ship structure, pollution prevention, certificates and inspections, and performance standards. Vessels are required to prepare a Polar Water Operational Manual (PWOM) and carry it onboard. The PWOM specifies the capabilities and limitations of the vessel in ice-covered waters and includes contingency plans in case the vessel encounters conditions beyond those identified as suitable in the manual. The Polar Code also outlines pollution prevention measures relating to oil, noxious liquids (in bulk), packaged harmful substances, sewage, and garbage. Additional requirements include compliance with international conventions such as the Safety of Life at Sea Convention (SOLAS) and the Convention for the Prevention of Pollution from Ships (MARPOL). The following is a list of structural categories for which the Polar Code sets a related goal, identifies the functional requirements, and lists regulations:

- Vessel categories A, B, and C
- Subdivision and stability
- Watertight and weathertight integrity
- Machinery installations
- Fire safety/protection
- Life-saving equipment
- Safety of navigation
- Communication
- Voyage planning
- Manning and training

Criticism for the most recent iteration of the Polar Code is that its text has become diluted from previous (voluntary) versions. Another criticism is that the Code is not actively enforceable and actual application can only be gained through state participation and the compliance of the international shipping industry (Wanerman, 2015). Finally, although the Polar Code will not enter into force as a mandatory set of standards until 2017, it reflects the internationally accepted minimum for safety in polar waters. As an international regulatory instrument it codifies the lowest common denominator of standards between states parties, since the standards it mandates are likely to be below that level which might be implemented unilaterally by an individual state.

Prioritizing Prevention: the Precautionary Approach

A guiding principle of prevention is Principle 15 of the Rio Declaration (1992), commonly referred to as the "precautionary approach." The precautionary approach was adopted as one of the twenty-seven principles outlined in the Rio Declaration: the primary output of the UN Conference on Environment and Development (UNCED). Governments from 172 nations participated in the conference alongside 2,400 NGO representatives. UNCED was intended to rethink economic development to incorporate environmental stewardship and protect the Earth's natural resources.

The text of Principle 15 reads:

> In order to protect the environment, the precautionary approach shall be widely applied by States according to their capabilities. Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation.

The precautionary approach is particularly relevant to the Arctic region because of the uniqueness of the region, especially in that it is still emerging as a place where humans can extract resources and benefit from ecosystem services, coupled with the irreversibility of the

harm that large oil spills could cause. Thus, the Arctic, rather than requiring a program of remediation for destruction already caused, calls for a preventative regime to protect the region from environmental destruction and irreversible harm. The cost-effective measures mentioned in the principle are determined by cost-benefit analyses that consider avoided impacts to the environment in relation to their costs. However, such assessments often do not take into account the uniqueness of a particular environment, nor do they include potential non-user benefits, or option values such as described above.

The precautionary approach is enshrined in the 2013 Arctic Marine Oil Pollution Preparedness Agreement preamble, which states, "Aware of the Parties' obligation to protect the Arctic marine environment and mindful of the importance of *precautionary* measures to avoid oil pollution in the first instance…" [emphasis added]. Precaution is an especially important concept for evaluating pollution prevention measures, as its application typically leads to the prioritization of prevention over response. In conjunction with the precautionary approach, the pollution prevention principle encourages states to "avoid oil pollution in the first instance" rather than enact measures to respond to, and cleanup pollution in the marine environment (Dzidzornu, 1998), also elevating preventive measures over those associated with response.

Methods

The method used to evaluate the oil pollution control strategies in the Arctic is a two case study design. Because Arctic states are responding to the same threat, and many are similarly positioned economically, a most similar case study design is fitting. Using the methodology outlined by Gerring (2007), the case study method used here is intended to first, generate a hypotheses by examining cases in which many of the variables are similar or shared and second, to test that hypothesis. Thus, this thesis is divided into two major sections. The hypothesis

generation section of this paper is an in-depth review of the selected Arctic shipping routes as well as the oil pollution regimes that apply to those routes. The hypothesis testing section of the paper identifies and investigates the possible causal factors that have led to differences among the regimes. The case study approach is useful because it allows for the specific investigation of particular examples of a phenomenon, here: governance responses to risks associated with climate change in oil pollution prevention strategies. And also the generalization of that phenomenon to a greater scale, here: future responses and adaptation to risks that derive ultimately from climate change in the Arctic.

Case Selection

The two cases used for this investigation are the United States (Bering Strait) and Canada (Northwest Passage). In choosing a pair of cases, it was important to consider both the national characteristics of the state in which the more specific case, that of an Arctic shipping route, resides. The U.S. and Canada are similar in many ways, hence the need for a most similar case study method. Both countries enact regulations at the national as well as the state/provincial level and have similar general approaches to environmental governance. Both the United States and Canada are federalist nations in which the central (federal) government delegates some of its power and responsibility to regional governments. The U.S. and Canada are highly industrialized, advanced and developed nations with large populations and large land areas. With regard to the Arctic, the United States and Canada are both members of the Arctic Five: countries with territory above the Arctic Circle and members of the Arctic Council.

The Northwest Passage in the Canadian Arctic archipelago and the Bering Strait off the coast of Alaska are the shipping routes chosen for examination. These two cases offer potentially crucial routes for commercial and private vessel traffic. They are located in sparsely populated

regions inhabited by indigenous peoples where the potential economic value of the Arctic is high. Both the Northwest Passage and the Bering Strait are situated on prospective transarctic routes that would decrease the distance between Asia and Western Europe by over 7,000 km, increasing the likelihood that each will experience increased shipping traffic in the coming decades. The commercial shipping is expected to increase in both the Northwest Passage and the Bering Strait in the coming years as climate change continues to impact the region, extending the length of the season over which these passages will be available for use.

For each case, I identified the oil pollution control regulations applicable to foreign flagged vessels and included these in the case studies. These data were used to determine the character of each regime. Pollution regulations were deemed preventative if they contained measures applicable to vessels before an oil spill incident occurred. These types of measures include zoning, CDEM standards, insurance requirements, navigational aids, traffic schemes, monitoring, and communication technologies. Pollution regulations were deemed responsive if they contained measures applicable to vessels after an oil spill incidence. These types of measures include oil recovery technologies, liability limits, and response cooperation with other states. Although liability is most often recognized as a deterrent for potential pollutions (thus, a preventative measure), oil spills in the Arctic are far more likely to be accidental than intentional, given climatic conditions – and high liabilities come into effect after an oil pollution incident. Thus, I have characterized them as hybrid measures. I did not include oil pollution rules or regulations that only served to codify international standards such as MARPOL and SOLAS.

Comparison

The comparison section of this paper serves to test the hypothesis generated in the exploratory case study, in which the difference between the U.S. and Canadian regime is

identified and labeled. In order to do this, I have identified five causal factors that might influence the character of the oil pollution regimes in the U.S. and Canada. The first factor is geography and climate; it is the physical differences between the Bering Strait and the Northwest Passage that lead to distinct challenges to oil pollution prevention and response. The second factor is the political climate during the period of rules adoption and includes the existence of focusing events (Birkland, 2011) that might have influenced policy and lawmakers to adopt certain types of rules and regulations. The third factor is the policy position of the government toward the Arctic. The factor takes into consideration the policy documents published by the governments of Canada and the United States that outline goals and objectives for the Arctic region. The fourth factor is the legal status of each waterway as defined by UNCLOS and also by the government of Canada and the United States. In the marine environment, the legal definition of certain zones provides for the types of activities, rules, and regulations that may be prescribed and enforced. The fifth and final causal factor is the relative strength of the fossil fuel industry and commercial shipping industry in each coastal state. This is relevant because oil and gas development in the Arctic is directly linked to the transport of oil and gas through the Arctic. The fossil fuel industry is likely to have a strong voice when it comes to pollution control regulations since it directly affects their industry.

