BOUNTY IN THE BERING STRAIT: A CASE FOR PROACTIVE REGULATION IN THE WORLD'S NEXT CHOKEPOINT

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A

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Abstract

This thesis analyzes trends in waterborne trade throughout history to demonstrate that the Bering Strait will soon become a chokepoint of international trade. Scientific studies suggest that the accelerating effects of global warming in the Arctic will result in ice-free routes in the coming decades. Given the likelihood that vessel traffic through the Bering Strait will rise, this thesis assesses the region's ecological vulnerability, along with its significant commercial and cultural values. The history of shipping regulation worldwide and commercial regulation in the Bering Sea reveals a tendency to enact regulation in response to a major oil spill or species depletion. To ensure the food security of Native coastal communities and the productivity of commercial fisheries in the Bering Sea, this thesis argues for a proactive approach to vessel traffic regulation in the Bering Strait. It examines several current regulatory regimes to identify which could be enacted to protect the region's resources. This thesis concludes that, despite barriers to cooperation between Russia and the U.S., a cross-border management regime that promotes safe shipping through the Bering Strait would further both nations' economic interests and safeguard the Bering Sea's valuable yet vulnerable marine resources.

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Introduction

The 'age of the Arctic' is upon us. On February 25, 2015 the maximum sea ice extent in the Arctic was the lowest ever recorded since the National Oceanic and Atmospheric Administration (NOAA) began collecting satellite images of the region in 1979. NOAA scientists suggest that this new record low is consistent with predictions that the Arctic will be ice-free in the summer months by 2040 (Hackman 2015). The promise of an ice-free summer season in the Arctic in the coming decades has spiked interest and investment worldwide in what was once an ice-choked region cloaked in mystery.

Interest in the Arctic's economic potential dates as far back as the late fifteenth century, when merchants began looking to the North for shorter trade routes between the East and West. Yet the region's unrelenting sea ice and brutal conditions resulted in nearly four hundred years of failed expeditions, countless destroyed ships, and the death of hundreds. The Arctic eluded even the most persistent and experienced explorers. Finally, at the turn of the twentieth century, both the Northeast and Northwest Passages were successfully traversed, though neither route proved viable, as conditions remained arduous and sailing technologies inadequate.

Ships suitable for Arctic conditions became more advanced throughout the twentieth century, beginning with the first seafaring icebreaker, the *Yermak*, an unmatched powerhouse commissioned by the Russian Navy. The Soviet regime would continue to propel icebreaking technologies throughout the twentieth century, eventually growing a fleet that continues to far surpass the fleets of every other Arctic nation. Today nations with icebreaker fleets are not limited to those with territory above 66° North. Rising powers such as China are investing hundreds of millions of dollars in increasing their Arctic capabilities.

Not only are technologies advancing, allowing vessels to access the previously impenetrable ice-choked Arctic Ocean, but conditions are changing dramatically. Since 1980, the Arctic has lost 40 percent of its ice cover and 45 percent of its volume of ice (Humpert and Raspotnik 2012). The effects of global warming are rapidly revealing a region brimming with economic potential in the form of shorter trade routes, offshore oil and gas reserves, and tourism. Nations worldwide are gearing up for the 'age of the Arctic.'

With rising interest in the region's economic potential, little attention has been paid to safeguarding the valuable, yet vulnerable, marine ecosystems of the Arctic. The International Maritime Organization (IMO), a United Nations agency that oversees the safety and security of shipping worldwide, recently adopted the International Code for Ships Operating in Polar Waters, though the code falls far short of ensuring the highest standards of safety throughout the region. One area in particular that warrants more site-specific and comprehensive international shipping regulation is the Bering Strait.

As the Bering Strait offers the only entry or exit point between the Arctic and Pacific Oceans, the waterway is a natural bottleneck for trans-Arctic traffic while also offering strategic access to the resource-rich Russian, American, and Canadian offshore areas. As sea ice dissipates and vessel traffic rises, the Bering Strait will become the next chokepoint in international trade. This thesis, grounded upon the assumption that the Bering Strait is the world's next chokepoint, begins with an analysis of maritime history to reveal why chokepoints form and the conditions that will attract more shippers to the Arctic.

The first chapter relies heavily on Adam Smith's economic theories in his *Inquiry into the Nature and Causes of the Wealth of Nations* (1776), which demonstrate just how important waterborne trade has been to the development and advancement of civilization. The ancient trade

networks that flourished along rivers such as the Nile, Tigris and Euphrates, and eventually expanded around the Mediterranean Sea, illustrate the significant role that waterborne trade played in the growth of societies. Yet it was not until the Portuguese mariner Vasco de Gama connected the markets in the East and West via an all sea trade route that states were able to take full advantage of the unparalleled efficiencies offered by waterborne trade.

As nations became more dependent on trade, access to the shortest routes between markets became increasingly important. Although a majority of transoceanic trade occurs in the open ocean, most requires transit through strategic straits or canals. The most commonly traversed passages are known as chokepoints. Several of the world's chokepoints occur naturally, between islands or through seas separating large landmasses such as the Strait of Hormuz, the Strait of Malacca, and Bab-el-Mandeb. The economic advantages of shorter trade routes have also motivated the costly construction of man-made canals such as the Panama and Suez Canals.

Today, 90 percent of trade occurs on oceans or waterways (International Chamber of Shipping 2013b). An analysis of the current state of the world's chokepoints reveals their vulnerabilities. Some are plagued by piracy and all suffer from congestion. As world trade rises, as the Arctic thaws, and as icebreaking technologies advance, the Arctic will offer attractive alternative routes between the world's major markets, and Bering Strait will emerge as the next chokepoint in international trade.

Chapter two examines of the region's ecological abundance, cultural significance, and economic value. The Bering Sea is one of the most biologically productive marine ecosystems in the world, where an upwelling of nutrients from the deep Pacific Ocean disperses over the sea's continental shelf. The Bering Sea boasts more than 450 species of fish, crustaceans, and mollusks, over 50 species of seabirds, and at least 25 species of marine mammals (Committee on

the Bering Sea Ecosystem 1996, 7). Largely owing to the sea's biodiversity, the region has supported human settlements for thousands of years. Today over 10,000 people inhabit the shores of the Bering Strait. While many communities take advantage of supplemental resources from the land and rivers, most of the region's Natives still depend heavily on marine-based resources (Ahmasuk and Trigg 2007). Along with supporting the subsistence diets of thousands of the region's Natives, the Bering Sea also contributes to the health of local, state, national, and international economies. The continental shelf of the Bering Sea hosts one of the largest and most productive fisheries in the world that has long produced approximately a quarter of the world's total yield of fish (McDowell Group Inc. 2013; Vilhjálmsson and Håkon-Hoel 2004, 746).

Despite the region's productivity, the Bering Strait is still relatively remote, with few aids to navigation. The closest Coast Guard facility lies over 1,000 miles away on Kodiak Island (Hartsig et al. 2012, 5). The strong currents and harsh and often unpredictable weather patterns that move through the strait increase the risk of accidents and hamper emergency response, exacerbating the vulnerability of the region to the threats posed by increased vessel traffic. Historical analysis of shipping regulation worldwide and commercial regulation in the Bering Sea reveals a tendency towards reactive rather than proactive regulation.

Chapter three examines the potential avenues for regulation in the Bering Strait. Regulatory instruments provided by the IMO offer the most comprehensive and site-specific options for the region, although international regulation requires international cooperation. Analysis of past and present U.S.-Russian relations and relations between both nations and their other Arctic neighbors reveals obstacles to cooperation. Nevertheless, evidence suggests that both Russia and the U.S. are more likely to cooperate on bilateral or multilateral treaties when

they see it in their economic interest to do so. The enduring Arctic ambition of Russia and the comparatively anemic yet slowly emerging Arctic ambition of the U.S. also suggest that both nations may recognize the advantages of protecting their assets in the Bering Sea through proactive regulation.

Ensuring safe shipping through the Bering Strait would advance the economic interests of both nations, as the Russian and American commercial fisheries in the Bering Sea contribute significantly to each nation's economy. Guaranteeing the highest standards of safety through the strait would also further Russia's efforts to transform the Northeast Passage into the world's next international trade route. A cooperative approach to managing vessel traffic through the Bering Strait would not only benefit Russia and the U.S. economically, it would also offer the best protection of the Bering Sea's valuable yet vulnerable marine resources that have supported subsistence communities in the region for thousands of years.

Although the 'age of the Arctic' is upon us, there is still time to prepare for increased traffic in the Arctic. The decades leading up to a completely ice-free Arctic will allow nations to build infrastructure, draft response plans, and formulate proactive regulation to prevent disastrous oil spills or other accidents at sea. Though Cold War mistrust lingers, the region benefits from its nearly three decade-long history as a 'zone of peace,' a term Soviet president Mikael Gorbachev popularized in his Murmansk speech in 1987, when he advocated for more cross-border initiatives and the restriction of military build-up in the Arctic (Gorbachev 1987).

More recent events such as the Russian annexation of Crimea and subsequent violence in the Ukraine have strained relations between Russia and Arctic nations such as the U.S., Canada, and Norway. Yet the international community continues to insist on peace in the Arctic. The Bering Strait offers Russia and the U.S. a unique opportunity not only to safeguard their

economic interests in the region, but also to demonstrate their leadership in securing the Arctic as a zone of peace.

Literature Review

The History of Maritime Trade

The importance of waterborne trade to the growth and advancement of civilization is a topic widely addressed by historians. The economic theories presented by Adam Smith in *An Inquiry into the Nature and Causes of the Wealth of Nations* (1776) have proven essential to histories and analyses of maritime trade since its publication. Smith's analysis of the strategy of specialization and the waterborne trade networks that connect markets and societies continues to demonstrate just how essential access to waterborne trade routes is to a nation's economic growth.

In *The Influence of Sea Power Upon History, 1660-1783* (1890), U.S. Navy officer and historian Alfred Thayer Mahan expanded upon Smith's economic theories, suggesting that the economic success of a nation depends on its access to and exploitation of waterborne trade. Additionally, Mahan theorized that nations require strong and globally dispersed navies to take full economic advantage of waterborne trade. Mahan's theories rank among the most influential in the history of naval strategy since their publication.

Despite the widespread acknowledgement of his theories, they were not universally accepted. Halford John Mackinder, an English geographer, challenged Mahan's concept regarding sea power in his article, "The Geographical Pivot of History" (1904). Mackinder assumed that a nation, such as Russia, with a large land area but limited access to global sea lanes, could rise to global significance by connecting markets via railways. Yet, Mackinder failed to recognize the unparalleled efficiencies and economic advantages to waterborne trade. Therefore, his predictions never come to fruition.

Robert Kaplan critiques Mackinder's emphasis on overland rail routes in his book *Revenge of Geography* (2012). Kaplan reiterates Mahan's theory that access to and control of global sea lanes is essential for any world power. Specifically, Kaplan points to Russia's lack of access to the two bodies of water that experienced the birth and growth of maritime trade, the Mediterranean Sea and the Atlantic Ocean, which has long stunted the economic and political growth of the nation.

Emphasis on the role that the Mediterranean Sea played in the advancement of societies is a common theme throughout much of the literature that builds upon Adam Smith's analysis of the efficiency of waterborne trade. A large subset of literature focuses on the role that trade played in the advancement of civilizations along the river deltas in Mesopotamia and later on in the Mediterranean. Steven Solomon harnesses Smith's theories on the importance of waterborne trade and Mahan's theories on the control of trade routes throughout history in his book, *Water: The Epic Struggle for Wealth, Power, and Civilization* (2011). Solomon examines the various empires that prospered around the Mediterranean Sea and later on the Atlantic Ocean to emphasize how political power and influence are intrinsically linked to the control of trade routes.

Chokepoints of Trade

As trade became a global phenomenon, access to the seas and oceans, such as the Atlantic and Mediterranean, via a warm water port was no longer sufficient. The literature that traces the evolution and expansion of transoceanic trade, beginning with Vasco de Gama's discovery of an all sea route between Europe and Asia, emphasizes the development of chokepoints. Nations that sailed the shortest routes between markets gained the most economic advantages of transoceanic trade. In the centuries that followed de Gama's discovery,

transoceanic trade became the dominant method of exchange between nations, resulting in the formation of chokepoints.

Although transoceanic trade flourished, the cargo traded until the eighteenth century consisted largely of non-essentials such as silks and spices. In *A Splendid Exchange* (2012), William Bernstein explains that the shift in cargo from fabled commodities to basic goods such as sugar, coffee, and cotton beginning in the 1700s heightened the significance of chokepoints. Increasing reliance on trade for essential goods increased the need to ensure the safest and most efficient routes between markets via chokepoints.

Today, chokepoints such as the Panama and Suez Canals, the Straits of Malacca and Hormuz, and Bab el-Mandeb play a significant role in the global economy. Grey literature from the International Chamber of Shipping (2013b) confirms that 90 percent of all trade is waterborne. Literature from the United Nations Convention on Trade and Development (UNCTAD) (2013) reveals that today's cargo consists not only of basic necessities, including food products and textiles, but it also consists largely of natural resources such as oil and gas. As nearly every nation depends on oil and gas, chokepoints serve as linchpins in the transfer of this essential commodity.

Jean-Paul Rodrigue stresses the value and vulnerability of chokepoints in his article on the global trade of oil and gas, titled "Straits, Passages, and Chokepoints: A Maritime Geostrategy of Petroleum Distribution" (2004). Rodrigue demonstrates the vulnerability of chokepoints during various conflicts in the Middle East, when the Suez Canal and Strait of Hormuz closed, interrupting the flow of oil from the region.

The World Bank report, "Pirates of Somalia: Ending the Threat, Rebuilding a Nation" (2013), further emphasizes the vulnerability of chokepoints. Piracy around the Horn of Africa

costs the world economy billions of dollars each year. Additional trade reports and forecasts from entities such as the International Energy Agency (2013) and the UNCTAD (2013) suggest that the global demand for oil and gas will continue to grow, as will the global population, further straining chokepoints of international trade.

Analyses of Arctic Shipping

The economic advantages of waterborne trade, demonstrated by historical analyses, current statistics, and forecasts, coupled with the vulnerability of chokepoints, warrant an evaluation of alternative trade routes. Historians have long been fascinated by the various expeditions that sought to connect markets in the east with markets in the west via the Arctic Ocean. Jeannette Mirsky's extensive survey of exploration in the north, *To the Arctic!* (1934) explores the tragedies endured, obstacles overcome, and sporadic successes of Arctic expeditions throughout history. Pierre Berton's *Arctic Grail: The Quest for the Northwest Passage and the North Pole, 1818-1909* (2000) provides an in-depth view of the countless explorers who went in search of the Northwest Passage, the North Pole, and the missing men of the Franklin expedition. Mirsky and Berton both offer fascinating histories of the centuries-long quest for an Arctic sea route.

Literature that focuses on the expeditions of specific explorers in the Arctic abounds. Primary literature authored by Arctic explorers, such as Fridtjof Nansen's *Farthest North* (1897), Vilhjalmur Stefansson's *My Life with the Eskimo* (1913), and Adolf Erik Nordenskiöld's *The Voyage of the Vega round Asia and Europe* (1882) shed light on the unrelenting desire to conquer the Northeast and Northwest Passages, while secondary literature that portrays such legendary explorers as Nansen, Stefansson, Franklin, and McClintock contextualizes their exploits. New publications appear each year.

After explorers successfully reached the pole and traversed the Northeast and Northwest Passages, attention shifted away from romantic accounts of expeditions to the economic and political implications of increasingly accessible trade routes. Ross Coen recounts the 1969 transit of an American oil tanker through the Northwest Passage in his book *Breaking Ice for Arctic Oil* (2012). The historic and highly publicized journey, which just sixty years prior took three years to complete, took two months to complete in 1969. Yet Coen explains that conditions in the Northwest Passage were still too perilous to transport oil from Alaska's North Slope to the East Coast at the time. The Tans-Alaska pipeline was built instead, and the *Manhattan's* voyage fell from the public's consciousness.

As the effects of global warming result in thinner and sparser sea ice cover in the Arctic, scientific literature published in the last decade has revealed the potential for increasingly ice-free summer shipping seasons. Laurence Smith and Scott Stephenson analyze two different climate scenarios to predict which trans-Arctic trade routes will become ice-free over the coming decades. Their article, titled, "New Trans-Arctic Shipping Routes Navigable by Mid-Century" (2013) suggests that, although the ice pack will melt more slowly in the Canadian Arctic Archipelago, both the Northeast and Northwest Passages will largely be ice-free by 2060.

Countless additional studies draw similar conclusions, though some literature challenges the safety of conditions and the economic viability of trans-Arctic routes in the future. A survey conducted by Frédéric Lasserre and Sébastien Pelletier, published in their article, "Polar super seaways? Maritime transport in the Arctic: An Analysis of Shipowners' Intentions" (2011), suggests that shipping certain types of cargo, such as container cargo, will not be economically viable via the Arctic for the foreseeable future, owing to the strict schedule shippers follow. Lasserre and Pelletier conclude, however, that shipping bulk cargo will be an economically

attractive option in the coming decades, especially as demand for bulk goods, including coal, rises in developing nations such as China and India.

Another subset of literature that reveals the growing importance of trans-Arctic trade focuses on the region's untapped oil and gas reserves. A report released by the U.S. Geological Survey (Bird et al. 2008) estimates there to be 90 billion barrels of undiscovered oil, 1,670 trillion cubic feet of natural gas and 44 billion barrels of liquefied natural gas in the Arctic. The report serves as the foundation for numerous journal articles that predict a significant rise in vessel traffic throughout the Arctic as the sea ice continues to melt in the coming decades.

Bounty in the Bering Sea

Recognition of the inevitable rise in vessel traffic through the Bering Strait led to an analysis of the region's values and vulnerabilities to gauge the potential effects of increased shipping. Abundant and wide-ranging scientific literature attests to the species diversity and ecological productivity in the Bering Sea. Scholars describing the periods of human migration and settlement in the region often cite literature portraying the ecological abundance in the region, whose marine resources have supported human inhabitants for thousands of years. The ability of the region's Natives to survive off the resources of the land and sea for so long has prompted an array of studies focusing on the subsistence practices of coastal communities in the Bering Strait region.

Ann Fienup Riordan is one of the most influential and prolific anthropologists on the Yukon-Kuskokwim Delta region. Among her numerous publications, *When Our Bad Season Comes: A Cultural Account of Subsistence Harvesting and Harvest Disruption on the Yukon Delta* (1986) stands out for its description of Yupik subsistence practices and cultures. Ernest Burch Jr. is perhaps the most notable anthropologist who has documented the lifeways and social

structures of Alaska's Iñupiat. His three volume series, *The Iñupiaq Eskimo Nations of Northwest Alaska* (1998), *Alliance and Conflict: The World System of the Iñupiaq Eskimos* (2005), and *Social Life in Northwest Alaska: The Structure of Iñupiaq Eskimo Nations* (2006) represent several decades of work dedicated to documenting the habits and cultures of the Iñupiaq in Northwest Alaska.

Igor Krupnik and Lyudmila Bogoslovskaya's article, "Old Records, New Stories: Ecosystem Variability and Subsistence Hunting in the Bering Strait Area" (1999), provides an overview of the subsistence habits of Natives along the Chukchi Peninsula of the Bering Strait. Their research reveals that Natives of the region strategically settled in areas that provided the best access to marine subsistence resources such as Pacific walruses and bowhead whales. A report compiled by Kawerak, the Native non-profit corporation from the Bering Strait region, titled, "A Comprehensive Subsistence Use Study of the Bering Strait Region" (Ahmasuk and Trigg 2007), emphasizes the important role that marine subsistence resources continue to play in the diet of the region's coastal communities. The report reveals that over 85 percent of all harvested subsistence resources are marine-based.

The long history of dependence on subsistence resources and the recently increasing reliance on store-bought foods has inspired numerous studies on the food security of Alaska Natives. Linda Janine Reed's dissertation, "Diet and Subsistence in Transition: Traditional and Western Practices in an Alaskan Athapaskan Village" (1995), concludes that although store-bought foods provide Natives with one form of food security, the preservatives and excess fats and sugars in the foods are deteriorating the health of Native communities throughout Alaska. An overview of health related studies conducted throughout Alaska and compiled by Philip Loring and S. Craig Gerlach confirms increased rates of Type II diabetes, obesity, coronary heart

disease, and cancer, along with depression, substance abuse, alcoholism, and violence (2009). A study conducted in seven communities in Western Alaska reveals that participants who consumed the highest amount of subsistence foods had significantly higher levels of vitamin A, vitamin D, vitamin E, Iron, and omega-3 fatty acids, compared to participants who consumed the highest amount of store-bought foods (Bersamin et al. 2007).

Another subset of literature that assesses the current value of the Bering Sea focuses on the significance of the region's commercial fisheries. Grey literature from the Food and Agriculture Organization (2014) emphasizes the substantial output of the region's fisheries; they account for 26 percent of the total global yield. A report from the McDowell Group (2013), a professional research firm based in Alaska, highlights the significant value that the Bering Sea fisheries offer in the form of employment, labor income, and economic output to both Alaska and the U.S.

The ecological abundance in the Bering Sea has supported various commercial endeavors over the last three centuries. As the Russian fur trade played a prominent role in the history of Alaska, Ernest Gruening's *The State of Alaska* (1954), George Rogers's section on colonial Alaska in *The Future of Alaska: Economic Consequences of Statehood* (1962), and Jeannette Paddock Nichols's *Alaska: A history of its administration, exploitation, and industrial development during the first half century under the rule of the United States* (1963) all offer detailed accounts of not only the fur trade but also the periods of commercial whaling that occurred off the coast of Alaska prior to the twentieth century. Claus Naske and Herman Slotnick's book *Alaska: A History* (2011) also recounts the various waves of commercialization in the Bering Sea.

Nearly every resource that was the focus of commercial harvesting resulted in a drastic decline in population, including the fur seal and sea otter, the bowhead whale, and the Pacific walrus. Consequently, many historical analyses of commercial harvesting in the Bering Sea also analyze the regulation that resulted from the various population declines. The literature demonstrates that commercial regulation in the Bering Sea and shipping regulation worldwide is often enacted *in response to* a major oil spill or species depletion

Regulation in the Bering Strait

Although much has been written on commercial harvesting in the Bering Sea throughout the last three centuries, the trend of formulating regulation following an overharvest of species or an accident at sea has never been harnessed to argue for a proactive approach to vessel traffic regulation in the Bering Strait. Despite this gap in the literature, scholars have become increasingly aware of the threats that increased traffic may pose to the marine resources in the Bering Sea.

A scientific study conducted by Jacqueline M. Grebmeier et al. (2006) investigates the effects of a major ecosystem change in the Bering Sea caused by global warming, which has shifted the feeding grounds of gray whales farther north into the Chukchi and Beaufort Seas. Scientific literature that documents shifting in habitats of marine subsistence resources is further supported by a study by Stafford et al. (2007), which recorded gray whales overwintering in Arctic waters, a phenomenon not previously witnessed by scientists or coastal communities. NOAA Fisheries studies (2013a; 2013b) reveal that subsistence resources such as the Bering Sea populations of gray whale, Pacific walrus, and ringed seal are already at risk owing to the effects of global warming.

A number of studies focus on the additional threats posed to subsistence resources by increasing shipping. An article by Andrew Hartsig et al. titled, "Arctic Bottleneck: Protecting the Bering Strait Region from Increased Traffic" (2012), acknowledges the region's biodiversity, cultural and economic value, and vulnerability to global warming, before addressing the threats associated with the impending rise in vessel traffic. Some studies focus on threats to specific species by a rise in traffic, such as Reeves et al.'s article, "Implications of Arctic industrial growth and strategies to mitigate future vessel and fishing gear impacts on bowhead whales" (2012).

As the effects of global warming and the threats posed by increased vessel traffic in the Bering Strait region have become more widely understood, more recently published literature examines regulatory options that will ensure safe shipping and alleviate potential strains on the marine ecosystem. Henry P. Huntington et al. review the regulatory measures needed for the Bering Strait, including shipping lanes, speed restrictions, and automatic tracking systems, in their article "Vessels, risks, and rules: Planning for safe shipping in the Bering Strait" (2014). Having identified the regulatory options, Huntington et al. briefly compare the effectiveness of voluntary, domestic, and international regulations, focusing specifically on the power afforded to coastal states by the UN Convention on the Law of the Sea (UNCLOS) and the regulatory options made available by the International Maritime Organization (IMO).

The literature that analyzes the legal framework of the Arctic often identifies UNCLOS and the IMO as the most appropriate instruments for increased regulation in the region. Many scholars agree that a regulatory gap exists for the Arctic marine area. However, the potential for implementing such regulation is complicated by the need for Russia and the U.S. to cooperate on a bilateral management regime.

The relationship between Russia/the Soviet Union and the U.S. is a subject covered extensively by scholars. J.D. Parks' *Culture, Conflict and Coexistence* (1983) provides a brief overview of the countless cultural exchanges between Russia and the U.S. via scholars, scientists, musicians, artists, and immigrants that took place throughout the 1800s. These exchanges allowed for peaceful relations between the two nations. Parks emphasizes how relations shifted after the Russian Revolution up until the Soviet Union and the U.S. signed the Lacy-Zaroubin Agreement in 1958 to enhance cultural exchanges between the two nations. Peter G. Boyle's *American-Soviet Relations* (1993) and Robert C. Grogin's *Natural Enemies* (2001) also analyze the shift in relations after the Russian Revolution, taking their readers through to the fall of the Soviet Union in 1991.

Although the two nations were allies during World War II, the tense relationship portrayed by Boyle, Grogin and numerous other scholars affirms the distrust that lingers on both sides. Tension built quickly after the end of the war, as the formation of the North Atlantic Treaty Organization between the U.S. and eleven other western nations motivated the rivaling Warsaw Pact between the Soviet Union and Eastern Europe. The nuclear arms race intensified the rivalry between the two nations.

Literature that portrays the history of communism, the implications of the Cold War, and the eventual dissolution of the Soviet Union also aid in understanding the complicated relationship that lingers between Russia and the U.S. David Remnick's *Lenin's Tomb* (1993), John Lewis Gaddis' *The Cold War: A New History* (2006) and Archie Brown's *The Rise and Fall of Communism* (2009) provide historical narratives of the decades leading up to the Cold War and the years that followed, offering insight into the differing ideologies of the two nations that continue to create conflict today.

Although hostilities between Russia and the U.S. subsided after the Cold War, the relationship remains strained. Jeffery Mankoff's article, "Generational Change and the Future of U.S.-Russian Relations" (2010) sheds light on the wariness that Russians continue to harbor for the West in general and the U.S. in particular. This distrust is evidenced by surveys conducted by Sam Greene and Graeme Robertson, who published their findings in an article in *The Washington Post* titled, "Explaining Putin's popularity: Rallying around the Russian flag" (2014). Surveys conducted by the Pew Charitable Trust reveal the reciprocal lack of trust that Americans had for Russians in 2012 (Horowitz 2013), prior to Russia's annexation of Crimea. Sanctions resulting from the annexation and ongoing violence in the Ukraine further complicate relations between Russia and the U.S.

Literature that examines the relationship between Norway and Russia reveals Russia's increased willingness to cooperate on cross-border agreements when it is within the nation's economic interest to do so. The same is demonstrated in literature that examines cross-border relations between the U.S. and Canada. Although both nations have historically resisted signing international treaties that limit their sovereignty, these hesitations are often grounded in the economic implications of the treaty.

The literature that addresses the need for international regulation in the Bering Strait briefly, if at all, suggests that cooperation between Russia and the U.S. is unlikely. Despite persisting apprehensions from the Cold War and recent clashes, including those surrounding Russian actions in Crimea and the Ukraine, the economic incentives for ensuring safe shipping and safeguarding the marine ecosystem are clear. This thesis takes the unique approach of arguing that the significance of an inevitable rise in vessel traffic through the Bering Strait lies in the value that the region provides to its coastal communities and commercial fisheries. This

thesis analyzes the various assets of the region by drawing upon literature generally focused on only one resource, economic sector, or cultural value of the Bering Sea and combines these assets and values to build an argument for proactive regulation. It argues that the economic incentives for safeguarding the Bering Sea's bounty should offset Russian and American reservations about entering into bilateral agreements, as it is in both nations' best interest to do so.

Methodology

This thesis began with the assumption that during the twenty-first century the Bering Strait will transform into a chokepoint of international trade. This hypothesis was initially grounded on the economic potential of the Arctic, as the accelerating effects of global warming open the region up to development. To investigate the likelihood of this hypothesis, the research began with a historical examination of secondary literature on the trends in waterborne trade. Because waterborne trade has proven essential to the advancement of societies since the first permanent settlements were established along the Nile, Tigris, Euphrates, Indus, Ganges, and Yellow Rivers, expansion of trade from these settlements served as a starting point.

The historical analysis of maritime trade supported the assumption that nations will ultimately seek out the shortest trade routes between markets. The analysis revealed rising demand for traded goods and increasing congestion of chokepoints, along with substantial costs associated with piracy along certain southern routes. In recent decades, the Arctic's potential as a shipping route has aroused intense interest and attracted investment by Asian nations in particular, as they recognize the efficiencies offered by ice-free Arctic sea lanes.

The second stage of this research focused on assessing the consequences of increased shipping through the Bering Strait. An analysis of the enduring reliance of coastal communities on marine subsistence resources suggested that the food security of thousands could be threatened by increased vessel traffic. The Bering Sea not only supports the livelihoods of its coastal communities, but also provides significant economic value to the fishing industries on both sides of the strait. Further analysis of the Bering Sea's value revealed the unique vulnerability of the marine ecosystem to the effects of global warming, which suggests that introducing ship-sourced pollutants and the potential of a large scale oil spill could devastate the

region and those who rely on its resources. The Bering Strait's strong currents, unpredictable weather, and lack of infrastructure further exacerbate the threats posed by increased shipping.

Evidence of the extraordinary bounty and heightened vulnerability of the region led to an examination of the regulatory frameworks that could help protect against and mitigate the harms resulting from the inevitable accidents and pollution that will accompany rising vessel traffic. Regulatory recommendations from Native communities and both Native and non-Native coalitions provided the foundation for determining the most appropriate regulatory instruments for the Bering Strait. The scope of the regulation recommended to ensure the health of the entire marine ecosystem revealed the need for comprehensive and site-specific international regulation.

The existing international legal frameworks for the Arctic Ocean were examined for their potential usefulness and applicability. The United Nations Convention on the Law of the Sea (UNCLOS) is the most widely harnessed framework by scholars advocating for more stringent regulation in the Arctic. UNCLOS specifically designates the International Maritime Organization (IMO) as the organization responsible for regulating international shipping, therefore prompting an analysis of IMO regulatory instruments such as Emission Control Areas (ECAs) and Particularly Sensitive Sea Areas (PSSAs) and their applicability to the Bering Strait region. These instruments were chosen owing to their ability to address most, if not all, of the recommended regulation for the region.

As the use of any IMO instrument in international waters requires an agreement among all coastal states, the third stage of this research evaluated the potential for cooperation between Russia and the U.S. Historical analysis revealed that, despite general skepticism and reluctance to enter into bilateral or multilateral agreements that limit their sovereignty and/or economic freedom, both Russia and the U.S. have entered into such agreements when it has been in their

economic interest to do so. This thesis does not argue the likelihood that Russia and the U.S. will reach an agreement on regulation in the Bering Strait, but rather suggests that, owing to the significant value and unique vulnerability of the region, a proactive approach to regulation is in the economic interest of both nations.

Chapter One: A brief history of maritime trade, the importance of chokepoints and the inevitable rise of vessel traffic through the Bering Strait

Introduction

Access to water has been essential to the growth and success of civilization since humans first transitioned away from a nomadic lifestyle nearly 10,000 years ago. Agriculture initiated the first permanent settlements, which required access to water for irrigation. The deltas of the Nile, Tigris, Euphrates, Indus, Ganges, and Yellow Rivers allowed for the expansion of agricultural societies, as the nutrient rich regions supported crop growth, while the rivers themselves allowed for the first instances of waterborne trade. As settlements expanded either down or up river and trade increased, the phenomenon of specialization spread. No longer did one person need to provide food, water, shelter, tools, clothing etc. for him or herself. Instead, each person specialized in an occupation, such as farming, and traded for other products, allowing for the most efficient production of a variety of goods. The most efficient production of goods combined with the most efficient transportation of goods supported the growth of civilizations and inspired advancements in all aspects of human society.

As civilization grew and competition increased, access alone would not suffice, leading states to invest in more efficient sailing technologies. The advancement of sailing technologies, which allowed for to the discovery of a sea route to the riches in Asia, resulted in safer and more efficient trade between the East and West. As trade flourished and the strategy of specialization spread around the world, states increasingly sought out even shorter routes, resulting in a majority of maritime traffic funneling through narrow channels that are now chokepoints to international trade.

The search for shorter trade routes extended north into the Arctic. Explorers traversed the Northeast and Northwest Passages by the turn of the twentieth century, though these routes were not economically viable due to the region's harsh environment and persisting sea ice. Recent accelerating effects of global warming are allowing more ships to travel through these once fabled Arctic shipping routes, opening the possibility of congestion in the region's narrow waterways in the not too distant future.