Canada: The Northwest Passage

The Northwest Passage (NWP) is a collection of narrow channels that traverse the Canadian archipelago from the Western Arctic Ocean to the North Atlantic Ocean. The five recognized routes through the Canadian Arctic's 36,000 islands and rocks are shallow and ice-covered for much of the year (AMSA, 2009). The shipping routes through the Northwest Passage are recognized by many actors, public and private, as potential commercial shortcuts between Asia and Europe, preferable in distance to the Panama Canal and Suez Canal routes by several thousand miles.

Figure 4. Map of Canadian Arctic (Natural Resources Canada).

Passage through the NWP is expected to increase in the coming years although there were only 30 transiting ships in 2012, 22 transiting ships in 2013, and 17 transiting vessels in 2014 because of the short and cold summer (Northwest Territories State of the Environment Report, 2015). Escort ships, Coast Guard vessels, and small adventure vessels account for approximately 65% of total NWP traffic (Northwest Territories State of the Environment Report, 2015). A smaller percentage of vessels supply Northern communities throughout the archipelago with food, fuel, and other materials. The AMSA predicts the greatest increase in destinational shipping in the coming decades because of the longer shipping season and an increase in demand for goods by growing northern communities.

Access to the NWP is controlled by ice conditions which will continue to be extremely variable (AMSA, 2009). The NWP is likely to be one of the last routes through the Arctic to experience an ice-free summer (Østreng, et al., 2013). The routes themselves are complex and restricted to smaller vessels because they are both shallow and narrow. There is a general lack of adequate charts for the region, making navigation particularly hazardous. In addition, GPS coverage is not reliable or lacking and there are no deep-water ports along the route to offer refuge to larger vessels (Østreng, et al., 2013). For these reasons, insurance premiums tend to be higher for vessels transiting the NWP than other Arctic routes. Preventing oil pollution from ships in the Canadian Arctic protects the economic gains associated with increased shipping, as well as the unique Arctic environment and the traditional livelihoods of the 30,000 inhabitants of the region.

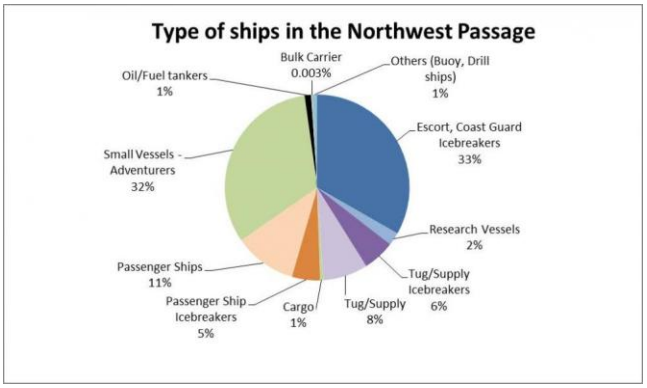

Figure 6. Types of Ships in the NWP (Northwest Territories State of the Environment Report, 2015)

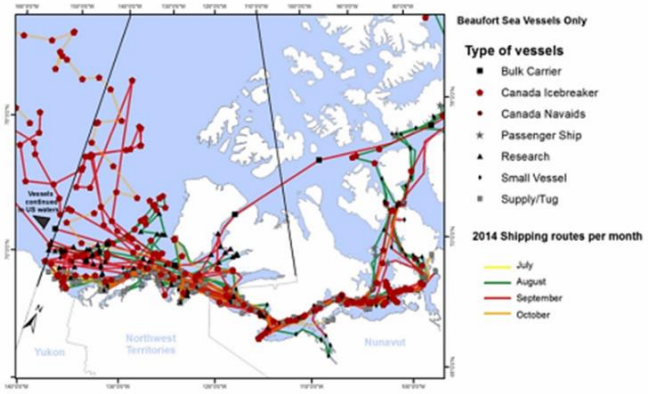

Figure 5. Beaufort Sea Vessel Traffic Map (Northwest Territories State of the Environment Report, 2015)

Canada claims full jurisdiction over the archipelagic region of the NWP, which was declared part of the internal waters of Canada in 1985 (Byers, 2013). The Canadian position is based in part on the historical claim that Inuit peoples have used the islands and waters for millennia (Head, 1960) and that the straight baselines allowed by the LOSC enclose the NWP as internal waters (Larson, 1989). This classification affords Canada the same prescriptive and enforcement jurisdiction as it enjoys on its land territory and extends its ability to implement pollution prevention regulations and compel all vessels to comply. The United States and European Union contest this claim, contending that the Northwest Passage is "an international strait, open to use by all states," (De La Fayette 2008, p.544) because the openings to each channel are too wide to be enclosed by straight baselines under the UN LOSC and because the NWP has the potential to be used as an international waterway. Although the legal status of the NWP is still disputed, the United States and Canada have adopted an "agree to disagree" conflict management strategy for this particular disagreement (McDorman, 2009).

Oil Pollution Regime in Canada

The oil pollution regime in Canada is made up of international law (discussed in the introduction) as well as national legislation and regulations. Oil pollution prevention legislation in the Canadian Arctic attempts to address the risks associated with shipping through shallow and narrow channels, with unpredictable weather, and a lack of hydrographic information. Vessels in the NWP tend to be small cargo resupply ships serving the northern Canadian communities and not transarctic ships (Østreng, et al., 2013).

Canada Shipping Act

The Canada Shipping Act (CSA) was first adopted in 1906. The most recent revision was adopted in 2001 and entered into force in July 2007. The Canada Shipping Act is a broad policy that includes two parts related directly to oil pollution prevention and response: Part 8 and Part 9. Part 8 pertains to 'Pollution Prevention and Response' and Part 9 addresses only 'Pollution Prevention.' Sixty-four unique regulations have been adopted under the CSA, many of which address safety and navigation and seven of which will be addressed here. The CSA applies to all Canadian navigable waters, including the St. Lawrence Seaway, Hudson Bay, the North Atlantic coast, and the Canadian Arctic. The CSA is applicable, in respect to pollution, to all foreign vessels in the EEZ of Canada (CSA, 2001, §8). The CSA explicitly prohibits the discharge of oil into Canadian waters and carries penalties for violations of up to $1,000,000 and/or eighteen months in prison (CSA, 2001, §187). The Act also outlines duties of a pollution response officer, who is empowered to conduct inspections and bring vessels to port is they are suspected of violating CSA rules and regulations regarding pollution (§175.1).

Seven regulations under the CSA are likely to have a direct impact on the prevention of oil pollution and will thus be included in the evaluation of the CSA. Each regulation is italicized

in the following paragraphs and the section numbers refer to the section within the regulation (not within the CSA). The Environmental Response Arrangements Regulations apply to oil tankers of 150 gross tonnage or more, vessels of 400 gross tonnage or more that carry oil as cargo or fuel, and groups of vessels that are towed or pushed, are of 150 gross tonnage or more in aggregate and carry oil as cargo. The regulation states that the prescribed maximum quantity of oil for these vessels is 10,000 tons (§4). The Hull Construction Regulations require double bottoms for all ships over 50 m in length (§11). The Navigation Safety Regulations establish equipment requirements and procedures for all ships including compasses, GPS, AIS, depth-sounding, and visibility from the navigating bridge (§19-38 and §63-89). They also provide additional requirements for vessels navigating in shipping safety control zones (under AWPPA).

The Northern Canada Vessel Traffic Safety Services Zone Regulations (NORDREG) require vessels, in certain areas, to obtain and provide additional information about their sailing plan upon entering and exiting a traffic safety zone and any deviations while in transit (§5-10). NORDREG applies in the shaded region of the map to vessels carrying a pollutant or dangerous goods as cargo and those over 300 gross tonnage (Transport Canada). NORDREG covers the entire Northwest Passage as well as the Hudson Bay region. NORDREG also provides services such as icebreaker escorts.