This chapter will begin with an analysis of the role that waterborne trade has played in supporting human civilization throughout history. Although naval and economic capacity play large roles in determining the most successful maritime powers, geographic access waterways has also proven vital in becoming a world power. Analysis of more recent maritime trade, with an emphasis on chokepoints, will illustrate the unparalleled economic advantages attained through access to the most efficient transoceanic trade routes.

Despite the advancement of shipping technologies that ensure the safest and fastest mode of transport, global trade is susceptible to disorder. An overview of the current state of maritime trade suggests that piracy and political turmoil threaten most chokepoints, leaving the global economy vulnerable to trade disruptions, making Arctic routes more attractive. Offshore natural resource development and shorter and safer trans-Arctic trade routes will increase vessel traffic to the region, with the Bering Strait emerging as the next chokepoint to maritime trade.

Waterborne Trade

The Growth of Civilizations

The four regions that enjoyed the world's first prospering civilizations all flourished around large, navigable rivers. Egypt was settled around the Nile, Mesopotamia along the Tigris and Euphrates, China along the Yellow, and the Indus along the Indus and Ganges Rivers. The

governing powers of each cradle of civilization held control of their respective regions by controlling the water systems. Although the rivers provided undeniable irrigation benefits to the growing populations, large-scale agricultural endeavors were economically meaningless without access to trade networks.

The Egyptians were one of the first peoples to expand their trading networks beyond the Nile into the surrounding seas. Seafarers traveled south to the Horn of Africa via the Red Sea. They also sailed north along the shores of the Mediterranean, trading for cedars from Lebanon, copper from Cyprus, silver from Asia Minor, and hand crafts and textiles from other Asian civilizations (Solomon 2011, 35). Although they ventures into adjoining seas, the ancient Egyptians did not advance far beyond the coastlines, due to inadequate sailing technologies. It was instead along the coast and upon the islands in the Mediterranean that the first seafaring civilizations thrived.

The First Maritime Empires

Mediterranean seafarers learned to harness strong winds with the use of sails, dramatically increasing their efficiencies at sea. Just as it is today, overland transport at the time was slow and sometimes impossible due to difficult terrain. Trade via the Mediterranean allowed societies to increase their wealth and diversify their markets through economic specialization. Adam Smith expands upon the strategy of specialization in his 1776 collection of books titled *An Inquiry into the Nature and Causes of the Wealth of Nations*. While explaining the natural division of labor, Smith proposes that it is human nature to specialize in certain crafts. Smith demonstrates the increased efficiency gained through specialization with a basic example of ancient trade. Within a tribe of hunters or shepherds, Smith notes that one particular person would have constructed bows and arrows with more "readiness and dexterity" than any other (A.

Smith 1776, I.2.3). This craftsman would exchange bows and arrows for cattle and venison, which would take him more time to acquire than it took him to craft the tools needed by others to do so. Within the global economy, the combination of specialization and trade ensures the most efficient relationship among nations. This relationship allows each to specialize in the production of goods that it excels at producing more than any other nation, a concept known as competitive advantage.

The most efficient production of goods has limited benefits, however, if a craftsman or a country does not have access to efficient transportation of goods. In *Wealth of Nations*, Smith asserts that trade via waterways is consistently more efficient than land-based trade. Moreover, he explains that, "it is upon the sea-coast, and along the banks of navigable rivers, that industry of every kind naturally begins to subdivide and improve itself" (A. Smith 1776, I.3.3).

The peoples who thrived above all others during the growth of the Mediterranean maritime civilizations were the Minoans of Crete. The one hundred sixty mile long island centrally located in the eastern section of the Mediterranean became the crossroads of maritime trade by 2000 BC. Minoans benefitted greatly from Crete's strategic location. Trade with eastern Mediterranean peoples, as well as with Egyptians and those from Asia Minor spurred unparalleled economic growth on the island of Crete. As they grew increasingly wealthy, Minoans built extravagant palaces and large cities. In the cities, domestic technologies such as drainpipes and sewers grew more advanced, while arts and language flourished. Strategic access to maritime trade in the Mediterranean allowed Crete to exert unrivaled economic, cultural, and naval influence throughout the region for over half a millennium (Solomon 2011, 64).

The civilizations that prospered after the fall of Crete shared similar characteristics. For millennia, empires that rose to dominate the Mediterranean world did so through their naval

power (Solomon 2011, 70). A strong navy ensured safe access to the most profitable trade routes. As civilization expanded farther west into Europe and east into Asia, societies and cities grew, but the underlying force of maritime trade continued to propel economies. Adhering to Smith's theory that it is upon the seacoasts and along the banks of navigable rivers that industry expands and improves upon itself, the most successful maritime empires were those that expanded their focus from small central seas such as the Mediterranean to vast oceans such as the Atlantic.

The Spread of Transoceanic Trade

Expanding upon the technologies introduced by Mediterranean seafarers, the Portuguese learned to harness wind and ocean currents, allowing them to venture beyond coastal waters and into the Atlantic Ocean. An expedition led by the Portuguese mariner Vasco da Gama first connected the markets in Europe with the markets in Asia via an all-sea trade route. With transoceanic trade connecting markets around the world, Europeans exchanged manufactured goods for silver and gold from the Americas and eventually exchanged silver and gold for silks and spices from Asia.

The spread of maritime trade among the Atlantic, Indian, and Pacific Oceans during the early modern era of 1500-1800 initiated the first "genuinely global economy" (Bentley and Ziegler 2006, 365). Although there were other expeditions in the Indian Ocean at this time, including Chinese and Ottoman expeditions, only Europeans consistently connected western, eastern, and oceanic peoples. By linking these three concentrations of peoples and markets, Europeans benefitted from unsurpassed opportunities to increase power, wealth, and influence around the world, just as the Minoans had done in the Mediterranean (Bentley and Ziegler 2006, 368). As Steven Solomon asserts in his book *Water: The Epic Struggle for Wealth, Power, and Civilization*, "open oceanic sailing was the West's breakthrough route to world dominance"

(2011, 2). Solomon stresses that, in every age, whichever society held control of the world's major sea-lanes "commanded the gateways of imperial power" (2011, 16).

By the mid-sixteenth century, Portugal had established more than fifty trading posts along the route between West Africa and East Asia, including posts at Hormuz and Malacca, two straits that would become crucial chokepoints for international trade in the twentieth and twenty-first centuries. Portugal's procurement of strategic trading posts along the route to Asia supported a brief yet profitable global trading empire by the mid-sixteenth century. In his book *World Trade Since 1431: Geography, Technology, and Capitalism*, Peter J. Hugill also argues that nations that controlled the seas controlled the world economy, a concept that was first introduced in the late 18th century by Alfred Thayer Mahan, a U.S. Navy officer and historian (Hugill 1993, 400).

Mahan harnesses Smith's assertion that trade via waterways was the most efficient means of exchange in *The Influence of Sea Power Upon History, 1660-1783* (1890). Mahan considered sea power and military power to be intrinsically linked, and in his examination the period between 1660 and 1783 when nations were becoming increasingly reliant on trade, Mahan demonstrated the importance of naval power to the economic strength of a nation.

In his review of Mahan's naval career and resulting theories, Historian William Livezey explains that to Mahan, "sea power was the sum total of forces and factors, tools and geographical circumstances, which operated to gain command of the sea, to secure its use for oneself and to deny that use to the enemy" (Livezey 1947, 277). Livezey stresses that Mahan did not argue simply that a strong and widespread navy guaranteed complete control of the seas. He insisted that a balance of military control and commercial use of global sea lanes would ensure the greatest political and economic success of a nation. He also stressed that the maritime success

of a nation depended upon geographical access to the sea. The English and Dutch, both with strategically located warm-water ports in the Atlantic, began to dominate trade between the East and West in the seventeenth century, as both nations advanced ship technology, sailing faster, cheaper, safer, and more powerful ships, which afforded them even more economic advantage over the Portuguese (Bentley and Ziegler 2006, 378).

The Importance of Geography

Advantages of Ocean vs. Land Transport

Although the political and economic advantages of controlling the seas are clear today, Mahan's theories were not universally praised at the time. Halford John Mackinder challenged Mahan's emphasis on sea power in his article, "The Geographical Pivot of History" (1904). Mackinder recognized that coastal states, such as England and the Netherlands, profited greatly from easy access to the sea. Yet, he also surmised that the spread of railways across Russia during the early twentieth century would provide it with land-access to the same major markets that England and the Netherlands accessed via sea lanes.

Mackinder argued that access to overland rail routes would diminish Russia's isolation. Mackinder assumed that rail access from remote parts of internal Russia to major markets in Asia and Europe would propel Russia to become a world power. He theorized that the nation that controlled Europe controlled Eurasia and Africa, or what Mackinder called the "World-Island," and the nation that controlled the World-Island controlled the world. His comparison between overland rail routes in Russia and all-sea trade routes ignored the economic advantages and increased efficiencies that waterborne trade has provided nations and empires for thousands of years. Indeed, Russia's inability to become a world power comparable to the U.S. or Great Britain can, in part, be explained by its vast land area and limited access to global sea lanes.

Geography and Power

Russia is the largest country in the world, covering 6.6 million square miles. It also boasts the longest coastline in the world, bordering two oceans and twelve seas. However, the largest portion of its coastline, 15,000 miles, runs along the barren and frozen Arctic Ocean. In *Revenge of Geography* (2012), Robert Kaplan reiterates Mahan's assertion that its "irremediable remoteness from an open sea" has disadvantaged Russia's quest to accumulate wealth and world power (2012, 104). Specifically, Russia lacks access to the two bodies of water that experienced the birth and growth of maritime trade: the Mediterranean Sea and the Atlantic Ocean.

Julian Corbett, an English naval historian, emphasized the Mediterranean Sea's centrality to political power, explaining: "For centuries the destinies of the civilized world had seemed to turn about the Mediterranean. Each power that had in its time dominated the main line of history had been a maritime power" (Corbett in Mitchell 1949, 15). In *Maritime History of Russia: 848-1948* (1949) Mairin Mitchell argues that Russia's inevitable land orientation limited its ability to reach world power status.

Despite the significant advantages that access to the Mediterranean Sea or Atlantic Ocean offered to its coastal states, strategic access alone could not propel a state to world power status. Since the spread of transoceanic trade in the fifteenth century, the greatest maritime powers have been those that aggressively pursued the shortest routes between major markets. Although a majority of each transoceanic trade route runs through open ocean, most require passage through strategic straits or canals. The most commonly traversed passages are known as chokepoints.

Chokepoints to Maritime Trade

Chokepoints connect two significant bodies of water and experience a large volume of traffic through a narrow waterway. Several of the world's chokepoints occur naturally, between

islands or through seas separating large landmasses such as the Strait of Hormuz, the Strait of Malacca, and Bab-el-Mandeb. The quest for all-sea trade routes has also motivated the costly construction of man-made canals such as the Panama and Suez Canals (Figure 1.1).

Figure 1.1. World Chokepoints
Source: (U.S. Energy Information Agency 2012)

As trade between the East and West flourished, access to and control of these waterways became vital to harnessing economic gains from these routes. The volume of cargo and the frequency of transits through these waterways demonstrate the significance of each maritime chokepoint. In *A Splendid Exchange,* Bernstein describes trade before 1700 as an exchange of "fabled commodities from exotic locations" (2012, 234). After 1700, the trade of basic goods such as sugar, coffee, tea and cotton began to dominate exchanges. As societies became reliant on the exchange of such basic goods, efficient trade routes became increasingly valuable.

Today nearly everything that is essential to the modern way of life, from basic commodities and manufactured goods to oil and gas, travels through chokepoints. The type and

volume of cargo that make up the world trade system demonstrate the strategic importance of chokepoints, not only to the advancement of economies but also to the survival of societies.

Chokepoints at Risk

A majority of the chokepoints that experience the highest volumes of trade are located in unstable regions of the world, leaving a large portion of world trade susceptible to piracy and political turmoil. As petroleum products account for one third of the total volume of world trade, the safety and efficiency of the chokepoints they travel is essential to the global economy (U.N. Secretariat 2013, 7). According to statistics from the U.S. Energy Information Administration, the chokepoints that experience the highest volumes of oil transits include the Strait of Hormuz, the Suez Canal, and Bab-el-Mandeb, all located in the Middle East (2012). The world trade system is most vulnerable at these three chokepoints, as they lie in a highly unstable region (Bernstein 2012, 370).

In his article on the geostrategic value and vulnerability of petroleum trade, Jean-Paul Rodrigue stresses that chokepoints are the "geographical Achilles heels of the global economy" (2004, 365). He demonstrates the vulnerability of world oil chokepoints through an examination of the various international conflicts that have blocked or restricted trade to the world's most vital passages. The Suez Canal was closed between 1956 and 1957 in response to Egypt's President Nassar's nationalization of the canal, which led to attacks on Egyptian soil by Israeli, British, and French forces. The canal closed again from 1967 until 1975, owing to continued conflicts between Egypt and Israel. The Strait of Hormuz experienced similar turmoil during the Iran-Iraq war from 1980 to 1988, resulting in a 25 percent decrease in shipping through the Persian Gulf (Rodrigue 2004, 366). Because a majority of the world's oil is transported through

unstable regions, future events interrupting the flow of oil are not simply possible or probable, but nearly certain (Bernstein 2012, 369).

As the global population grows, specifically in developing Asian nations such as India and China, the demand for oil will continue to grow as well. The Strait of Malacca, which connects the Indian Ocean to the South China Sea, is expected to experience a sharp increase in oil tanker transits, as the International Energy Agency (IEA) forecasts that in the next five years almost half of global oil demand growth will come from China (International Energy Agency 2013). The IEA's *World Energy Outlook* for 2013 forecasts that, along with an immediate growth in oil demand from China, India will become the largest single source of oil demand growth in the coming decades, resulting in a reorientation of energy trade from the Atlantic basin to the Asia Pacific region by 2020 (2013, 4). The 2013 *Review of Maritime Transport* compiled by the UNCTAD estimated that the value of world trade will more than double between 2010 and 2020, with exchanges between Asia and Europe experiencing the greatest increase in value (2013, 10).

The Indian Ocean, the seas surrounding the Middle East, and the South China Sea are all host to piracy and political conflict. Although 2012 experienced a sharp decline in piracy incidents, the World Bank's 2013 report "Pirates of Somalia: Ending the Threat, Rebuilding a Nation" estimated that Somali piracy cost the world economy eighteen billion dollars in 2012 (The World Bank 2013, 5). As international demand for oil and other goods continues to increase and the sea lanes surrounding chokepoints continue to fall victim to expensive acts of piracy, nations will seek out safer and more efficient alternative trade routes.

Arctic Alternatives

Northeast and Northwest Passages

From the late 1400s until the early 1900s countless voyages set out in attempts to discover an alternative navigable route from Europe to the riches in Asia through the uncharted Arctic. The two connecting routes considered were the Northwest Passage, passing through the Canadian Arctic Archipelago and around Alaska's Arctic coast, and the Northeast Passage, which runs along the northern coasts of Russia and Norway. After centuries of failures resulting in the loss of hundreds of lives, both routes were eventually traversed at the turn of the twentieth century. Adolf Erik Nordenskiöld, a Finnish-Swedish sea captain, was the first to sail through the continuous Northeast Passage in 1878. The Norwegian explorer Roald Amundsen made the first successful voyage of the Northwest Passage on an expedition that spanned three years from 1903-1906. Although both explorers proved the existence of shorter Arctic trade routes, the persistent sea ice and harsh conditions rendered these routes economically unfeasible for international trade.

Just over sixty years after Amundsen's voyage through the Northwest Passage the route's economic viability was tested again, this time by the American oil tanker the *SS Manhattan.* Ross Coen recounts the historic journey of the *Manhattan* through the Northwest Passage in his book *Breaking Ice for Arctic Oil* (2012). Humble Oil & Refining Co., an American-owned oil and gas company, commissioned the *Manhattan* to determine whether the Northwest Passage was an efficient route to transport oil from Alaska's North Slope to the eastern seaboard of the U.S. On September 2, 1969 the oil tanker left New York Harbor and sailed up to Baffin Bay *en route* to the North Slope. The *Manhattan* reached Prudhoe Bay in Alaska to pick up one ceremonial barrel of oil.

The ship returned to New York Harbor on November 12, 1969, requiring just over two months to complete a round trip through the Northwest Passage, which just sixty years earlier took Amundsen's crew three years to complete. The *Manhattan's* transit proved that the Northwest Passage could be traversed much more quickly and efficiently than ever before, yet the data acquired during the journey verified that shipping oil through an Arctic sea lane was not an economically viable option at the time; the Trans-Alaska Pipeline was constructed instead (Coen 2012, 215).

Global Warming and Thawing Shipping Lanes

In recent years the Northwest and Northeast Passages have experienced a rise in transits of icebreakers, tourist ships, fishing vessels and private yachts. The U.S. Coast Guard reported a 100 percent rise in vessel traffic through the Arctic between 2008 and 2012, with vessel traffic through the Bering Strait increasing by 118 percent, an increase that is expected to continue and even accelerate in the coming decades (2014a, 1–1).

Since 1980, the Arctic has lost 40 percent of its ice cover and 75 percent of its volume of ice (Goldenberg 2014). The effects of global warming have lengthened the summer shipping season as the summer ice continues to become thinner and sparser. The National Snow and Ice Data Center (NSIDC) released a statement following the 2013 sea ice minimum extent, projecting that an ice free summer in the Arctic Ocean in only a few decades (Goldenberg 2014).

In a study conducted on the navigability of trans-Arctic shipping routes over the next half century, researchers determined that routes will be far more accessible over the North Pole and through both the Northeast and Northwest Passages in the coming decades (L. C. Smith and Stephenson 2013). Merging climate model outputs with numerical transportation analysis produced an assessment of the future of trans-Arctic shipping for both open water and polar class

vessels. The study utilized two future climate scenarios proposed by two different research institutions. Researchers examined these climate scenarios (RCP 4.5 and RCP 8.5) during two time periods, between 2006 and 2015 and between 2040 and 2059 (Figure 1.2).

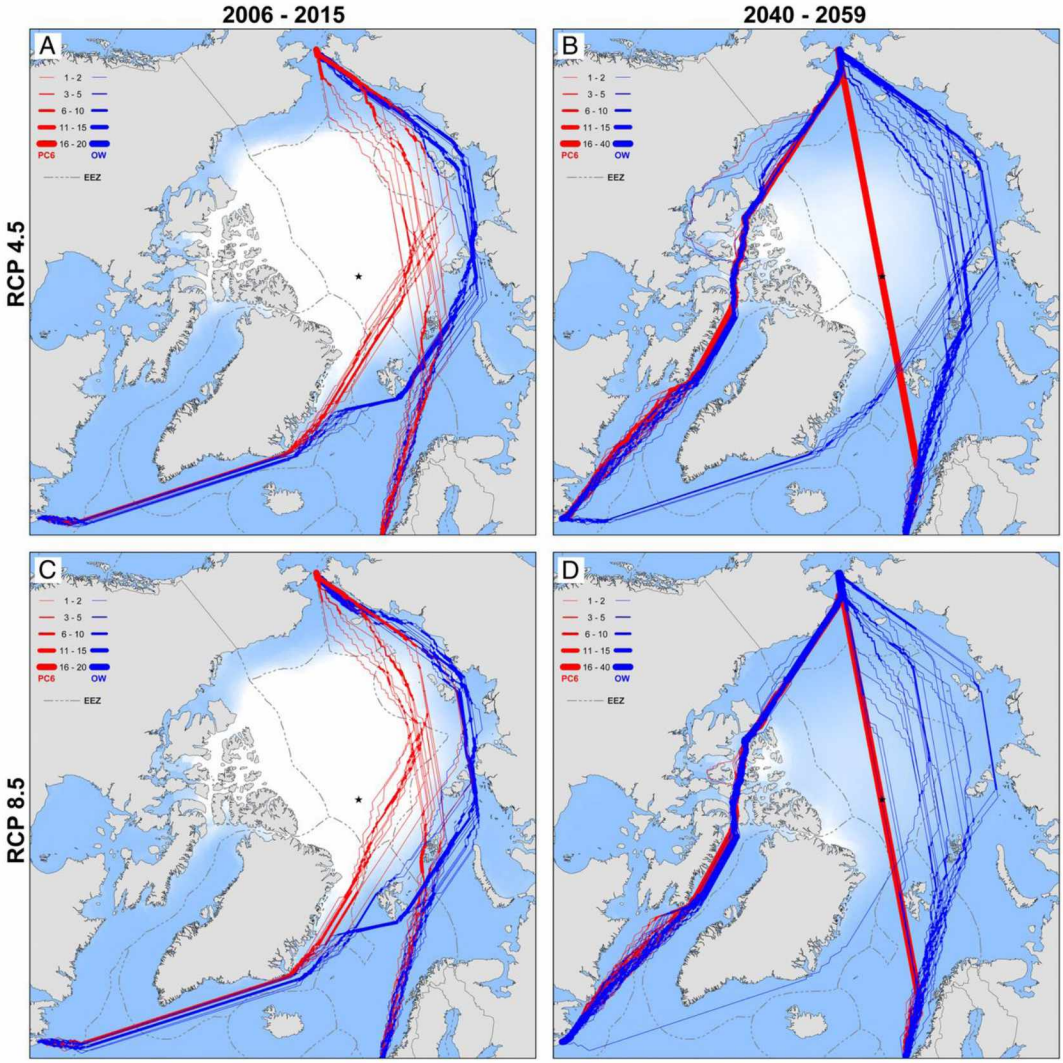


Figure 1.2. Projected summer navigation routes for open water (blue) and polar class (red) vessels
Source: (L. C. Smith and Stephenson 2013)

Both climate scenarios (RCP 4.5 and 8.5) project that the Northeast Passage will continue to support summer vessel traffic, with more direct routes opening up between 2040 and 2059. Between 2040 and 2059, both climate scenarios project that the Northwest Passage will open up substantially as well, offering a more efficient route from eastern North America to ports in Asia.

A route between North America and the markets in Asia via the Northwest Passage is over 6,500 miles shorter than the alternative route through the Panama Canal, a distance savings of nearly 40 percent (Østreng et al. 2013, 435).

Some scholars have not fully embraced this highly optimistic outlook for the potential of Arctic shipping routes. Skeptics argue that "ice free" Arctic routes will not transform the future of global trade, as the conditions in the Arctic will continue to remain too risky during most months of the year (Det Norke Veritas 2010). Even during the "ice free" summer months the Arctic Ocean and surrounding seas will contain remnants of winter ice that will threaten to puncture ships that choose to transit without the icebreaker assistance (Humpert and Raspotnik 2012).

For the foreseeable future, the Northwest Passage may remain too risky to serve as a reliable summer route. Although ice is thinning and diminishing throughout the Arctic, it is not doing so equally throughout the region. Due to the high volume of islands, shallow depths, and ocean circulation patterns in the Arctic, the ice is thinning at a far slower rate throughout the Canadian Arctic compared to the open ocean above Russia and Norway (Pfirman et al. 2009, 6–8).

The Allure of the Northeast Passage

The Northeast Passage has thawed far more quickly than the Norwest Passage, as the dominant wind and ocean currents in the Arctic pack the sea ice into the Canadian Arctic Archipelago and towards northern Greenland. As the summer sea extent recedes away from the Russian and Norwegian coastlines, the Northeast Passage may experience a dramatic rise in maritime traffic. The passage has been open to international shipping since 2005, though a

majority of Northeast Passage traffic only transits the sections of the Northern Sea Route along the Russian coast (Østreng et al. 2013, 435).

The Northeast Passage offers a route between major ports in Europe and Asia that is approximately 5,000 miles shorter than the southern route through the Suez Canal. The route boasts a shipping season of over four and a half months, from the beginning of July through the middle of November, with "quite easy ice conditions" throughout the transit (Northern Sea Route Information Office). Between 1979 and 2005 sea ice limited the feasibility of transit for open water vessels through the route, restricting transits to polar class vessels. Yet the probability of feasible transit in September rose to approximately 65 percent for 2006 to 2015 and is expected to rise to a 95 percent feasibility rate by midcentury (L. C. Smith and Stephenson 2013, 1192).

With the increasing demands for oil, gas, and other goods from rising world powers such as India and China, the Northeast Passage offers attractive distance savings in potentially ice free waters in the summer months. Although there is no way of knowing for certain how significant and predictable the ice loss and shipping conditions will be throughout the passage, climate models of future scenarios for the region suggest that prospects are good. For centuries the world's most economically and politically powerful nations have been those that have taken advantage of increased trade efficiencies that result in additional profits. The Northeast Passage has the potential to provide unparalleled efficiencies and profits to the nations willing to invest in and divert portions of their trade through the Arctic.

The Bering Strait as a Future Chokepoint

A potential rise in vessel traffic through Northeast Passage in the near future and through the Northwest Passage in decades beyond will produce a new chokepoint in international trade. Vessels venturing into the Arctic Ocean have few entry and exit points from the major ports

around the world. The Bering Strait, a fifty-three mile wide international strait bordered by Russia and the United States, is a natural bottleneck for international shipping in the Arctic, as it is the only waterway connecting the Arctic Ocean with the Pacific Ocean.

As resource development and shipping has increased throughout the Arctic, the Bering Strait has seen a steady rise in vessel traffic over the last decade. During the summer shipping season of 2013, forty-one vessels traversed the entire Northeast Passage, transporting a total of 1.19 million tons of cargo. An additional thirty more vessels traversed sections of the Northeast Passage, either traveling from one Russian port to another, or traveling from a Russian port to a foreign port (Humpert 2014, 5). Traffic patterns from the 2013 shipping season demonstrate favorability for eastbound transits, primarily shipping natural resources, such as oil and gas, from a Russian port to markets in Asia, which require transits through the Bering Strait (Figure 1.3).

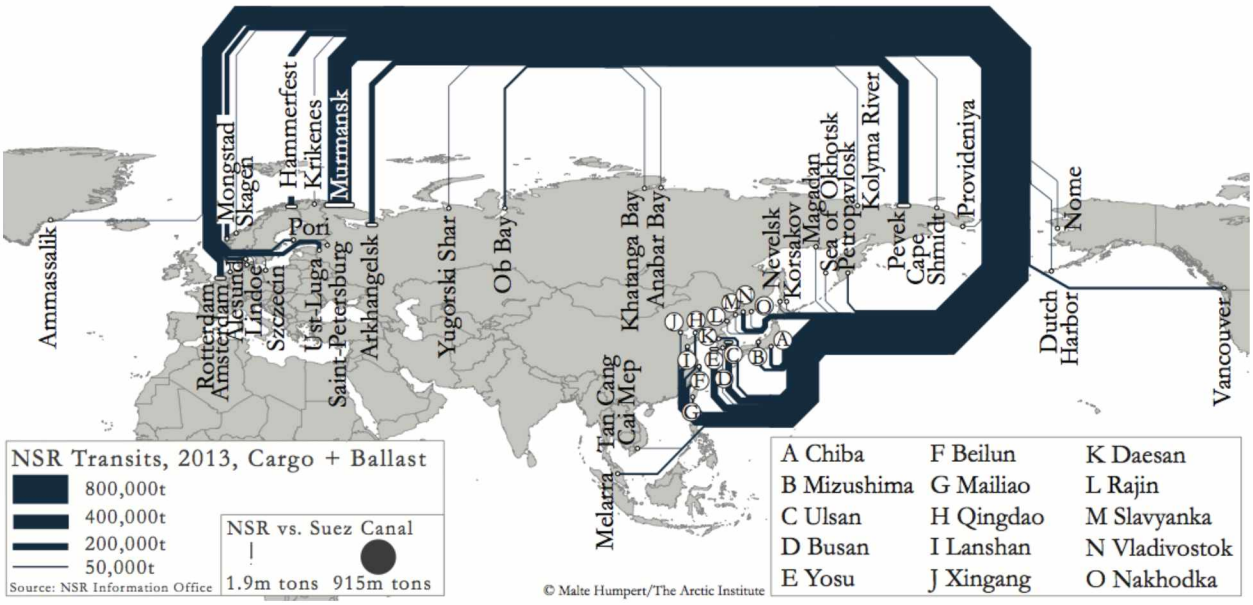


Figure 1.3. 2013 Summer Shipping Season in the Northeast Passage
Source: (Humpert 2014)

Besides entry to or exit from trans-Arctic shipping routes, the Bering Strait also experiences vessel traffic from fishing, tourism, community resupply, and both offshore and

land-based natural resource development in the Arctic. During the 2013 shipping season, 440 vessels transited through the Bering Strait, carrying a total of three million tons of cargo (Huntington et al. 2014, 120).

In contrast to the Bering Strait, 13,660 vessels transited the Panama Canal in 2013, carrying a total of 210 million tons of cargo, while 16,596 vessels transited the Suez Canal also in 2013, carrying a total of 915 million tons of cargo (Canal de Panama; Suez Canal Authority). These statistics help put the current state of the Bering Strait into perspective, as it has clearly not yet risen to the international attractiveness of the Suez or Panama Canals, mainly due to the harsh environmental conditions and lack of adequate infrastructure in the Arctic. Yet these figures allow a possible projection of what volume of traffic the strait could see during the increasingly ice free summers. Unquestionably, a more efficient and therefore more cost-effective trade route through the Arctic will bring more traffic through the Bering Strait.

International Interest in the Arctic

The accelerating effects of global warming have attracted significant international attention to the economic opportunities in the Arctic. China is currently the world's greatest exporter, with 2013 exports valued at $2.2 trillion (Chang 2014). The director-general of the Polar Research Institute of China recently informed the foreign media that anywhere from 5 to 15 percent of China's international trade, valued at $683 billion, will utilize the Northeast Passage by 2020 (Warren 2013). The value of Chinese trade suggests that the diversion of even a modest portion of exports through the Arctic would have serious implications for the Bering Strait, especially given the lack of infrastructure and regulation in the region.

Recent actions by the Chinese government also suggest that the Bering Strait will experience a rise in transits. Since 2012, China purchased its second icebreaker, successfully

petitioned to become an official observer at the Arctic Council, and has attempted to strengthen economic ties with Denmark, Norway and Iceland. China's first icebreaker, the *Snow Dragon*, has now completed five Arctic voyages, all of which included transits through the Bering Strait, and one of which was a complete round-trip of the Northeast Passage. China solidified its economic relationship with Iceland in 2013, when it signed a free-trade agreement that took effect the following year (Jolly 2013).

China is not the only rising world power to demonstrate a strong interest in the economic opportunities in the Arctic. South Korea, India, Singapore, and Japan have all gained observer status at the Arctic Council. Along with China, these four nations represent some of the world's major consumer markets, implying an interest in shorter, more efficient shipping routes through the Arctic. Rising international interest and investment in the Arctic is clear, specifically among the world's most powerful trading nations. What has yet to be proven, however, is the commercial viability of accessing alternative Arctic trade routes.

Commercial Viability of the Arctic

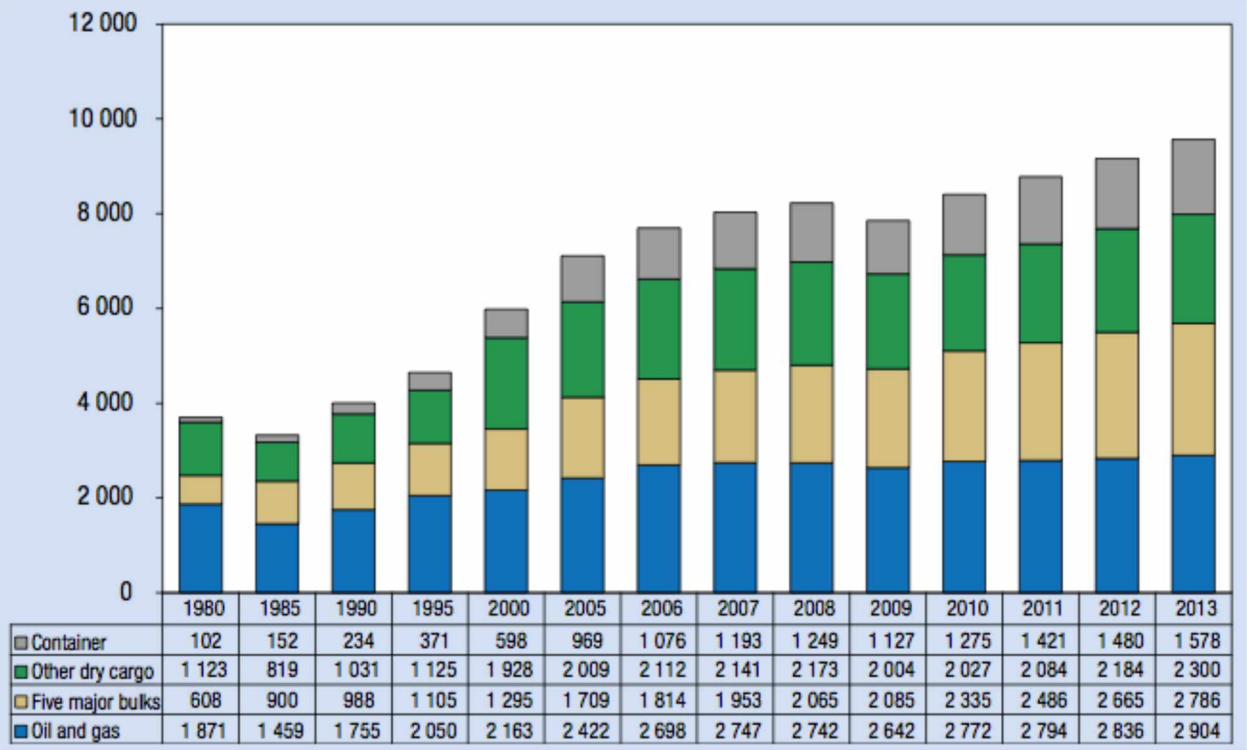
As previously noted, Arctic trade routes offer attractive distance savings of approximately 40 percent between major markets in the East and West (Østreng et al. 2013, 435). Potential distance savings attainable with Arctic shipping routes via the Bering Strait are clear, but the total cost of commercial shipping in such a harsh and remote region, compared with other more accessible routes, remains unclear.