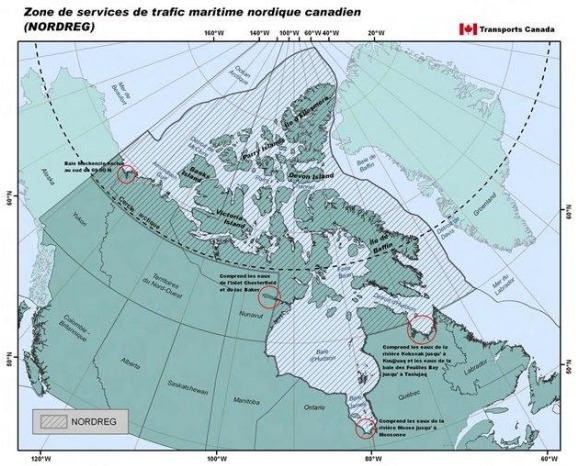

Figure 7. Map of NORDREG Zone (Transport Canada, 2015).

The Vessel Pollution and Dangerous Chemicals Regulations address the discharge of oil, stating that Canadian vessels shall not discharge oil in any Canadian waters (§43). These

regulations further require double hulls for oil tankers and codify much of MARPOL Annex I in Canadian legislation. The Vessel Traffic Services Zones Regulations ensure that vessels are capable of communicating with a marine traffic regulator and details the contents of required reporting (§5-8). The Vessel Operation Restriction Regulations ban classes of vessels from certain Canadian waters for reasons of environmental protection and safety; these regulations predominately apply to rivers and lakes, but some bays and are included (Schedules 1-8).

Arctic Waters Pollution Prevention Act

In 1970, Canada adopted the Arctic Waters Pollution Prevention Act (AWPPA) in response to a 1969 transit of the NWP by the U.S. oil tanker *Manhattan*. No pollution occurred during the transit, but the incident sparked backlash in Canada, since Canada had repeatedly made requests that U.S. vessels get clearance to transit the NWP (which were ignored). AWPPA originally extended 100 nautical miles off the Canadian coast; however, it was extended to 200 nm in 1996 by the Oceans Act. The Arctic Waters Pollution Prevention Act (AWPPA) was most recently amended in 2014. AWPPA prompted the adoption of two regulations: the Arctic Shipping Pollution Prevention Regulations (ASPPR) and the Arctic Waters Pollution Prevention Regulations (AWPPR). ASPPR concerns CDEM standards for vessels in ice-covered waters and AWPPR concerns liability and compensation/penalties for oil spills.

AWPPA regulates foreign and domestic vessels in Canadian Arctic waters (internal waters) and prohibits any person or ship from depositing waste of any kind in Arctic waters or on the mainland or islands of the Canadian Arctic where that waste might end up in the marine environment (AWPPA, 1970). AWPPA exceeds the CSA in two main ways: first, it extends Canadian jurisdiction into arctic waters (specifically the waters surrounding the Canadian archipelago, whose legal status is not resolved); and second, it allows for the declaration of

shipping safety control zones in which navigational and structural requirements may be enforced. These safety zones can be closed to traffic altogether due to ice conditions. AWPPA also provides for civil liability for harm from the deposit of waste; negligence need not be proved (Carnahan, 1971). AWPPA also outlines the duties of a "pollution prevention officer," an onboard observer role usually fulfilled by a member of the Canadian Coast Guard who is empowered to conduct vessel inspections and vessel seizures if the officer suspects the vessel of discharging oil illegally into Canadian waters (AWPPA, 1970).

AWPPA also prompted the Arctic Ice Regime Shipping System (AIRSS), which is intended to minimize the risk of pollution in Arctic waters due to damage of vessels by ice. AIRSS requires ship operators to take into account ice conditions and assign values to those conditions and the capabilities of the ships. Intentional entry into conditions with negative 'ice regime' values is prohibited without icebreaker escort (Transport Canada AIRSS, 2010).

The Arctic Shipping Pollution Prevention Regulation (ASPPR) specifies design, construction, and machinery requirements for Arctic ships and is associated with a Certificate which indicates which ice class the vessel satisfies. The Certificate is voluntary, but demonstrates a vessel's full compliance with ASPPR. The standards for construction are codified in the "Equivalent Standards for the Construction of Arctic Class Ships."

Canadian Arctic Policy

The Canadian Northern Strategy (2008) is Canada's most recent policy document for the Arctic region. It stresses the importance of the Arctic as a component of Canadian identity and a commitment to developing the North for native people. The Northern Strategy focuses on four priority areas: exercising sovereignty, promoting socio-economic development, protecting the environment, and improving governance. The 2008 Strategy supports Canada's hard line legal

approach to the Northwest Passage, maintaining that they are internal waters subject to the full jurisdiction of Canada.

In contrast to the Northern Strategy's first goal of exercising greater sovereignty in the Arctic, a recent poll demonstrated that only 45 percent of Canadians believe that the Northwest Passage constitutes Canadian internal waters. While 45 percent represents a large portion of the population, in 2010 74 percent of Canadians believed that the NWP was within Canadian waters (Koring, 2015). This shift in public perception of the Canadian Arctic is not likely due to any policies of the Canadian government, which in addition to increasing Coast Guard presence and spending money to develop infrastructure in the Arctic, just wrapped up its two-year chair of the Arctic Council.

Canadian Enforcement and Response Capacity

Enforcement of the pollution prevention measures and regulations discussed above is mainly carried out by the Coast Guard of Canada and appointed and certified pollution prevention officers. Canada's Northern Strategy states that the consistent patrol of arctic waters by the Coast Guard is a priority for the protection of the marine environment. Currently, the Canadian Navy and the Coast Guard operate 43 vessels, 13 of which are very large vessels with icebreaking or cutting capabilities. Canada also administers a National Aerial Surveillance Program (NASP) with one aircraft stationed in Nunavut for the Arctic shipping season (Transport Canada). The NASP is intended to serve in both an enforcement and surveillance capacity. It is worth noting, however, that there is no emergency unit with the necessary facilities to perform a quick and timely response to an oil spill incident in the Canadian Arctic (Østreng, et al., 2013).

United States: The Bering Strait

The Bering Strait is the international waterway that separates the State of Alaska, USA from the Russian Federation. At its narrowest point, the continents of North America and Asia are only 90 km apart (AMSA, 2009). Numerous Russian and American islands make sections of the passage narrower. The Bering Strait leads to both the Northwest Passage and the Northern

Figure 8. Map of Bering Strait Region (SiteAtlas)

Sea Route and serves as a major entry and exit point to and from the Arctic Ocean. The maritime border between the United States and Russia in the Bering Strait has been negotiated and settled, but has not yet been ratified by the Russian legislative body (the Duma), although the two nations have agreed to the provisionally binding agreement (Byers, 2013).

The Bering Sea Region is a Large Marine Ecosystem that is home to one of the largest marine mammal populations in the world and 43% of all the breeding seabirds in the United

States (Young, 2005). The Bering Strait is the only migration corridor for many species of birds, fish, and marine mammals from the Pacific Ocean to the Arctic. It provides habitat for endangered species, ice-dependent mammals, and a diverse group of benthic feeders. The Bering Strait region is inhabited, in the United States, by indigenous communities who have lived on its shores for several thousand years (Young, 2005). The Bering Strait forms the only corridor between northern and east-west transportation routes into the Pacific Ocean and is expected to experience and increase in traffic, particularly traffic associated with oil and gas development (AMSA, 2009).

Climate change, and especially the resulting loss of sea ice in the Arctic, is associated with a number of risks for vessel operators. Part of this risk is the expected increase in traffic through the Bering Strait, which generally increases the likelihood of an incident. Collisions, ice strikes, and bad weather (as more open water increases the fetch for storms likely leading to increased wave heights) may all become more frequent as climate change progresses. Although the shipping activity through the Bering Strait is currently light compared to other industrialized regions, the capacity to provide support for vessels is much more restricted (Pew, 2014).

Aside from the risks associated with climate change, vessel operators in the Bering Strait can expect to encounter inclement weather, quickly moving ice, marine mammals, and other vessels (Pew, 2014). Currently, there is no established navigation routing scheme through the Bering Strait. In addition, AIS capabilities are limited and

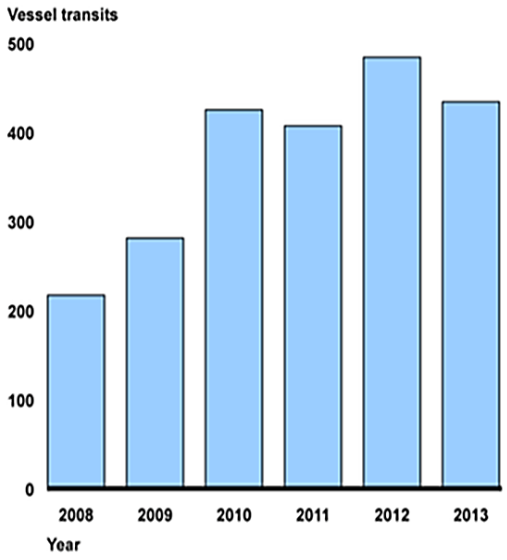

Figure 9. Number of Bering Strait Vessel Transits by year (US GAO, 2014).

magnetic GPS is often unreliable at high latitudes (AMSA, 2009). The coastal states of the U.S. and Russia have a limited ability to respond to incidents, including search and rescue as well as oil recovery. In the Bering Sea, climate change is expected to provoke a significant reduction in sea ice in the Bering Strait during the months of November and December (AMSA, 2009).

Because the Bering Strait is an international strait used for navigation, it is governed by international standards and regulations, most notably Section III of the UN Law of the Sea Convention. As described in Table 1, transit passage exists for all vessels in international straits, and thus in the Bering Strait. Any specific regulations concerning oil pollution prevention and response must be negotiated between the United States and Russia and then submitted for approval to the IMO (UN LOSC Art. 41). These regulations might include traffic lanes, navigation routes and aids, as well as rules and regulations to prevent pollution under Article 234. Thus far, no joint regulations or navigation routing measures have been adopted for the region, although the U.S. Coast Guard has put forth a plan for a new traffic scheme intended to enhance vessel safety and improve navigation (World Maritime News, 2014).

Oil Pollution Regime in the United States

Because the Bering Strait is somewhat narrow, it has no high seas passages, and thus any navigation schemes or Strait-wide regulations must be jointly proposed by the coastal states, the United State and Russia, to the competent international organization: IMO. The UN LOSC requires transiting ships to comply with generally accepted international regulations, procedures and practices for the prevention, reduction, and control of pollution from ships. The Convention also allows coastal states to adopt laws and regulations regarding the prevention, reduction and control of pollution, by giving effect to applicable international regulations regarding the discharge of oil, oily wastes and other noxious substances in the strait. Finally, the Convention

states that bordering states and coastal states should, by agreement, cooperate for the prevention of oil pollution from ships (UNLOSC, 1982). According to Etkin (2003), polluters in U.S. waters are subject to the most stringent penalties and fines in the world.

Clean Water Act

The Clean Water Act, most recently amended in 1972, prohibits the discharge of pollutants without a permit from any point source, including vessels, into the navigable waters of the United States. With regards to oil, the CWA prohibits oil spills in quantities that may be harmful to human health and the environment and requires violators to take actions to prevent future spills (EPA). The CWA requires vessels operating in U.S. waters and carrying oil to carry appropriate removal equipment that employs the best economically feasible technologies (CWA, 1972, §311). It also allows for the promulgation of performance standards for pollution control devices (§312). However, unless a particular regulation implements an international agreement regarding the discharge of oil, the regulation does not apply to foreign-flagged vessels (§313). In 2000, Congress enacted an additional law entitled the "Zero Tolerance for Repeat Polluters Act" which increases civil penalties for repeat violators of the pollution regulation of the United States (Etkin, 2003).

Ports and Waterways Safety Program

The Ports and Waterways Safety Program applies to vessels under U.S. jurisdiction: U.S. flagged vessels or foreign flagged vessels under U.S. port state control. It allows for the control of vessel traffic in waters under U.S. jurisdiction for reasons of weather, congestion or other hazardous conditions (§1223). It also allows for the establishment of navigation and traffic separation schemes (§1223). This program is enforced by the U.S. Coast Guard.

Oil Pollution Act

The Oil Pollution Act (OPA) of 1990 applies in the U.S. EEZ to foreign flagged vessels who are inbound or outbound to and from U.S. ports. The OPA does not otherwise apply to foreign-flagged vessels. It also applies in U.S. internal waters. The OPA requires adequate insurance and pollution response plans for vessels carrying pollutants. It predominantly addresses large tankers that use the U.S. EEZ to transport oil and requires that they are double-hulled (OPA, 1990, §4115). At the time of adoption, OPA 90 was the most stringent oil pollution control instrument in the world. It influenced the adoption of legislation around the world and instruments at the international level. OPA created a comprehensive prevention, response, liability and compensation regime for oil (from vessels and facilities).

Title 1 of OPA increased the liability limits for oil spills and included natural resource damage as a potential consequence of spillage. OPA also mandated that tank vessel owners ensure the availability of adequate response resources to respond to a vessel's worst case discharge scenario. Additional regulations apply to vessels bound for U.S. ports in Western Alaska under the Alternative Planning Criteria (APC). U.S. law requires vessels bound for U.S. ports to comply with the worst case scenario discharge planning, which state that vessel operators must have approval from a nearby oil handling and clean up facility capable of responding to a worst case scenario spill incident from their vessel. However, the facilities in Western Alaska do not meet these requirements, since oil spill response is severely limited in the Arctic. Therefore the U.S. Coast Guard requires participation in an alternative, prevention based, system (Marine Safety Information Bulletin, 2014). These additional prevention measures include prior notification of transit, expanded AIS services, and risk reduction routing (O'Brien's, 2012).

The OPA also created the Oil Spill Prevention, Safety, and Environmental Response Committee, which reviews and assesses measures designed to prevent oil spills and the planning and preparedness for responding to, containing, cleaning up, and mitigating the impacts of oil spills (OPA, 1990, §5002). In 2004, the Oil Spill Prevention and Liability Act was introduced to Congress to amend the OPA and further increase liability limits, however, it was not enacted (Congress.gov).

Coast Guard Maritime Transportation Act

The Coast Guard Maritime Transportation Act (CGMTA) was adopted in 2012 to authorized appropriations for the Coast Guard through 2014. Sections 221 and 222 authorize procurement contracts for National Security Cutters and Polar Icebreakers, demonstrating the U.S. government's commitment to Coast Guard presence in the Arctic and continued Arctic research and development. The Act also requires that the Coast Guard submit an assessment to Congress on the needs for additional Coast Guard presence in high latitude regions for the purpose of enhancing prevention and response capabilities (§716).

Cooperation with Russia

The Bering Strait separates the United States from the Russian Federation. This geographic proximity has instigated cooperation in the field of oil pollution preparedness and response. The USSR-U.S. Agreement Concerning Cooperation in Combating Pollution in the Bering and Chukchi Seas in Emergency Situations, signed in 1989, entered into force in 2008 and concerns the exchange of information and coordination of response to oil pollution incidents in the Bering and Chukchi Seas. The Agreement, similar to the Arctic Council Agreement, does not issue requirements to vessels, but rather outlines the duties and obligations of states parties regarding planning and response. The Agreement commits both the U.S. and Russia to

developing early warnings systems, conducting joint pollution response exercises, and providing assistance in the event of an emergency oil pollution incident (Alaska Department of Environmental Conservation). In 2001, the U.S. and Russia signed a Joint Contingency Plan to reconstitute the message of the 1989 Agreement (AMSA, 2009).