Along with distance savings, the commercial shipping industry will take into account factors such as the cost of insurance, transit time, riskiness of routes, and the construction and upkeep costs for ice-strengthened ships (Lasserre and Pelletier 2011, 1468). The riskiness of routes is a complex measure on its own, as the Arctic Council notes in its 2009 publication, the

Arctic Marine Shipping Assessment, that much of the Arctic seafloor remains uncharted. For example, the Canadian Hydrographic Service has reported that only 10 percent of the Canadian Arctic has been surveyed to modern standards, which will present difficulties and uncertainties for maritime transport through the Canadian Arctic Archipelago (Arctic Council 2009, 158). The region also lacks navigational aids and sufficient service facilities and support systems in case of spills or emergencies.

Another restriction to Arctic shipping is the shortened shipping season. The limited number of ice-free summer months would require shippers to adopt separate winter and summer schedules. This is not only inconvenient for the shippers, but it is also difficult to arrange, as the spring thaw and winter freeze-up in the Arctic changes from year to year. The lack of intermediate markets along Arctic routes further reduces commercial potential. Along traditional routes that utilize chokepoints such as the Suez or Panama Canals there are multiple loading and offloading opportunities along the way, providing increased opportunities and efficiencies for shipping companies to profit along the way.

Despite the region's current shortcomings, rising international interest in the Arctic has spurred shipping companies to evaluate the types of cargo that would benefit the most from summer shipping through the Arctic. Understanding the types of cargo that would most likely take advantage of Arctic routes is essential to projecting what sort of vessel traffic the Bering Strait will experience in the coming decades. According to the 2013 United Nations Convention on Trade and Development's (UNCTAD) Review of Maritime Transport, a total of 9.5 billion tons of cargo traveled via seaborne trade in 2013. The review broke down the cargo into four types: containerized cargo, dry cargo, major bulk cargo (iron ore, coal, grain, alumina and phosphate rock), and oil and gas cargo (UNCTAD Secretariat 2013, 7) (Figure 1.4).



	1980	1985	1990	1995	2000	2005	2006	2007	2008	2009	2010	2011	2012	2013
Container	102	152	234	371	598	969	1 076	1 193	1 249	1 127	1 275	1 421	1 480	1 578
Other dry cargo	1 123	819	1 031	1 125	1 928	2 009	2 112	2 141	2 173	2 004	2 027	2 084	2 184	2 300
Five major bulks	608	900	988	1 105	1 295	1 709	1 814	1 953	2 065	2 085	2 335	2 486	2 665	2 786
Oil and gas	1 871	1 459	1 755	2 050	2 163	2 422	2 698	2 747	2 742	2 642	2 772	2 794	2 836	2 904

Figure 1.4. International Seaborne Trade from 1980-2013 (Millions of tons)
Source: (UNCTAD Secretariat 2013, 7)

In 2013, containerized cargo represented just over 16 percent of the total volume of seaborne trade. According to an analysis conducted on the commercial interest of Arctic shipping, containerized trade is unlikely to be diverted into the Arctic (Lasserre and Pelletier 2011, 1472). Because the container shipping industry works on a fixed schedule that relies on guaranteed on-time delivery, unpredictable weather and drifting ice could cause disastrous delays or even require some ships to return to their homeports and transfer containers to vessels traveling through the more reliable southern routes, as ice strengthened vessels are financially inefficient to operate in warmer waters (Lasserre and Pelletier 2011, 1469).

One form of trade that is not limited by a strict schedule is bulk trade. Researchers predict a sharp increase in demand for dry bulk, specifically iron ore and coal, from rising world powers such as China. Although the 2013 UNCTAD Review of Maritime Transport predicted that

shipping bulk cargo through the Arctic would be more viable than containerized cargo, shipping companies cited the persisting sea ice, the lack of port facilities and navigation aids, and the inaccuracy of nautical charts as the current limiting factors (Lasserre and Pelletier 2011, 1469). Increased investments in infrastructure and decreased thickness and extent of sea ice in the coming decades may soon open the Arctic to bulk trade.

The most widespread and arguably the most essential form of cargo transported via seaborne trade is oil and gas. In 2013, oil and gas accounted for just over 30 percent of all seaborne trade (UNCTAD Secretariat 2013, 7). The largest portion of the world's oil and gas supplies originate in the Middle East. As a large percentage of Middle Eastern oil is imported either to Europe via Bab el-Mandeb and the Suez Canal or to Asia via the Strait of Malacca, the international trade of oil and gas will not likely transform the Bering Strait into the next Suez Canal. Yet the Arctic is home to a large portion of the world's undiscovered oil and gas reserves, which undoubtedly will prompt exploration and a need for transportation routes in the region.

Oil and Gas Arctic Shipping

The U.S. Geological Survey conducted a four-year review of all the geological data available from the Arctic and published its findings in a report released in 2008. The report estimated there to be 90 billion barrels of undiscovered oil, 1,670 trillion cubic feet of natural gas and 44 billion barrels of liquefied natural gas, all deemed recoverable. Considering the region from a global perspective, the Arctic is home to at least 13 percent of the undiscovered oil, 30 percent of the undiscovered natural gas and 20 percent of the undiscovered liquefied natural gas in the world. A majority of all undiscovered resources in the Arctic is offshore, including 84 percent of oil reserves and 67 percent of the total natural gas reserves (Figure 1.5) (Bird et al. 2008, 3049:4).

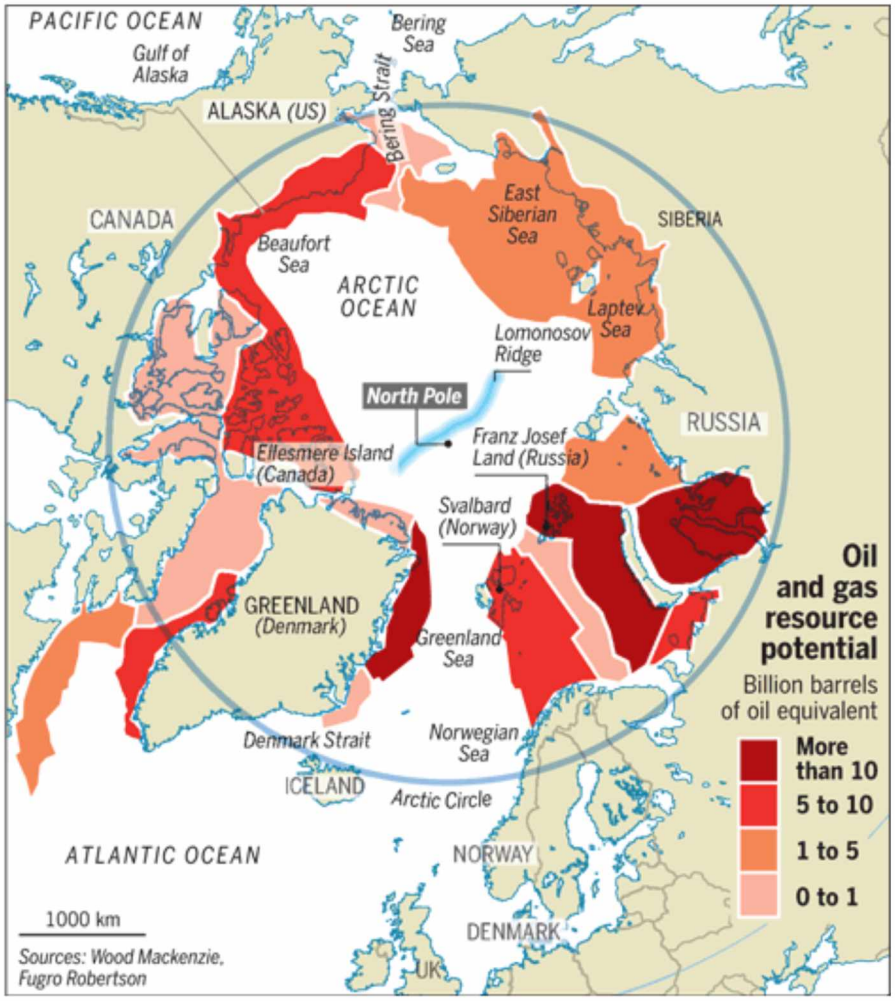


Figure 1.5. Estimated Oil and Gas Reserves in the Arctic
Source: (*Financial Times* 2007)

The high costs, perceptions of risks, and unreliable nature of navigation in the Arctic currently serve as the major deterrents to international shipping in the Arctic (Lasserre and Pelletier 2011). Despite these deterrents, both on and offshore resource development are attracting investments from the world's major oil and gas companies such as Shell, Cairn Energy, Gazprom, Rosneft, and Statoil (National Research Council 2014). Arctic oil and gas reserves are also attracting the interests from oil dependent emerging nations such as China, a nation that is expected to account for a majority of the global oil demand growth over the next five years.

Because of these offshore economic opportunities, destinational shipping related to natural resource exploration and extraction is certain to increase in the Arctic. Mining and both on and offshore oil and gas drilling are already profitable industries in the Arctic, with even more profit to be gained from untapped reserves throughout the region. The declining ice cover, the continued instability in the Middle East, and the rise in interest and investment from emerging nations such as China and India all suggest that the transportation of oil and gas from the Arctic will result in an increase in maritime traffic through the Bering Strait.

Discussion

Currently over 90 percent of all world trade is transported on oceans or waterways (International Chamber of Shipping 2013b). As the world's population continues to grow, the International Chamber of Shipping (ICS), the principal international trade association for the shipping industry, predicts that emerging economies will create more demand for safe and efficient transportation of goods and raw materials. Because shipping is the most fuel-efficient form of commercial transport, the percentage of seaborne trade will continue to grow. The trend between tons of cargo transported, world GDP, and world population is clear: as world population and GDP rise, so too does world seaborne trade (Figure 1.6).

Figure 1.6. Predicted Increases in World Seaborne Trade, GDP and Population
Source: (International Chamber of Shipping 2013a)

The expansion of the international trade industry will put further strain on the world's current trade chokepoints, such as the Suez Canal, the Panama Canal, and the Strait of Malacca. With the rising cost of fuel, the continuing threat of piracy, and the growing demand for goods worldwide, the shipping industry will seek shorter and safer trade routes to avoid congestion and to save time and costs on transits.

The initial drive for the safest and most efficient transportation of goods in ancient societies transformed trade from a largely land based activity to one that utilized the surrounding rivers and seas. Vasco da Gama's discovery of an all-sea trade route from Europe to Asia in 1498 resulted in a far more efficient method of international trade, allowing for safer and more cost-effective exchanges between nations. Previously, goods traveled from Europe to Asia through both the Mediterranean Sea and Indian Ocean, while also requiring sections of land-based transits. This mix of land and water-based trade involved many exchanges along the way, with transfer costs incurred at each exchange. The all-sea trade route allowed European merchants to eliminate middlemen who charged fees for every exchange that occurred along the route (Hugill 1993, 109). In some of these exchanges, the goods would be stolen or the merchants would be robbed of their forms of payment.

Although today just 10 percent of world trade is land-based, which minimizes transfer costs, piracy along the coasts of major shipping routes threatens the safety of maritime trade while also costing the global economy billions of dollars each year (The World Bank 2013, 5). Trade between Asia and Europe diverted through the Arctic would pass through the Bering Strait between the U.S. and Russia and continue along the Russian and Norwegian coasts before arriving at European ports. Although Russia lacks consistent economic and political stability, its

dedication to becoming a world power, its investment in Arctic offshore resources, its military presence, and its economic interest in attracting traffic to the Northeast Passage all suggest that its Arctic waters will remain free of conflict.

Along with shorter routes and safer access to shipping lanes, as well as the interest in extracting oil and gas resources from the Arctic, recent advancements and investments in shipping technologies also demonstrate the likelihood of an increase in Arctic shipping. Just as England and Holland did in the sixteenth century, nations around the world today are investing in more advanced shipping technologies. Within the sphere of Arctic shipping, these technological advancements take the form of stronger and sturdier icebreakers.

Russia has been proactive in preparing for Arctic shipping and offshore natural resource development by investing in three new nuclear powered icebreakers to add to its current fleet. The first of the three new icebreakers is due to be completed by 2017. In total, Russia estimates the construction cost for the new fleet to be around $3.7 billion, strong evidence of Russia's commitment to the growth of maritime trade and resource development in the Arctic (World Nuclear News 2014).

Interest in Arctic issues within Japan and South Korea, along with a professed commitment to Arctic shipping from China, suggests that Arctic waters will experience a rise in vessel traffic in the coming years. The rising demand for oil and gas from emerging nations such as India and China also demonstrates that shorter and safer transoceanic trade routes are in high demand. As global warming continues to open the region up to shipping and offshore resource development, interest in Arctic shipping routes will continue to rise. Further improvement of icebreaking technologies, better cartographic information and the development of more support plans and facilities along Arctic shipping routes will increase safety in navigation. As shorter

trans-Arctic trade routes such as the Northeast Passage and Northwest Passage become safer to navigate, the Bering Strait will experience a steady rise in traffic. Historically, narrow channels that provide geostrategic access to the shortest transoceanic trade routes have emerged as chokepoints. As sea ice becomes thinner and sparser throughout the Arctic, the Bering Strait will become the next chokepoint in international trade.

Conclusion

Trade has initiated and sustained relationships among societies for thousands of years. Although ancient trade did not occur on the scale or with the complexity that it does today, the general patterns of trade remain the same. Waterborne trade first flourished along rivers such as the Nile, with trade networks quickly expanding into the Mediterranean Sea. Empires that dominated sea trade in the Mediterranean also had the farthest-reaching political and cultural influence in the region. For thousands of years the Mediterranean was host to a growing international trade network. The exchange of both goods and ideas during this era allowed for significant intellectual and technological advancements.

Maritime trade continues to be the most widespread and efficient form of exchange among nations, while also continuing to connect societies and spread ideas worldwide. Today the global trade network relies on access to only a handful of chokepoints that provide the shortest routes between production and consumption points. Yet the cost of piracy and rising demand for goods demonstrate that more efficient routes will offer economic advantages to those with the technological and geographic ability to access them.

The accelerating effects of global warming in the Arctic reveal shorter trade routes between the East and West. The drive for economic development and prosperity will motivate further investment in icebreaking technologies that will enhance the appeal of Arctic shipping

routes. As both Arctic and non-Arctic nations continue to invest in icebreaking technologies, and as Arctic states pursue oil and gas resources in the region, vessel traffic throughout the Arctic will increase. The Bering Strait likely will never experience the volume of cargo or frequency of transits that the Suez or Panama Canals experience, but it will no doubt experience a steady rise in vessel traffic.

The rise in the number of ships traveling through the Bering Strait, whether for trans-Arctic or destinational shipping, will not only affect the waterway but also the coastal communities and commercial fisheries that depend on a healthy marine ecosystem. Although the Arctic is decades away from consistently ice-free summers, suggesting that the Arctic Ocean and Bering Strait are decades away from a significant rise in maritime traffic, the immense value that the region provides to its coastal communities and commercial fisheries warrants a proactive approach to vessel traffic regulation.

Chapter Two: Assessing present values in the Bering Sea and past regulatory trends worldwide to make the case for proactive regulation in the Bering Strait

Introduction

The Bering Sea's marine resources have sustained human settlements for thousands of years. Humans first inhabited the region approximately 15,000 years ago, when the first stage of migrations occurred across the Bering Land Bridge from Eurasia to North America (Hoffecker, Powers, and Goebel 1993, 47). During their migrations, hunter-gatherer communities lived off the resources of the land and sea. Following waves of migrations and topographical changes in the region, communities established permanent settlements along both the Siberian and Alaskan coasts of the Bering Sea approximately 1,000 years ago (Raghavan et al. 2014). Since then, coastal communities have made their livelihoods off the plentiful resources offered up by the sea, including fish, marine mammals, and seabirds. Today the region also supports a highly productive and valuable commercial fishing industry, providing thousands of jobs, millions of dollars in state tax revenues and labor income, and a large percentage of the nation's commercially harvested fish.