U.S. Arctic Policy

The first U.S. Arctic Region Policy was adopted in January 2009 under the George W. Bush Administration and identifies U.S. interests in seven topical areas: Arctic national and homeland security, international governance, extended continental shelf and boundary issues, international scientific cooperation, maritime transportation, economic and energy issues, and environmental protection and conservation of living marine resources (U.S. Arctic Region Policy, 2009 and Brosnan, et al., 2011). This document further emphasized that the United States has 'fundamental national security interests in the Arctic' which include protecting the U.S. from foreign threats and furthering U.S. Arctic resource development and conservation (Bergh, 2012). The United States perspective is also closely associated with the freedom of navigation, which guides U.S. policy on marine transportation in the Arctic (Østreng, et al., 2013) and is one of America's strongest international policy positions.

In 2013, President Obama issued a National Strategy for the Arctic Region, which identifies three lines of effort for the United States: advance U.S. security interests, pursue responsible stewardship, and strengthen international cooperation. These lines of effort are supported by the U.S. guiding principles in the region, which are: to safeguard peace and stability, to make decisions using the best available information, to pursue innovative arrangements, and to consult and coordinate with Alaska Natives (National Strategy, 2013). In 2014, the White House issued an Implementation Plan associated with the National Strategy. The

Implementation Plan specifically addresses oil pollution prevention and identifies objectives and next steps for the United States in that regard. The U.S. objective is to "implement international agreements consistent with domestic activities to reduce the risk of marine oil pollution while increasing global capabilities for preparedness and response to oil pollution incidents in the Arctic." It is one of the goals of the Obama Administration to raise awareness about the Arctic among U.S. citizens and promote involvement and political participation in Arctic policymaking. However, the U.S. populace is not very informed about the Arctic region and thus, Arctic governance is not a politicized issue in the United States (Bergh, 2012).

U.S. Enforcement and Response Capacity

The primary agency tasked with responding to spill incidents in the United States is the Coast Guard. Both civil and criminal proceedings may be opened against polluters in the U.S. (OPA, 1990). There is no permanent Coast Guard presence in the Bering Sea region. The closest facility is located on Kodiak Island, south of Anchorage, which is over 1000 miles from the Bering Strait by sea (Hartsig, 2012). NOAA's office of Response and Restoration is also responsible for responding to oil spills in coastal waters, in particular, NOAA offers scientific support and advanced mapping software to Coast Guard spill responders (NOAA, 2015).

In July 2012, the National Oceanic and Atmospheric Administration (NOAA, 2015) launched Arctic ERMA, a web-based GIS tool designed to assist emergency responders and environmental managers in dealing with pollution incidents. ERMA is already in place in nine other U.S. regions including the Gulf of Mexico and the North Atlantic. ERMA stands for Environmental Response Management Application, providing evidence that the U.S. spends its resources on advancing response capabilities, at least as much as in prioritizing prevention of oil spills.

Results

The following tables (Tables 2 and 3) illustrate the pollution control regimes in Canada and the United States and identify each pollution related instrument, whether a regulation or program, as a prevention, response, or hybrid measure. The tables demonstrate the similarities between the Canadian and U.S. regime. However, they do not compare the regimes active in just the Northwest Passage and the Bering Strait. That comparison would be much more asymmetrical since the U.S. relies entirely on Russian cooperation to implement regulations and programs in the Strait, while Canada treats the NWP as if it were internal waters. All of the Canadian instruments listed below apply uniformly to vessels in the Canadian Arctic; however, only the U.S. Joint Contingency Plan uniformly applies in the Bering Strait. Each of the other U.S. regulations or programs apply only in U.S. waters or to foreign vessels under the port state control of the United States.

Table 2. Canada Oil Pollution Regime Components

CANADA	
Instrument Name or Component	Prevention: **P**; Response: **R**; Hybrid: **H**
CSA: Penalty for Discharge	**H**
CSA: Pollution Response Officer	**R**
CSA: Environmental Response Arrangement Regulation	**P**
CSA: Hull Construction Regulation	**P**
CSA: Navigation Safety Regulations	**P**
CSA: NORDREG	**P**
CSA: Pollution and Dangerous Chemicals Regulation	**H**
CSA: Vessel Traffic Services Regulation	**P**
AWPPA: Civil Liability for Discharge	**H**
AWPPA: Pollution Prevention Officer	**P**
AWPPA: AIRSS	**P**
AWPPA: ASPPR	**P**
National Aerial Surveillance Program	**H**

Table 3. U.S. Oil Pollution Regime Components

UNITED STATES	
Instrument Name or Component	Prevention: **P**; Response: **R**; Hybrid: **H**
Clean Water Act	**H**
Joint Contingency Plan with Russia	**R**
Ports and Waterways Safety Act	**P**
Coast Guard Maritime Transportation Act	**H**
OPA: Increased Liability	**H**
OPA: Worst Case Scenario Discharge response	**R**
OPA: Alternative Planning Criteria	**P**
OPA: Double-hulls for Tankers	**P**
Arctic ERMA	**R**

While the Bering Strait and the Northwest Passage share many important characteristics, the outcomes of the pollution control regimes along each route are very different. The Canadian regime in the Northwest Passage is a predominately preventative approach that focuses on rules and regulations to make ships safer and less likely to spill oil in the first instance. Conversely, the United States regime in the Bering Strait must focus on response oriented measures because those are the measures that Russia has acceded to. Given this characterization, what are the factors that influence this outcome?

Comparison

Canada and United States share many characteristics. They are both western democracies, highly developed and resource rich. The U.S. and Canada legislate through a federalist system in which regional and local governments create law and policy specific to particular geographic areas within the federal government framework. The U.S. and Canada also have similar approaches to environmental policy in that they are committed to energy independence and have invested in renewable energies nationwide (most notably, hydroelectric power). The U.S. and Canada have each regionally authorized and then backed down from instituting an emissions trading regime under the Western Climate Initiative (Klinsky, 2013). The U.S. and Canada have similar strategies for controlling oil pollution from ships in the maritime zones under their full jurisdiction (internal waters and under port state control). However, comparing the Northwest Passage and the Bering Strait necessitates an asymmetrical comparison between two distinct zones. While Canada has so far been able to exceed international standards and implement a more preventative regulatory regime regarding shipping in the Northwest Passage, the United States is unable to do so in the Bering Strait. Although a preventative and Arctic-specific regime is possible in the Bering Strait, it does not yet exist. What factors explain this difference between the Canadian and U.S. Arctic marine pollution regimes? And what does that mean for the future of Arctic shipping?

Geography and Climate

The most obvious difference between the Northwest Passage and the Bering Strait is geographic. The topography of each route determines many of its associated risks including weather, the impacts of climate change, the routes physical characteristics, and the behavior of sea ice and ocean currents. Threats that plague the entire Arctic region include its lack of

adequate charting, intense and unpredictable storms, fast moving sea ice, extreme seasonal variability, the remoteness of the region, and the decreased functionality of navigation instruments including compasses and GPS.

Routes through the Northwest Passage are shallow and narrow, fit only for small and medium sized vessels. Smaller vessels are less likely to be resistant to ice strikes and collisions, and carry a smaller crew, less capable of working around the clock to navigate the vessel. However, many ships in the Northwest Passage are destinational supply ships, which have been running their routes for many seasons are therefore familiar with the challenges associated with each crossing. The Bering Strait, on the other hand, is large enough for container vessels (even those too large for the Panama and Suez Canals). An increase in shipping through the Strait may lead to a larger number of mariners unaccustomed to Arctic voyages – increasing the threats from the physical environment (AMSA, 2009). The Bering Strait is plagued by quick moving currents and winds which propel sea ice up to 27 nautical miles per day (Hartsig, et al., 2012). Current patterns in the Arctic suggest significant and long term ecosystem changes in the region including increased sea ice (while the overall trend for the Arctic is decreasing sea ice), which could impact vessel traffic.

The threats associated with shipping in the Northwest Passage are addressed through Canadian programs such as NORDREG and the Arctic Waters Pollution Prevention Act (AWPPA). These regulations require specific CDEM standards to be upheld by transiting vessels. The Canada Shipping Act also identifies shipping safety control zones throughout the archipelago with greater enforcement capacity and vessel traffic services.