As global warming opens the region up to increased industrial activities, including offshore resource extraction and increased shipping, the health of both commercial fisheries and coastal communities is at risk. While vessel traffic through the Bering Sea increases, the likelihood of an accident at sea also rises. Because the Bering Strait is a strait used for international navigation, all transiting vessels have the freedom of unimpeded transits unless coastal states agree upon additional international regulations (UN General Assembly 1982, Art. 37). Currently there are no speed limits, traffic separation schemes, or areas to be avoided nor is there any search and rescue plan in place or Coast Guard facility in the Bering Sea. Unregulated

vessel traffic through the Bering Strait has the potential to cause constant distress to migrating marine mammals while also posing a major threat to commercial fisheries through a series of smaller contaminations or through a potentially disastrous oil spill.

In order to assess potential risks and propose appropriate regulations for Bering Strait vessel traffic, this chapter will examine the various stages of commercial exploitation in the region and their resulting regulations. Marine mammal harvesting dominated commercial endeavors in the Bering Sea beginning in the mid-eighteenth century. National jurisdictions over marine areas had not yet been allocated, which ultimately resulted in overharvesting of marine mammals. Despite the obvious differences between marine mammal harvesting in the eighteenth, nineteenth, and early twentieth centuries and shipping in the twenty-first century, both activities share one defining trait: being outside of the bounds of national regulation.

Prior to the delineation of territorial waters by the United Nations Convention on the Law of the Sea (UNCLOS) in 1982, marine mammals were common property resources. Even after the establishment of UNCLOS, certain marine areas remained beyond the limits of national regulation. Commercial fisheries in the Bering Sea are now regulated by states, though one area in particular in the Bering Sea that lies outside of the 200-mile limit of either Russian or American territorial waters is known as the donut hole (Figure 2.1). Owing to the lack of national regulation, commercial fishing activities nearly destroyed the donut hole's population of pollock in the late 1980s, finally forcing nations to declare an international moratorium on fishing in the region (Wespestad 1993, 18).

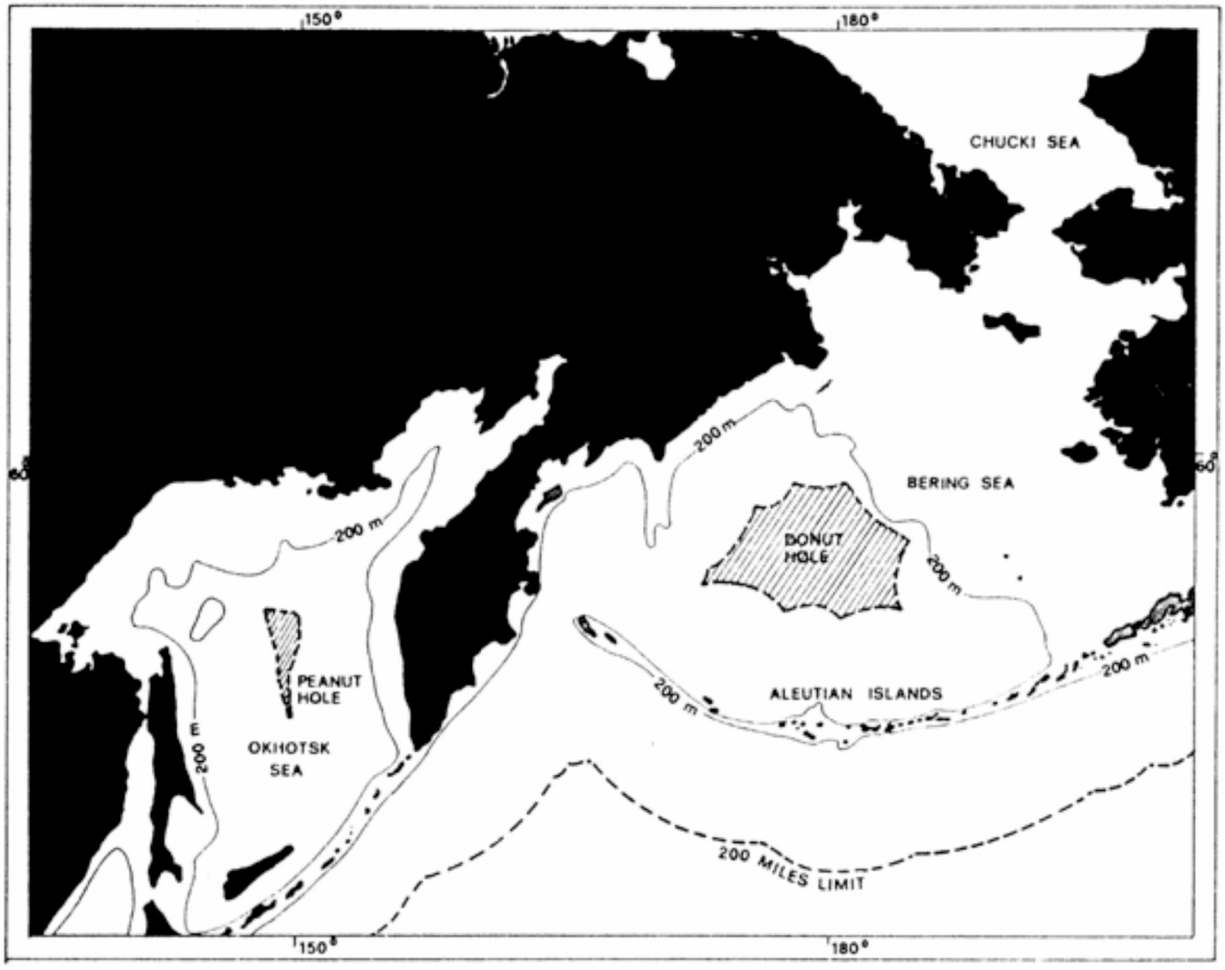


Figure 2.1. International Waters, known as the Donut Hole, in the Bering Sea
Source: (FAO Fisheries Department 1994, sec. 3.1)

Every stage of commercial exploitation in the Bering Sea that preceded UNCLOS resulted in a dramatic decline of at least one of the harvested species. Harvesting activities in the eighteenth and nineteenth centuries severely reduced the Bering Sea fur seal and sea otter stocks (Mirovitskaya, Clark, and Purver 1993, 24). The demand for whale oil and baleen in the nineteenth and twentieth centuries decimated the region's population of bowhead whales and Pacific walruses, causing famines in the most walrus-dependent coastal communities (Bockstoce and Burns 1993, 574).

Although a series of regulations followed the severe reductions in marine mammal stocks during the eighteenth, nineteenth, and twentieth centuries, the trend of reactionary regulation has proven harmful to the health of the marine environment and the coastal communities in the Bering Sea. Certain species have yet to recover from these periods of commercial exploitation. Today, a healthy marine ecosystem in the Bering Sea is not only vital to the well-being of coastal communities, but it is essential in supporting commercial fisheries. The Bering Sea fisheries contribute a significant value to the local and state economies through wages and tax revenue, while more than one third of all commercially harvested fish in the U.S. comes from the Bering Sea, contributing to the national and international annual total global yield of fish (McDowell Group Inc. 2013).

This chapter will begin with an ecological overview of the Bering Sea, emphasizing the diverse marine wildlife, productive marine ecosystem, and unique relationship between the coastal communities and the marine environment. Following a synopsis of human migrations and subsequent permanent settlements, this chapter will examine the Bering Sea's current value to its coastal communities and commercial fisheries. Evidence will demonstrate that, as shipping through the Bering Strait promises to be part of the next stage of commercialization in the Bering Sea, the lack of regulation poses a real threat to the health and stability of the marine ecosystem.

A review of the previous stages of commercial endeavors and an analysis of resulting regulations will illustrate that regulations in the Bering Sea have usually followed species depletions or an environmental disaster. Outside of the Bering Sea, stricter shipping regulations have also been reactionary, most commonly following a major oil spill. The trend of reactionary regulation leaves the marine ecosystem and the people and industries that rely on its health susceptible to calamity. A proactive approach to shipping through the Bering Strait, through the

implementation of vessel traffic regulations, would ensure the food security of coastal communities and the productivity of commercial fisheries in the Bering Sea.

The Bering Sea Ecosystem

The Bering Sea (Figure 2.2) is a sub-Arctic semi-enclosed sea between the Pacific and Arctic Oceans. The region covers nearly 900,000 square miles, consisting of a deep basin in the southwest and a continental shelf to the east and north. The Russian regions of Chukotka and Kamchatka border the Bering Sea to the west, while mainland Alaska borders the sea to the east and the Aleutian Islands to the south. The Bering Strait, the 53-mile wide passage that connects the Bering Sea to the Arctic Ocean, acts as the sea's northern boundary (Committee on the Bering Sea Ecosystem 1996, sec. 28).

Figure 2.2. Map of the Bering Strait Region
Source: (Huntington et al. 2014, 120)

The Bering Sea is a highly productive ecosystem rich in biodiversity, boasting more than 450 species of fish, crustaceans, and mollusks, over 50 species of seabirds, and at least 25 species of marine mammals (Committee on the Bering Sea Ecosystem 1996, 7). The biological and ecological abundance in the Bering Sea has been the focus of countless conservation studies worldwide. In an attempt to stimulate a global strategy to conserve biodiversity, the Worldwide Wildlife Foundation initiated a project to identify all of the "areas that contain exceptional concentrations of species and endemics," (Olson and Dinerstein 2002, 199). Biologists and conservationists analyzed global patterns of biodiversity to establish a list of terrestrial, fresh water, and marine ecoregions around the world. Of the marine ecosystems identified as priority ecoregions owing to their unique species, communities, and ecological phenomena, the Bering, Beaufort, and Chukchi Seas and the Barents-Kara Seas ecoregions were recognized as "arguably the two most diverse and productive Arctic marine ecosystems" (Olson and Dinerstein 2002, 217).

Historical Value

Land Bridge Migrations, First Settlements, and Subsistence Trends

Owing to their ecological abundance, the marine ecosystems in the Bering Sea and the adjoining seas to the north have supported Alaska and Chukotka Native communities along the coastline through harsh winters and unpredictable summers for thousands of years. Hunter-gatherer communities formed throughout the Eurasian Arctic as early as 40,000 to 28,000 years ago. During this time, a 1,000-mile wide land bridge linked Eurasia and North America. A portion of the communities that followed food sources east into Siberia eventually migrated across the Bering land bridge to North America. Although it is still disputed amongst scholars,

the dominant theory suggests multiple migrations into Alaska occurred between 14,000 and 12,000 BCE (Hoffecker, Powers, and Goebel 1993).

Periods of glaciation and subsequent sea level rises forced the region's first inhabitants to migrate south to more hospitable climes. Approximately 1,000 years ago, Natives from the Siberian coast crossed the Bering Strait and established the first permanent settlements along the Alaskan coast of the Bering Sea (Raghavan et al. 2014). The yearly migration of marine mammals and seabirds has provided the coastal communities along both sides of the Bering Strait with unparalleled access to subsistence resources (Arctic Council 2009, 106). The oldest native settlements along the Siberian coast of the strait, such as Uelen on Cape Dezhnev, were strategically located in areas that provided the best access to migrating marine mammals such as Pacific walruses and bowhead whales (Krupnik and Bogoslovskaya 1999, 17).

Additional archeological evidence of hunting camps and migration routes along both coasts reveals the central role that marine mammals played in the settlement of coastal communities. Archeologists have uncovered pit houses used by prehistoric peoples to store the heads and bones of grey, bowhead and beluga whales, as well as those of walruses, polar bears, reindeer and mountain sheep (International Park Organization 1989, 13). The region remains a focal point for archeologists from around the world looking to uncover and preserve prehistoric artifacts from some of the first human settlements along the coast of the Bering Sea. The strategic location of the first permanent settlements and the physical evidence of marine mammal harvesting substantiates the vital role that marine mammals played and continue to play in the health of the Bering Sea coastal communities (Krupnik and Bogoslovskaya 1999, 17).

Current Value

Despite the influx of modern technologies and decreasing need to rely on the natural world for survival, coastal communities continue to exist largely due to the preservation of their subsistence lifestyles. Along with ensuring the food security of coastal communities, the Bering Sea also plays a vital role in the regional, state, and national economies through the highly productive commercial fisheries.

Subsistence Habits and Food Security in Coastal Communities

Currently over 10,000 people inhabit the shores of the Bering Strait in Siberian and Central Yupik, Chukchi and Inupiat communities (Arctic Council 2009, 106). While most communities take advantage of supplemental resources from the land and rivers, many of the region's Natives still depend heavily on marine-based resources. The subsistence diet of coastal communities along the Bering Sea generally consists of a combination of fish, shellfish, seabirds, marine mammals, and plants. Kawerak, the Native non-profit corporation from the Bering Strait region, completed a study in 2009 on the subsistence habits of twelve native communities along the Alaskan coast of the strait. The report, titled "A Comprehensive Subsistence Use Study of the Bering Strait Region," found that over 85 percent of all resources harvested were marine-based, with the two communities on St. Lawrence Island harvesting more than 95 percent marine-based subsistence resources (Ahmasuk and Trigg 2007).

As previously mentioned, communities along both sides of the coast historically settled in areas along the shoreline that provided the best access to migrating marine mammals (Krupnik and Bogoslovskaya 1999, 17). Specific features of settlement sites along the Bering Strait included their close proximity to active spring and winter polynyas, areas of open water surrounded by pack ice. Coastal polynyas form in areas where strong winter winds from the

shore force the existing ice pack away from the coast. Prominent coastal polynyas form along both the Siberian and Alaskan coasts of the Bering Sea, as well as along St. Lawrence Island. Human settlements along the Bering Strait have ensured their food security for thousands of years owing to their proximity to sea ice and migration routes (Krupnik and Bogoslovskaya 1999, 17). However, recent warming ocean and air temperatures threaten local access to strategic harvesting areas.

Subsistence Species Threatened by Global Warming

NOAA has considered the Bering Sea populations of bearded and ringed seals as threatened under the Endangered Species Act since 2012, due in part to the decline in snow and sea ice cover. Ringed seals are extremely dependent on stable sea ice and sufficient snow cover, as the species breed on sea ice and builds lairs with snow pack to hide from predators and keep their young warm. Insufficient autumn snow pack on the ice or warm spring temperatures can result in reproductive failure for ringed seals (Kovacs et al. 2011, 185). NOAA projects continuing decline in both ringed and bearded seal populations in the Bering Sea, possibly at an increasing rate in the future due to the effects of global warming.

Recent trends of earlier retreating sea ice are also depressing the survival rates of Pacific walrus. Pacific walrus populations in the Bering Sea depend on sea ice extent, as walruses use sea ice for breeding and calving grounds. In the spring, adult females and their young follow retreating sea ice into the Chukchi Sea while adult males spend summers along the coastal areas of the Bering Sea. The females and their young then follow the developing sea ice down into the Bering Sea during autumn where they join the males for the winter (Jay, Marcot, and Douglas 2011, 1066–1067). Reports of abandoned calves out at sea have followed the springtime retreat of sea ice farther north away from the shallower shelf areas. Females and their young are

spending more time on shore, especially during periods of extraordinarily low ice cover (U.S. Fish and Wildlife Service 2015).

The sea ice minimum in 2007 was the lowest recorded since NASA satellites began documenting Arctic ice extent in 1978. Also in 2007, scientists first witnessed large congregations of walruses hauled out onshore. Historically, walruses rested on sea ice in between time spent feeding on the seafloor. In recent years, the thinner and sparser sea ice has forced larger numbers of walruses instead to haul out onto nearby beaches. In 2009, a subsequent record low sea ice extent, 3,000 walruses hauled out. Although annual sea ice minimum of 2014 was only the sixth lowest on record, NOAA biologists witnessed approximately 35,000 walrus haul outs along Alaska's northwest coast (Qiu 2014). Human or predator induced disturbances during haul outs cause massive stampedes, resulting in the deaths of hundreds or thousands of walruses. Due to their small size compared to adult walruses, calves are particularly at risk of being trampled to death during these incidents (Jay, Marcot, and Douglas 2011, 1067).

Bowhead and beluga whales are not as directly vulnerable to sea ice changes as seals and walrus are. Their breeding and feeding grounds do not depend on sea ice, though both species use sea ice cover as protection against predators such as the killer whale. Bowhead whales spend their winters in coastal polynyas but generally feed out in the open waters, especially in late summer and autumn. Beluga whales' food sources, such as shrimp and capelin, leave them more directly vulnerable to sea ice changes than bowheads, as their prey are more commonly ice-associated (living near sea ice or feeding off nutrients from sea ice) (Kovacs et al. 2011, 186).

NOAA Fisheries estimated that the population of bowhead whales in the Bering-Chukchi-Beaufort Seas was as high as 23,000 before commercial harvesting in the early twentieth century. As previously noted, whaling nearly depleted the bowhead population. Today

NOAA Fisheries estimates the size of the stock to be between 6,400 and 9,200, with an annual growth of 3.2 percent (NOAA Fisheries 2013a). Despite this slow recovery, the ESA lists the global population of bowhead whales as endangered.

NOAA Fisheries considers the population of beluga whales in the Bering Sea healthy, though evidence from Cook Inlet suggests that an increase in human activity can severely affect the species' survival rate. In the late 1970s, the National Marine Fisheries Service (NMFS) estimated the Cook Inlet beluga stock to be around 1,300 while the current estimate is 325. NOAA Fisheries cites oil and gas production in Cook Inlet as a major cause for the decline and lists current threats as shipping, oil and gas production and transport, noise, direct and indirect effects from commercial fishing, and pollution (NOAA Fisheries 2013a).

Unlike beluga and bowhead whales, gray whales are strictly benthic feeders, foraging on sediment and amphipods from the sea floor in shallow coastal areas. They migrate much farther than bowhead and beluga whales, breeding and calving as far south as coastal Mexico in the winter. During the summer months, the Eastern Pacific population of gray whales migrates over 5,000 miles along the coast of North America, eventually into the Northern Bering Sea (NOAA Fisheries 2013a). In recent decades, the primary feeding grounds of gray whales have shifted farther north into the Chukchi and Beaufort Seas (Grebmeier et al. 2006, 1462). The number of gray whale sightings off the northern coast of Alaska during summer and fall has increased since the mid 1990s, owing to warming ocean temperatures and receding sea ice. During the 2003-04 winter, acoustic recorders off the coast of Barrow confirmed that some gray whales were wintering in Arctic waters (Stafford et al. 2007, 167).

Introduction of Cash Economies and Store-Bought Foods

The effects of global warming threaten to limit access to migrating marine mammals, therefore altering the subsistence culture that has ensured the food security of coastal communities for thousands of years. As villages evolve into more mixed economies with the introduction of wage earning opportunities, native traditions are evolving throughout the Arctic. Cash incomes and other aspects of western culture encourage the purchasing of store-bought foods, which are often less nutrient rich and not as culturally appropriate as subsistence food (Poppel 2006). Because suppliers cannot always guarantee the shipment of fresh foods due to unpredictable weather in the region, families fill their cupboards with processed and packaged foods that have the longest shelf life. Although this may provide communities with minimal food security, commercially available foods packed with preservatives and excess fats and sugars are compromising the health of native communities throughout Alaska (Reed 1995, 158–159).

Owing to a combination of factors, Alaska Natives are experiencing steep declines in physical and psychological health, with near-epidemic rates observed and projected for Type II diabetes, obesity, coronary heart disease, and cancer, along with depression, substance abuse, alcoholism, and violence (Loring and Gerlach 2009, 467). In a study conducted on dietary needs in western Alaska, participants who consumed the highest amount of subsistence foods had significantly higher levels of vitamin A, vitamin D, vitamin E, Iron, and omega-3 fatty acids, compared to participants who consumed the highest amount of store-bought foods (Bersamin et al. 2007, 66). Fish and marine mammals, which are the major food sources for Bering Sea coastal communities, are especially rich in omega-3 fatty acids and selenium, both of which are associated with reduced rates of prostate cancer and improved glucose tolerance (Dewailly et al. 2003, 972).

An increased reliance on store-bought foods also creates economic insecurities in communities that are shifting away from a traditional diet, as prices of fresh foods are generally very high. Food costs in urban Alaska are 25 percent higher than the national average, while the cost of food in rural Alaska is, on average, two to three times higher than in urban Alaska (Loring and Gerlach 2009, 468). Protecting the subsistence resources that coastal communities along the Bering Sea have traditional relied on is vital to ensuring both food and economic security for these communities. A diet consisting mostly of subsistence foods such as whale, seal, or walrus meat, local plants, and additional protein from seabirds and fish is economically, culturally, and physically advantageous for coastal communities.

Bering Sea Fishery

Along with supporting the subsistence diets of thousands of the region's natives, the Bering Sea also contributes to the health of local, state, national, and international economies. Due to the region's ecological abundance, the continental shelf of the Bering Sea hosts one of the largest and most productive fisheries in the world. In the 1970s, the Bering Sea produced a quarter of the total global yield of fish (Vilhjálmsson and Håkon-Hoel 2004, 746). In 2011, the North Pacific fishery produced more than 21 million tons of fish, accounting for approximately 26 percent of the total global yield of fish (Food and Agriculture Organization 2014, 11). The latest data available for the fisheries industry in Russia indicates that in 2012 the Russian Far East fishery, which includes the Okhotsk Sea, the Bering Sea and the East Kamchatka zone, accounted for 68.5 percent of total fishery production for Russia ("USDA GAIN: Russia Fish and Seafood Production and Trade Update" 2013) (Figure 2.3).

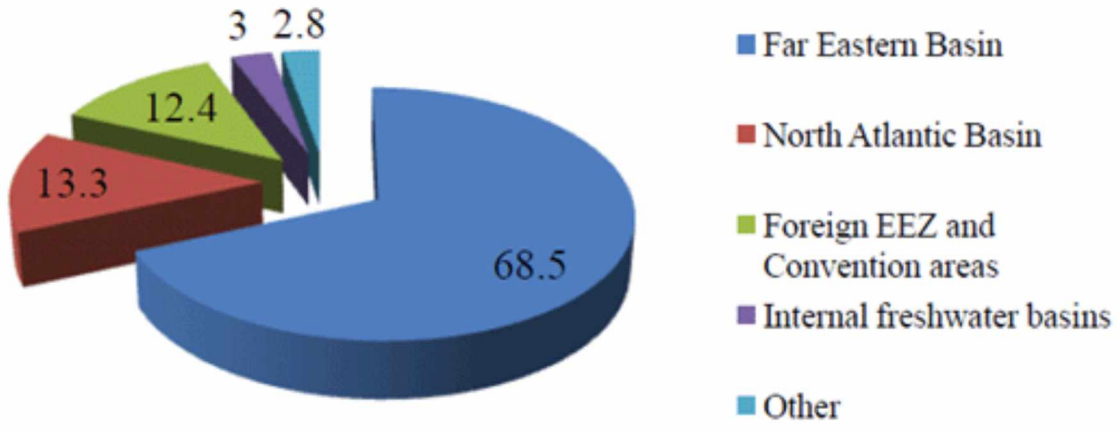


Figure 2.3. Russian Catch by Basin in 2012
Source: ("USDA GAIN: Russia Fish and Seafood Production and Trade Update" 2013)

Within American waters, the Bering Sea and Aleutian Islands fisheries account for 40 percent of the total national commercial fish production. The wholesale value of all fish caught throughout the Bering Sea and Aleutian Islands fisheries in U.S. waters in 2011 was estimated to be around $2.4 billion, with pollock catches accounting for over half of the region's value (Figure 2.4).

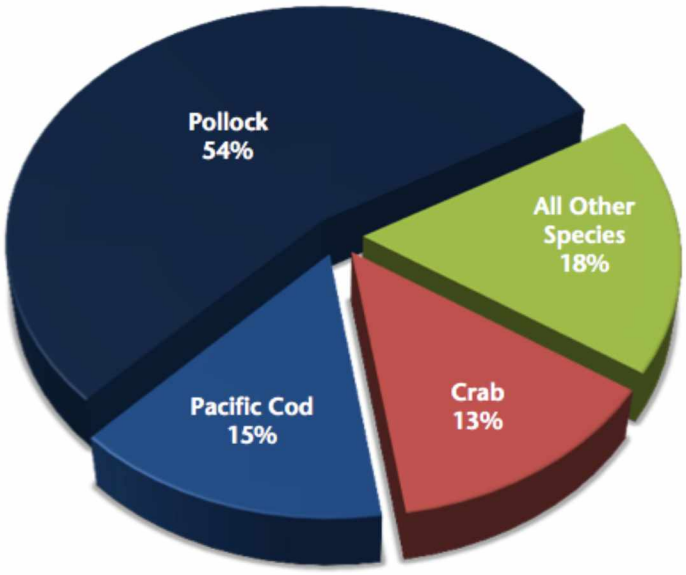


Figure 2.4. 2011 Wholesale Value of Fish, by species, in the Bering Sea Aleutian Island Fishery
Source: (McDowell Group Inc. 2013, 43)

The economic benefits of the Bering Sea and Aleutian Islands fishery are even more significant at the state and local level. The fishery accounts for 73 percent of Alaska's commercial seafood harvest and 37 percent of the Alaska's commercial fishing industry employment. In 2011, the Bering Sea and Aleutian Islands fishery employed 15,160 workers, generating $774 million in labor income. Although non-residents make up a majority of the workforce in every Alaskan fishery, the Bering Sea fishery employed an estimated 2,500 regional residents who earned $125 million in labor income in 2011 (McDowell Group Inc. 2013, 40–41). Considering that the region is home to only about 9,000 Alaskan residents, the seafood industry in the Bering Sea plays a significant role in the local economies. Not only are regional residents dependent on cash income from fishing and processing jobs, but residents, both Alaska Native and non-Native, also rely on subsistence seafood for a large portion of their diets (McDowell Group Inc. 2013, 42).

The Bering Sea has contributed significantly to the diets of coastal communities, to state and local economies, to national seafood industries, and the total global yield of fish due to the region's ecological abundance and remote location. Until now, the Bering Sea has experienced a low volume of ship traffic, leaving waters uncongested with low risk of collisions or spills. Yet, with vessel traffic through the Bering Strait rising, the chances of an accident at sea will undoubtedly increase. An examination of the previous periods of commercial exploitation in the Bering Sea, beginning in the eighteenth century, reveals how the region may develop in the future under changing ecological conditions. The regulations that resulted from these periods of exploitation suggest that a proactive rather than reactive approach will better safeguard the subsistence resources and commercial fisheries in the Bering Sea.

History of Commercial Endeavors in the Bering Sea

Eighteenth and Nineteenth Centuries: Marine Mammal Harvesting

The abundance of marine mammals such as seals, walruses, and whales in the Bering Sea became the focus of commercial endeavors beginning in the late eighteenth century. The Great Northern Expedition, organized by Russia, captained by Danish explorer Vitus Bering, and spanning between 1733 and 1743, sought to map and explore the Russian Arctic coast and potentially reach the western coast of North America. Surviving members of the expedition brought back a wealth of information on the region's topography, flora, fauna, minerals and peoples, but perhaps the most important resources they discovered were the fur seals and sea otters (Naske and Slotnick 2011, 49). A voyage spurred by the Great Northern Expedition returned to Russia in 1746 with 1,600 sea otter and 2,000 fur seal pelts.

The original expedition and those that followed soon thereafter demonstrated the great potential profit that existed in the North Pacific and Bering Sea. The pelt of a fur seal contains over 350,000 hairs per square inch, while the sea otter pelt provides even more warmth. The unparalleled luxury of fur seal and sea otter pelts encouraged Russian merchants to complete over one hundred fur-hunting expeditions during the second half of the eighteenth century, harvestings more than 187,000 pelts (Naske and Slotnick 2011, 51). The frequency and intensity of sea otter and fur seal harvests during this time forced expeditions to travel farther east to previously unexplored islands, leading to new geographical discoveries. Between 1786 and 1787, the navigator Gavril L. Pribylov discovered and named what would soon become two of the most profitable islands in the Russian fur trade, Saint George and Saint Paul islands, collectively known as the Pribilof Islands. The Pribilofs are home to the world's largest rookery of fur seals, accounting for approximately half of the world's fur seal population (Melin et al. 2012, 4).

By the early nineteenth century, the Russian fur trade began to decline due to overharvesting. Declining profits from the fur trade combined with the distance from the mother country, financial strains on the Russian economy from events such as the Crimean War, and other challenges convinced Russia to sell the territory of Alaska, including the Pribilof Islands, to the U.S. in 1867 (Naske and Slotnick 2011, 87). Intense harvesting continued throughout the Bering Sea following the sale, with more than 1,900,000 seals harvested from the Pribilof Islands between 1870 and 1890, depleting the Pribilof fur seal herd population by an estimated 80 percent (Mirovitskaya, Clark, and Purver 1993, 24).

Harvesting took place outside of American waters as well, with Japanese, Russian, British and American schooners all harvesting both in their territorial waters and in open water. By the late nineteenth century, seal harvesting in open water, known as pelagic sealing, had devastated the entire North Pacific population of fur seals. Russia, Japan, the U.S. and Great Britain all attempted to impose regulations on pelagic sealing, including a bilateral agreement in 1891 between the U.S. and Great Britain to temporarily prohibit pelagic sealing, though individual regulations proved powerless without an international management strategy in place. Eventually, Japan, Russia, Great Britain, and the U.S. signed the North Pacific Fur Seal Treaty in 1911, after the entire region's population of fur seals had been decimated to an estimated 125,000 (Melin et al. 2012, 4).

Fur seal and sea otters were not the only marine mammals that motivated concentrated commercial harvesting in the Bering Sea. The high demand for whale oil drew American and British commercial whalers into the North Pacific and Bering Sea beginning in 1845, putting an additional strain on the marine ecosystem. The bowhead whale harvest surged during the second half of the nineteenth century, when commercial whalers harvested an estimated 20,000 bowhead

whales (Bockstoce and Burns 1993, 566). From 1848 to 1914, commercial whaling in the Bering Sea reduced the population of bowhead whales from 23,000 to an estimated 3,000, nearly decimating the stock (Bockstoce and Burns 1993, 574).

Although commercial whaling took place over several decades, whalers harvested one-third of their total kills by 1852 and one-half by 1864 (Bockstoce and Burns 1993, 574). Similar to the fur seal and sea otter harvesting, the rate at which commercial whalers were harvesting was unsustainable. The rapid reduction in whale populations in the Bering Sea, along with the collapse of the whale oil and baleen market, slowed commercial whaling to a near halt in 1914 (Gambell 1993, 102). Whaling continued elsewhere around the world, with some of the highest rates of harvesting in the international waters surrounding Antarctica. The decline of whale populations worldwide spurred many attempts at management strategies to regulate commercial whaling.

In 1937, fifteen nations, including the U.S. and Russia, signed the International Agreement for the Regulation of Whaling, which provided protection to the depleted stocks of right and gray whales. It also set a minimum size limit for blue, fin, humpback and sperm whales and banned the harvest of female whales accompanied by calves. The agreement also declared large portions of the ocean north of 40° off-limits to whaling, though the North Pacific remained open to commercial whaling as a concession to Japan (Gambell 1993, 98). Signatory nations applied further limitations to whaling in the years that followed, culminating in 1946 with the establishment of the International Whaling Commission (IWC). Signatories afforded the IWC the power to completely protect threatened species, designate specified areas as whale sanctuaries, set total allowable catches each season, and continue to set minimum size limits and restrict the capture of females accompanied by calves.

In 1982, the IWC declared a whaling moratorium on all commercial whaling activities. Russia and Japan opposed the moratorium, while Norway and Iceland also opposed the moratorium and each year issue their own quotas. Despite the opposition, the IWC has finally committed to a proactive whaling regulation. Along with adopting the moratorium and coordinating scientific research, the IWC plays a vital role in setting quotas for subsistence whaling each season. The bowhead whale population in the Bering Sea is far from recovered following the decades of commercial harvesting, but the population is now slowly increasing (NOAA Fisheries 2013a).

The final stage of commercial marine mammal harvesting in the Bering Sea began in response to the steep decline in bowhead whales, when whalers began harvesting Pacific walrus and gray whales to compensate for declining profits from bowhead harvests. Between 1848 and 1914, commercial whalers killed an estimated 220,000 walruses, though due to the inefficiency of the hunts, only harvested 140,000 (Bockstoce and Botkin 1982, 148–149). The depletion of the Bering Sea walrus population resulted in famines in 1878-1879 and 1890-1891 in the most walrus-dependent communities such as those on St. Lawrence Island (Bockstoce and Burns 1993, 575). The U.S. eventually reacted to the decline in walrus populations by banning commercial walrus harvesting in 1941. The passage of the Marine Mammal Protection Act in 1972 further protected the species from overharvesting, though the delay in regulation threatened the species' survival rate and affected the food security of coastal communities.

Twentieth and Twenty-First Centuries: Bering Sea Fisheries

Largely due to depletion of resources, commercial activities in the Bering Sea during the twentieth century shifted away from marine mammals and onto the region's abundant seafood stocks (Committee on the Bering Sea Ecosystem 1996, vi). Commercial fishing has occurred in

Alaskan waters as early as the 1860s, though cod served as a majority of the catch and only an average of ten fishing vessels per year fished the region. The introduction of canneries sparked the commercial salmon fishery and by 1900, salmon accounted for over 85 percent of the fish caught in Alaskan waters. By 1917, there were 118 canneries throughout coastal Alaska, canning more than half of the world's supply of salmon valued at $46 million (U.S. Bureau of Fisheries 1917, 36).