In the Bering Strait, no vessel routing measures have been implemented. Automatic Identification System (AIS) is limited, although the Alaskan government is looking into an

expansion of service. There is a 2001 Agreement between the U.S. and Russia on combating pollution in emergency situations, focusing on response capacity and coordination (AMSA, 2009).

Political Climate and Focusing Events

The political climate and timeliness of oil pollution rules and regulations also contributes to the preventive or responsive character of the rules. Included in this conception of 'political climate' are focusing events, which spur legislative or regulatory bodies to action on particular issues. Table 4 illustrates the general political climate regarding environmental regulation during the decade of adoption for AWPPA, the CSA, and the OPA and Coast Guard and Maritime Transportation Act in the United States. The table also notes any current events that likely influenced lawmakers.

The Arctic Waters Pollution Prevention Act (AWPPA) is the earliest legislation examined. It was passed in the 1970s during a time of increased environmental regulation in the Anglo-Saxon world. The 1960s witnessed a series on environmental disasters and the publication of popular books that addressed the environmental degradation caused by humans and provoked a widespread regulatory movement (Gunningham, 2009). This movement was characterized by the prohibition and restriction of environmentally harmful activities – perhaps explaining why regulations adopted in the 1970s are the strictest of the legislative instruments in the table. AWPPA was influenced by the transit of the *SS Manhattan* through the Northwest Passage: the first commercial ship to do so. Although the *Manhattan* did not discharge pollutants, the voyage prompted discussions about Canadian sovereignty in the Arctic and culminated in the establishment of AWPPA (Larson, 1989).

Table 4. Political Climate Surrounding Rules Adoption

Legislative Instrument	Political Climate	Potential Focusing Event
Arctic Waters Pollution Prevention Act – Canada	1970s – positive climate for environmental regulation, command and control	Transit of the *USS Manhattan* in 1969
Canada Shipping Act – Canada	2000s – reform project throughout the '90s culminated in updating CSA	
Clean Water Act – United States	1970s – positive climate for environmental regulation, command and control	
Ports and Waterways Safety Act	1970s – positive climate for environmental regulation, command and control	
Oil Pollution Act – United States	1990s – rise of voluntary environmental programs, economic + environmental goals	*Exxon-Valdez*, Prince William Sound, Alaska in 1989
Coast Guard and Maritime Transportation Act – United States	2010s – appropriations bill, need for icebreakers, increased U.S. interest in the Arctic	*Deepwater Horizon*, Gulf of Mexico in 2010

The Canada Shipping Act of 2001 is the product of a reform project undertaken in the 1990s to update antiquated language and the ad-hoc revision system of the legislation that had prevailed since the 1850s. The 1990s saw the rise of voluntary environmental programs in the U.S. and Canada, which sought to combine both economic and environmental goals after the intense deregulation of the 1980s. The CSA includes more stringent liability clauses, but also combines new technologies and a greater focus on safety and the protection of the marine environment.

In the United States, the Oil Pollution Act was implemented during the same wave of environmental and economic goal setting as the CSA in Canada. However, the adoption of the OPA was provoked in the first instance by the devastating *Exxon-Valdez* spill in Prince William Sound, Alaska. It contains two key provisions: requiring double-hulls for oil tankers and

increasing liability for owners whose tankers spill oil. Similarly, the Coast Guard Maritime and Navigation Act was enacted two years after the *Deepwater Horizon* spill in the Gulf of Mexico and during a period of increased U.S. interest in the Arctic. In particular, the desperate need for more icebreakers spurred most of the Arctic clauses in this Act. The Coast Guard Act also funds the Coast Guard through 2015 and implements a wide range of non-Arctic policies, which makes it an outlier as far as the other legislation considered.

Table 4 does not illustrate a stark difference between the motivations behind U.S. and Canadian oil pollution rules. AWPPA and OPA were both adopted as reactions to threatening events that caused each state to re-think its position on oil pollution prevention. The transit of the *Manhattan* caused Canada to fear further incursions into its sovereignty in the north and the potential for environment degradation those incursions might cause. While, the *Exxon-Valdez* spill exposed the weaknesses in the American oil prevention and response regime. Other oil pollution rules and regulations were adopted by legislatures in a traditional session without major focusing events.

Policy Position

A state's policy position regarding shipping and oil pollution is an important factor when considering the text of a legislative document. In this case, it is particularly relevant to examine both the U.S. and Canadian Arctic policies, which highlight each state's goals and national interests in the region. These policies shed light on the U.S. and Canadian relationship to the Arctic as it pertains to their national identity and its importance on the decision agenda.

Arctic policy in Canada is codified in Canada's Northern Strategy: Our North, Our Heritage, Our Future (2009). The document opens with a paragraph stressing that the Arctic is a part of the fundamental identity of Canada. In the policy, Canada outlines four priorities in the

Arctic: exercising Arctic sovereignty; promoting social and economic development; protecting environmental heritage; and improving and devolving northern governance. These priorities reinforce Canada's strong relationship with the Arctic, one that prioritizes unilateral action in the pursuit of Canadian national interests. The 2009 document also stresses the importance of defending Canadian Arctic territory and demonstrating a visible presence in the Arctic (Lackenbauer, 2011).

National identity is an important component of Canada's oil pollution regime in the Arctic as well. Although less obvious than geography and politics, a nation's identity plays a crucial role in setting the agenda for a state. Canada has demonstrated its commitment to the Arctic by publicly disagreeing with the United States and Europe regarding the legal status of the Northwest Passage and by putting enormous resources into the drafting of the Polar Code. For decades, Canada's claim in the Arctic was originally founded on an argument for territorial sovereignty in order to maintain control over the high north (Larson, 1989). More recently, Canada has framed its northern policy as a strategy for representing native peoples and encouraging development in the Arctic.

U.S. Arctic policy is codified in both a policy document (the National Strategy on the Arctic Region) and implementation plan published by the White House in 2013 and 2014. The U.S. policy highlights the importance of safeguarding and maintain the freedom of the seas, both as a principle and as a policy, which generally encourages the deregulation of the oceans. Østreng, et al. (2013) argues that the freedom of the seas is the most important principle guiding U.S. Arctic policy, further underscoring the U.S. perspective that all potential shipping routes through the Arctic have an inherently international character, including the Northwest Passage and the Northern Sea Route.

In the field of oil pollution prevention, the U.S. objective is to "implement international agreements consistent with domestic activities to reduce the risk of marine oil pollution while increasing global capabilities for preparedness and response to oil pollution incidents in the Arctic," rather than enact new legislation at the national or regional level. These international agreements are likely to include the Polar Code and the Arctic Council's 2013 Agreement on Oil Pollution Prevention, Preparedness, and Response. During the chairship of the Arctic Council, the United States has expressed its desire to increase public awareness of Arctic issues among Americans (Kerry, 2015). However, the presidential directives regarding the Arctic indicate that U.S. policy in the Arctic will not be based on the precautionary approach, but rather risk-assessments of economic development measures and that ecosystem-based management will guide industry in the region (U.S. National Strategy, 2013). Furthermore, according to Østreng, et al. (2013), the United States is unlikely to postpone development in the face of scientific uncertainty.

An additional legal component of the U.S. and Canadian approach to the Arctic may have to do with the differing conception of sea ice in each country. Baker and Mooney (2013) explore the categorization of sea ice as either land or water and how that impacts its legal status and importance in both the U.S. and Canada. Baker and Mooney (2013) argue that sea ice is consistently categorized as water in the United States. The EPA describes it as such under the Clean Water Act and the principle of the freedom of the seas is just as relevant in sea ice covered regions as elsewhere on the ocean. However, Canada more often categorizes sea ice as land, mostly for territorial reasons, for example, the NW Territories Act of 1952 (Baker and Mooney, 2013). More recently, Canada has begun to conceptualize sea ice as a hybrid form of water and land (ex. the Nunavut Waters Act).

The difference in the policy positions of the United States and Canada may have something to do with their national relationship to the Arctic region, In particular, whether the Arctic plays a role in the national identity of the state, as defined by those in power to make policy. In recent decades, environmentalists have begun to adopt the theory of place attachment when explaining the likelihood of societies to protect the natural environment. Place attachment as a term comes from psychology, where it is used to describe the emotional bond between people and places. It is one of the main tenants of environmental psychology and may be useful here. Positive emotional attachments to the environment promote stewardship and conservation. Wynveen et al. (2013) find these attachments extends to the marine environment as well by examining environmental protection in the Great Barrier Reef region. While these theories are often referenced within the context of recreation and tourism, it is plausible that they could apply to the policy position of states regarding environments to which national identity is linked.

Legal Status

The legal status of both the Northwest Passage and the Bering Strait has a considerable impact on the difference between the oil pollution regimes. The 1982 UN Law of the Sea Convention stipulates the rules and obligations of coastal states and foreign flagged vessels through a wide variety of jurisdictional zones. The primary maritime zone in the Northwest Passage is internal waters, while the primary maritime zone in the Bering Strait is an international straits used for navigation.

The Canadian government claims the Northwest Passage as internal waters, which are under the full jurisdiction of the coastal state. In internal waters, a coastal state may enforce its domestic laws upon all vessels foreign as domestic. Typically, internal waters are separated from greater ocean and are only accessible through small passages (an example of this is Puget Sound,

Washington). In the case of the Canadian Archipelago, hundreds of small islands create small and large channels into the Northwest Passage. Canada's claim to internal waters is based on the drawing of straight baselines in 1985 to enclose the channel openings in the NWP (Byers, 2013). Before 1985, Canada claimed the region as internal waters under historic usage and the long-term acceptance of other states (Byers, 2013). The 1985 claim was protested by the U.S. government as evidenced by the transit of the *SS Manhattan* in 1969.

The designation of the Northwest Passage as internal waters allows Canada to enforce AWPPA and the CSA upon foreign flagged vessels within the archipelago, giving those legislative instruments greater weight and strengthening the pollution prevention regime in Canada. In 2013, Canada made is mandatory for foreign vessels entering Canadian Arctic waters to report themselves to Canadian authorities, making it easier for officials to ensure compliance with Canada's regulations in the region (Huebert, 2013). Although a number of powerful western nations disagree with Canada's assertion that the Northwest Passage is internal waters, the NWP has not received enough attention as a potential route through the Arctic for these disputes to be resolved, either by the IMO or by some other mediation process.

Should the debate about the NWP's legal status reach the international stage, Canada could claim to be invoking its right under Article 234 of the Law of the Sea Convention to take additional measures to prevent pollution and protect the safety of life at sea in ice covered waters. Article 234 allows coastal states to prescribe pollution prevention measures in areas of their EEZ that remain ice covered for most of the year. Although these parameters are vague, they do permit coastal states a greater degree of jurisdiction and oversight in the Arctic when it comes to pollution prevention (AMSA, 2009). Article 234 does not, however, specify what kinds of measures can be or should be taken, not does it require states to impose requirements on ships

at all (McDorman, 2014). In fact, Canada's actions to implement its own Arctic pollution regulations prompted the drafting of Article 234 in the first place (Byers, 2013). Article 234 applies to the exclusive economic zone, 200 nautical miles off the coast of each Canadian island in the Arctic. However, it is possible that the legal status of the Northwest Passage will be resolved as an international strait used for navigation, in which case Canada will be unable to continue to enforce many of its pollution prevention regulations on foreign-flagged vessels.

The Bering Strait is a well-established international strait used for navigation. International straits allow for the unimpeded transit passage of foreign flagged vessels and require that coastal states submit any navigation schemes or other regulations to the IMO for approval. This is further complicated by the fact that the Bering Strait is a bi-state strait, bordered by both Russia and the United States. In the Bering Strait, further regulation of the waterway beyond international standards and customary law would have to be agreed upon by both coastal states. Given that the Russian legislature has yet to ratify the agreed-upon maritime boundary in the Strait, this kind of cooperation seems unlikely. If a navigation route were to be established through the exclusive economic zone of the United States, Article 234 would also apply, however, no such steps have been taken by the U.S. government. The current legal standing of the Bering Strait is a potential commons problem in which there is little incentive for either Russia or the U.S. to govern the region without the clear threat of economic and/or environmental damage to serve as an impetus (Østreng, et al., 2013). It's possible that the U.S. government has not pressured Russia to negotiate a more preventative regime in the Bering Strait in order to pursue its own objectives, such as maintaining the freedom of the seas.

Industry Power

A final causal factor to consider is the relative strength of relevant industries in the U.S. and Canada. Two industries of particular interests are the fossil fuel industry and the commercial shipping industry. Generally speaking, the fossil fuel industry is quite strong in both the U.S. and Canada, where energy production and energy independence are highly valued. In 2013, the IMF reported Canadian fossil fuel subsidies at $34 billion annually and U.S. fossil fuel subsidies at $502 billion annually (IMF, 2013). The United States has the highest level of fossil fuel subsidies in the world, although the Obama Administration has repeatedly called for decreases (Sheppard, 2014). In terms of relative power, for every dollar the fossil fuel industry spends on campaign contributions and lobbying in the United States, it gets $103 back in subsidies (Makhijani, 2014). In 2015, over 750 individuals lobbied for the oil and gas industry in the United States (Center for Responsive Politics, 2014). In Canada, that number is almost 1000 (Linitt, 2015), demonstrating the greater relative strength of each individual lobbyist in the United States.

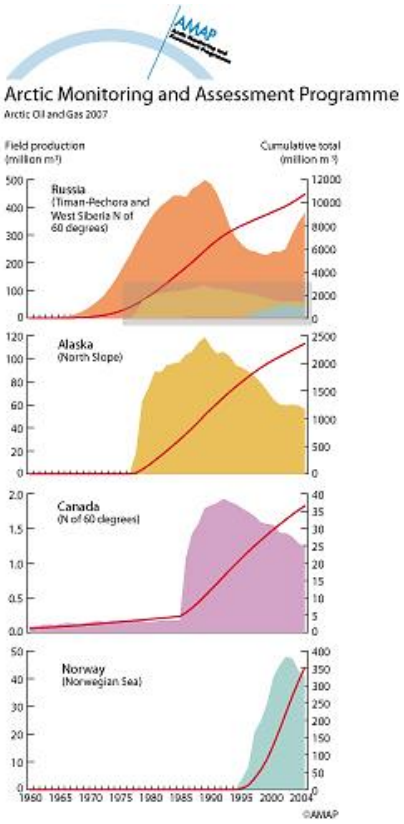

Figure 10. Annual and Cumulative Oil Production in the Arctic (AMAP, 2007)

Figure 11. Annual and Cumulative Oil Production in the Arctic (AMAP, 2007)

In 2015, the U.S. granted permits to the Royal Dutch Shell Oil Company to conduct exploratory surveys in the Arctic (Schlanger, 2015). Earlier this year, however, Shell discontinued their exploration project in the Arctic for financial reasons, for the foreseeable future (Page, 2015). Public debate has been vocal on the topic of Arctic drilling in the United States since the 1960s when vast oil reserves were discovered in

Prudhoe Bay, Alaska (Arctic Power, 2013). The Prudhoe Bay drilling project and its associated pipeline through Alaska became the most sued-against project in history (Arctic Power, 2013).

Canada's has a number of active Arctic oil and gas exploration permits and leases in the Beaufort Sea (Huebert, 2014). Four companies obtained their leases in 2007-2008 (Dawson, 2015). Exxon Mobile, Imperial Oil, and BP began exploratory drilling in the Beaufort Sea and the Mackenzie Delta in 2014 (Huebert, 2014). The three companies (Exxon, BP, and Imperial Oil) have combined their Beaufort programs into a joint venture called Imperial Oil Resources Ventures Ltd. (Dawson, 2015). Imperial Oil Ltd. suspended their programs in June 2015, citing insufficient time to begin test drilling before their lease expires in 2020 (Dawson, 2015). In December 2014, Chevron also decided to halt its exploratory program in the Beaufort Sea. In recent years, Canada has focused on developing the oil sands in Alberta, which might account for lack of continued interest in the oil and gas reserved in the Arctic.

It is likely that the commercial shipping industry impacted the negotiations of the mandatory Polar Code exemplified by a weakening of environmental protection language and navigation measures in the 2014 draft approved in IMO committee (Rayfuse, 2014). Environmental groups have criticized some of the gaps in the Code including the lack of a plan to phase out the use of heavy fuel oils, which have already been prohibited in Antarctic (Colwell, 2014). Other concerns are that non-ice-strengthened vessels will still be allowed to operate in ice-covered waters and continued adverse impacts on wildlife (Colwell, 2014).

Prevention vs. Response

According to the 2009 AMSA, most Arctic states, including Canada and the United States, do not have the capability to cleanup or adequately mitigate the damage caused by oil spills in the Arctic. This claim is supported by a 2014 National Academies of Sciences report which identifies knowledge and response gaps in the Arctic ranging from meteorological data and forecasting to hydrological mapping (NRC, 2014). Pew estimates that on any given day there is a 60% chance that mitigation strategies cannot be deployed because of weather, visibility, accessibility, and/or other factors (Pew, 2013). The impact of a large-scale oil spill in the Arctic would be catastrophic for biological, social, economic, and cultural life in the region. Furthermore, numerous small-scale spills and their cumulative impacts could prove to be just as devastating to the Arctic ecosystem and its services. Given these threats, it is prudent for states to prioritize pollution prevention strategies over response capability and technology (AMSA, 2009).

The Canadian oil pollution regime in the Arctic prioritizes prevention. This much is clear from the Canadian government's commitment to increased monitoring, the creation of safety control zones, implementation of CDEM regulations, and the willingness of the Canadian legislature to exceed international standards in its own waters. In contrast, the United States Arctic regime is more response oriented. While its international agreements focus on response coordination and resources, domestic laws highlight both the liability aspect of oil spills under the polluter-pays principle and the importance of prevention in the Arctic due to the lack of response capabilities. However, the U.S. domestic measures cannot be implemented in the Bering Strait unilaterally.

These differences can be explained by a combination of factors including national identity and relationship to the Arctic, the legal status of the waterways themselves, and the

relative strength of public and private stakeholders. However, this comparison isn't quite fair, since the legal status of the Bering Strait severely restricts the preventative measures that can be taken by the United States, while the internal waters jurisdiction in the Canadian Arctic extends Canada's sovereign rights in the Arctic. A more equitable comparison would look at the internal waters of the United States, where pollution prevention measures are just as stringent. The appearance of a compelling difference between the U.S. and Canadian oil pollution regimes in the Arctic is misleading, and yet also adds to the diversity among regimes in the Arctic region. The different legal status of the two waterways in conjunction with their geographic and functional similarities create the appearance of a preventative vs. response regime dichotomy. And while the United States may have relatively more measures focused on response in the Arctic, its measures are not necessarily less preventative, merely less applicable.

It's important to revisit the data on emergency response capabilities in the Arctic and the information available regarding oil spill cleanup to better understand the Canadian and American pollution regimes. On any given day in the Arctic there is a 20% chance that vessels will be successfully deployed from port in a pollution emergency and capable of recovering a small percentage of the spill (Pew, 2013). And while both Canada and the United States have a highly developed infrastructure for responding to emergencies at sea, in the Arctic, all nations are inadequately resourced because the technologies do not exist. Therefore, it is vital that oil pollution regimes in the Arctic prioritize prevention over response. It is the most efficient allocation of resources until such time when oil recovery technologies advance in the Arctic and/or emergency vessels are able to be deployed under all weather conditions.

Given the geographically specific risks to vessels in the Arctic, coastal state rules and regulations are of even more importance. International standards are incapable of addressing the

topography of the entire Arctic region and while harmonization is an important component of any region-wide regime, coastal state customization is vital to protecting the environmental from further degradation from oil pollution.

Conclusion

It should be noted that in the last twenty years, there have been no significant negative impacts on Arctic ecosystems from pollution associated with shipping (Østreng, et al., 2013), however, with traffic expected to continue to increase, maintaining the health of the Arctic ecosystem may become more difficult. There is a general consensus that the application of the best available technologies and the effective implementation of IMO regulations should be sufficient to protect the region from significant negative impacts in the future (AMSA 2009). However, there is substantial diversity among the various pollution prevention regimes in the Arctic. Diversity that impacts the implementation of the best available technologies and their effectiveness. This research, by examining two examples of pollution prevention schemes in the Arctic, has attempted to explain the diversity among regimes and its impacts on pollution control and prevention.

The finding that the Northwest Passage presents a preventative regime while the Bering Strait presents a response-oriented regime may not be surprising. However, the factors contributing to these characterizations may be less obvious. While the Northwest Passage and the Bering Strait exhibit differing geographic characteristics and pose distinct challenges to transiting vessels, the geography and climate of the two routes are too similar to contribute greatly to the regime diversity illustrated. Similarly, the political climate during rules adoption in Canada, mirrors that of the United States. The policy positions of the United States and Canada exhibit significant divergence in that Canadian national identity is tied to the Arctic region in a

way that is not demonstrated in the United States, indicating a positive relationship between national identity and stewardship. Canadian policy and public opinion are in agreement that the Arctic is an important 'Canadian' environment, signaling an emotional connection.

The most significant area of divergence is that of legal status. The legal status of the NWP as internal waters allows Canada the ability to prescribe and enforce pollution prevention measures on foreign-flagged vessels, which is not possible in the Bering Strait. Conversely, the international character of the Bering Strait makes it difficult for the United States to enact unilateral pollution control measures. If the United States were to accede to the UN LOSC, it could enact further pollution control measures under Article 234, which would apply to all vessels, regardless of port-state control. And finally, while Canada and the United States both provide an advantageous environment for fossil fuel producers and distributors, the relative strength of the fossil fuel industry in the United States' suggests that policy and law makers are heavily influenced by industry interests, including potential deregulation of commercial shipping of oil and oil and gas exploration and drilling the Arctic. Each dollar spent by the fossil fuel industry lobbying the U.S. government goes further to ensure the perspectives of the industry are recognized and prioritized. However, this disparity seems less influential on the outcome of the pollution prevention regime than that of legal status and national identity.

Canada's insistence on going above and beyond the generally accepted international standards in the Arctic might be a reflection of their lack of faith in the international instruments (Lalonde, 2014), but does that faith explain why the United States is content to allow MARPOL, SOLAS and the 2013 Arctic Agreement govern the Bering Strait when it comes to pollution? The answer seems to be 'no' since the United States is still the only Arctic state not a member of the UN Law of the Sea Convention.

With regards to Russia, another large Arctic nation with interested in international shipping routes, there is much to consider. Reflecting on the findings of this research, Russia seems most similar to Canada. In the Northern Sea Route, Russia has instituted measures that exceed GAIS especially with regards to navigation rules. Only Canada and Russia have zero tolerance vessel oil discharge standards (Rayfuse, 2014). Russia also requires all transiting vessels along the Northern Sea Route to be escorted by a Russian icebreaker. Russia has a greater connection to the Arctic both geographically and culturally than the United States, and clearly takes its sovereignty claims in the Arctic very seriously (i.e. planting a flag at the North Pole).

Some final thoughts: Hopefully this research is a useful exercise in examining the Arctic regime as both a cohesive one and a diverse one. While the oil pollution regimes (and many other regimes) in the Arctic overlap and share commonalities, individual states are still the primary units at which environmental protection occurs. To ensure the preservation of the unique Arctic environment for years to come, coastal states must take steps toward a preventative oil pollution regime that can be enforced on all vessels in the Arctic before oil spills occur.

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