Alaska's fisheries experienced periods of high and low demand during the first half of the twentieth century, owing largely to World Wars I and II, as well as periods of high and low supply, due to a combination of technological advancements, natural fluctuations, and cases of over-fishing and mismanagement. Following statehood in 1959, the federal government transferred fisheries management to the state government, which advocated for a proactive regulation. An amendment to the state constitution adopted in 1972 gave the state the power to, "limit entry into any fishery for purposes of resource conservation, to prevent economic distress among fishermen and those dependent upon them for a livelihood," (Constitutional Convention 1956, Art. 8, Sec. 15).

Fisheries management in the Bering Sea entered into a new era in 1982, when sixty nations around the world signed the United Nations Convention on the Law of the Sea (UNCLOS). To date 167 nations, including the entire European Union have signed the Convention, making UNCLOS the main source of international law governing the global ocean. The United States is the one remaining world power that has yet to ratify the convention, though it adheres to all but one section of the convention, that which addresses the right to mine and explore the seabed beyond a state's territorial waters (Remy 1992, 1248).

Generally, UNCLOS outlines important maritime rights and enforces certain obligations regarding the delineation of territorial and international waters, the protection of the marine environment (including ice-covered areas), freedom of navigation, and marine research. Within the section on the delineation of waters, UNCLOS defines various zones to limit the use and exploitation of marine resources. One zone in particular, the exclusive economic zone (EEZ), which extends from the edge of a nation's territorial waters out to a limit of 200 nautical miles, has directly limited the exploitation of marine resources worldwide. Although the U.S. was not a signatory of UNCLOS, in 1983 President Reagan declared a 200 nautical mile EEZ surrounding the U.S. (Remy 1992, 1225). As the Bering Sea is bordered by Russia and the United States, with each nation's EEZ extending 200 miles beyond its coastlines, most hunting and fishing that takes place in the open ocean is now regulated by either nation.

One region of approximately 48,000 square miles, or about 10 percent of the Bering Sea, remains outside of both nations' EEZs. The region, known as the donut hole, is located in the deepwater Aleutian Basin that lies between the continental shelves of Russia and the U.S. Walleye pollock, one of the most intensely harvested species of fish in the North Pacific Ocean, became increasingly abundant in the Aleutian Basin in the late 1970s and early 1980s. This increase in abundance likely resulted from a combination of factors, including a warming trend in both air and water temperatures (PICES 2005, 28: 39–40). Scientists also speculate that the pollock population flourished in the Aleutian Basin owing in part to uncontrolled harvesting of whales and larger fish in the '50s, '60s, and '70s, leaving more prey and less predator threat for the pollock (Committee on the Bering Sea Ecosystem 1996, 2).

Fishing crews from Japan, Russia, China, Poland, South Korea, and other nations began exploiting the surge of pollock in the Aleutian basin in the early '80s, reaching a peak of 1.7

million tons caught in 1987 (Bailey 2011, 2). After the peak, pollock catches plummeted in the following years, reaching the lowest catch of 10,000 tons in 1992. In 1994 China, Japan, South Korea, Poland, Russia and the U.S. agreed on a fishing moratorium in the international waters of the Aleutian Basin. Despite the reactionary regulation imposed in the region, the North Pacific population of pollock has yet to recover (Vilhjálmsson and Håkon-Hoel 2004, 750).

Threats to the Bering Sea Fisheries and Subsistence Resources Posed by Shipping

The history of overexploitation of marine mammals and fish in the Bering Sea demonstrates that regulation of commercial activities generally follows species depletions. As the previous chapter demonstrated, within the coming decades, the Bering Strait will experience a rise in trans-Arctic traffic as shippers seek to benefit from distance savings and to avoid congested and dangerous alternative trade routes. As oil and gas exploration and extraction expand in the outer continental shelves of the Arctic, and as nations around the world look towards the Arctic for shorter and safer trade routes, the number of vessels transiting through the Bering Strait will rise significantly. Unregulated vessel traffic poses various threats to migrating marine mammals, in the form of ship strikes, noise pollution, and additional ship-sourced pollutants. The entire marine ecosystem, including the region's fisheries, is under serious threat from the potential of a major oil spill or a series of smaller spills. Both the coastal communities and commercial fisheries in the Bering Sea are vulnerable to the effects of increased unregulated shipping through the Bering Strait.

Oil and Gas Spills

The Bering Strait is a relatively narrow channel with depths ranging from 65 to 200 feet with few visual aids to navigation. The currents that move through the strait are powerful and often unpredictable, and combined with strong wind, can move sea ice at speeds up to twenty-

seven nautical miles per day. Although sea ice will likely become thinner and sparser in the years to come, the severe weather and strong currents in Bering Strait will continue to pose dangers to ships (Hartsig et al. 2012, 1).

A collision or spill from vessels transporting oil or gas through the Bering Strait could devastate the marine environment, affecting the coastal communities and the commercial fishing industry that depend heavily on its resources. Fog and severe storms could halt the cleanup process for weeks. Weather is not the only impediment to oil spill cleanup in the region. The closest permanent Coast Guard facility is over 1,000 nautical miles away, on Kodiak Island, exacerbating the risks posed by spills and other vessel-related accidents (Hartsig et al. 2012, 5).

The severe weather and inadequate response capacities create difficult and dangerous clean up conditions, potentially allowing oil to spread throughout the region. Although sea ice is increasingly thinner and sparser during the summer months, oil could cover any nearby icebergs and float for thousands of miles, eventually contaminating remote areas. Oil has the potential to sink as well, contaminating the seafloor and harming any benthic feeding animals, such as seals, walruses, and gray whales, and any groundfish such as pollock and cod.

President Obama recently declared 9.8 million acres in the Beaufort and Chukchi Seas off-limits to oil and gas drilling. A statement released by the White House noted the region's biodiversity as the main driver behind this declaration, as the newly protected area hosts more than forty species of fish such as cod and herring, and migrating whales such as gray and bowhead and it serves as a feeding ground for bearded seals and Pacific walrus (Boots and Utech 2015). Nevertheless, companies such as Shell still plan to drill within their leased areas in the Chukchi Sea beginning in 2015.

In late 2014, the Bureau of Ocean Energy Management (BOEM) released an environmental impact statement on the leased areas in the Chukchi Sea. The report estimated there to be a 75 percent chance of one or more large spills occurring in the area within the next seventy-seven years (Bureau of Ocean Energy Management 2014, 154). The report only assessed the potential for spills to occur from platforms, pipelines, or wells, and did not take into consideration the potential for an oil spill resulting from a tanker transiting accident, which is also highly probably, given the unpredictable weather and ice condition, harsh currents, and insufficient navigational charts. An oil spill, whether it be from a platform, pipeline, well or tanker accident in the region could leave lasting and profound effects on the valuable marine ecosystem surrounding the Bering Strait.

Both subsistence communities and commercial fishermen in southeast Alaska suffered greatly from the 1989 *Exxon Valdez* spill. Subsistence harvests dropped substantially following the spill, with the Native villages in the spill area halting nearly all of their harvesting activities. Natives from every village within a 500 mile radius of the spill noticed unusual behaviors in animals or suspect conditions of subsistence foods. Whether an animal was visibly oiled or not, the spill cast doubt and apprehension in the minds of many subsistence harvesters, leading villages to discard traditional foods or refrain completely from harvesting any subsistence resources (Fall et al. 2001, 163:170). The salmon, herring, rockfish, sablefish, crab, and shrimp fisheries in Prince William Sound, Cook Inlet, the outer Kenai coast, Kodiak, and the Alaska Peninsula closed for the 1989 fishing season. Parts of the shrimp and salmon fisheries in Prince William Sound stayed closed through the 1990 fishing season, while the herring fishery in Prince William Sound remains closed, twenty-five years after the spill. The fishery closures inflicted over $300 million in economic harm on the more than 32,000 people whose livelihoods

depended on commercial fishing in the region, while the spill caused immeasurable damage to the subsistence habits of thousands of the region's inhabitants (Oceana 2014, 1).

Ship Strikes

An additional concern raised by the prospect of increased ship traffic through the Bering Strait, specifically for large marine mammals such as whales, is the threat of ship strikes. In 2007, there were approximately 750 recorded ship strikes of large whales worldwide. Researchers believe that an unknown number of ship strikes go undetected or unreported each year, making the actual number of large whales that suffering ship strikes undoubtedly higher (Sibler, Bettridge, and Cottingham 2009, 1).

As sea ice recedes and industrial interest in the Arctic rises, vessel traffic through the Bering Strait will increase the possibility of ship strikes with whales. Within Alaskan waters, whales are currently susceptible to strikes by cruise liners, oil tankers, icebreakers, and other large vessels. During the summer of 2010, a luxury cruise liner struck a forty-three foot-long female humpback whale near Douglas Island, Alaska. Cruise ships are equipped with radars that detect shoals or other obstacles in the water; however, whales and other marine mammals are often too small to appear on the radar. Instead, cruise ships typically rely on visual whale sightings or reported sightings from nearby vessels. It is common practice for a cruise ship captain to reduce the ship's speed if a whale is spotted or reported nearby. Within highly trafficked areas such as Glacier Bay, the National Park Service implements speed limits to reduce the likelihood of strikes during summer months when humpback whales return to their feeding areas (National Park Service 2014).

Clear evidence exists of vessel collisions and gear entanglement along the coasts of the Bering and Beaufort Seas. In recent years, 1-2 percent of whales harvested by Alaska Natives

have had wounds or scars consistent with ship strikes, while 10 percent showed evidence of entanglement (Reeves et al. 2012, 457). In an analysis of North Atlantic right whales, researchers found that aside from completely diverting traffic away from migratory routes and feeding areas, reducing vessel speed was the most successful strategy for reducing ship strikes (Reeves et al. 2012, 458). Although Russia and the United States are drafting voluntary shipping regulations for the region, no speed restrictions currently exist in the Bering Strait (MacArthur 2014).

Noise

Noise pollution from increased shipping and offshore activities also poses a threat to marine wildlife. Until recently, the Arctic was considered an "acoustic refuge," free of seismic activity and dense vessel traffic (Reeves et al. 2012, 455). As marine mammals use sound to communicate with one another and to detect their surroundings, interfering sounds threaten their health and survival. Underwater noise can originate from many sources in Arctic waters including seismic surveys, drilling operations, and shipping and fishing traffic, and even sea ice dynamics. Today, increasing activities throughout the Arctic and specifically in the Bering Strait region raise the potential harm that noise poses to marine mammals.

Noise from ships, especially icebreakers, could shift migration routes of marine mammals in the Bering Strait, which are already changing due to warmer waters altering sea ice conditions. Because whales are highly sensitive to noise, hunters often travel alone or in small groups, commonly in skin boats powered by sails or oars when there's no ice in the water. A study conducted on the behavior of bowhead whales in the Bering, Chukchi and Beaufort Seas found that underwater noise from offshore oil and gas operations deflected whales away from their usual harvesting areas, resulting in a lower success rate for subsistence hunters in the region (Reeves et al. 2012, 455). In Canadian Arctic waters, researchers observed beluga whales

traveling great distances to avoid icebreaking vessels. For days following their diversion from the icebreaker, the beluga whales demonstrated alterations in their behaviors (Huntington et al. 2014, 121).

Vessel traffic and seismic surveys unavoidably create noise. However, disturbances to the ecosystem can be limited by avoiding certain harvesting areas in a given region. Without regulations regarding areas to be avoided in the Bering Sea, marine mammals will continue to experience noise pollution until a management regime is established.

Pollution

Lastly, increased shipping in the Bering Strait and all throughout the Arctic will increase the levels of harmful air pollutants from ship exhaust such as sulfur oxides (SOx), nitrogen oxides (NOx), and black carbon. Emission of black carbon (soot) in ship exhaust has the potential to significantly impact high traffic areas, as the soot that falls on ice and snow in the area creates a much darker and more heat conductive surface, therefore increasing ice melt in the region (Arctic Council 2009, 29). The melting effects caused by soot-covered snow and ice will further deteriorate the habitats of those subsistence species that rely on snow and ice for feeding and spawning grounds. Moreover, harmful pollutants will increase toxicity in the diets of marine mammals and those who rely on them for subsistence resources.

Additional ship-sourced pollution includes garbage, sewage and ballast water. A balanced ballast tank is essential to safe and efficient shipping. Released ballast water can introduce non-native bacteria, small invertebrates and their eggs, and cysts and larvae of other species, some of which could be invasive. The introduction of harmful bacteria or invasive species could profoundly impact a marine environment. In 2004, the International Maritime Organization (IMO) adopted the International Convention for the Control and Management of Ships' Ballast

Water and Sediments; however, the convention has not yet entered into force, as it requires ratification from thirty states representing at least 35 percent of the world merchant shipping tonnage. Although forty-four states have ratified the convention, those states only represent 32.5 percent of the world merchant shipping tonnage.

Discharge of sewage and garbage also contaminates marine areas and therefore threatens those who rely on its resources for their own livelihoods. The IMO's International Convention for the Prevention of Pollution from Ships (MARPOL) offers a platform for increased regulation of sewage and garbage, but coastal states must agree on increased regulation. Neither Russia nor the U.S. has applied for the regulation of sewage or garbage discharges in the Bering Sea, leaving the marine environment vulnerable to contamination.

Discussion

The absence of any vessel traffic regulation in the Bering Strait poses a serious threat to the coastal communities and commercial fisheries in the Bering Sea. An oil spill caused by an accident at sea or a leak from an offshore drilling operation could cause irreversible damage to the valuable yet vulnerable marine ecosystem. Unregulated ship-sourced pollution including sewage, garbage, and toxic emissions from exhaust will also threaten commercial fisheries, coastal communities, and marine wildlife.

The history of marine management suggests that sufficiently stringent shipping regulations in the Bering Strait may only follow an accident at sea. Historically, marine accidents have served as catalysts for shipping regulations in Alaskan waters and around the world. Although the trend of reactionary regulation has prompted the formation and refinement of safe shipping regulations, marine environments have suffered devastating contamination in the process. Inadequate ship construction, the lack of staff oversight, and outdated radar technology

contribute to marine accidents, which, if they result in spills, could endanger the ecosystem and therefore the coastal communities and fisheries that rely on the health and productivity of the Bering Sea. To their advantage, policy-makers in Russian and the U.S. have the benefit of hindsight when considering these issues.

Overharvesting of Marine Resources

The regulations that followed various stages of commercial exploitation demonstrate that reactionary regulation is far more common than proactive regulation in the Bering Sea. Fur seals and sea otters were overharvested to the point of near extinction in the nineteenth century. The Fur Seal Treaty of 1911 banned all open-water seal hunting and defined the legal rights of the U.S. regarding commercial on-shore seal hunting. The US honored their commitment to the treaty by instating a five-year ban, beginning in 1912, on all sealing activities in order to regenerate the population. The ban remained in effect until 1942 and was followed by additional international agreements banning commercial seal and otter harvest and initiating research programs throughout the region. In 1911, the fur seal population was around 125,000. Today, the population has reached an estimated 1.18 million fur seals, owing in large part over a century of conservation efforts (Melin et al. 2012, 4).

Unregulated commercial harvesting of marine mammals such as whales and walruses followed the same trend of unregulated overexploitation. Not until the population of bowhead whales and Pacific walrus were exhausted did the international community agree on a moratorium. The final species affected by the absence of regulation in the Bering Sea is the walleye pollock. Overfishing in the donut hole nearly depleted the stock. A fishing moratorium in the region has yet to restore the species to a healthy population size.

Oil Spills and Subsequent Regulations

Outside of the Bering Sea, stricter shipping regulations also have followed the trend of reactionary regulation after disasters at sea. In 1967 the oil tanker *Torrey Canyon*, *en route* to the United Kingdom, struck a reef just fifteen miles from the coast. The tanker spilled 32 million gallons of crude oil, covering 270 square miles, contaminating 180 miles of coastline and killing more than 15,000 sea birds and an unknown number of aquatic animals. At the time, the *Torrey Canyon* spill was the largest oil spill in history. The incident shed light on the lack of shipping regulations for oil tankers and the lack of clarity regarding liability and compensation following oil spills.

In 1973, the IMO adopted the International Convention for the Prevention of Pollution from Ships (MARPOL). The convention sought not only to mitigate accidental and operational oil pollution in the seas, but also ship-sourced pollution from chemicals, packaged goods, sewage, garbage disposal, and air pollution. Yet, states hesitated to ratify the convention. A series of tanker accidents between 1976-1977, most of which occurred in or near American waters, energized the international community to adopt stricter shipping regulations. The 1974 International Convention for the Safety of Life at Sea (SOLAS) added safety regulations regarding radar and collision aids, among other requirements. SOLAS and MARPOL significantly strengthened construction and equipment standards for tankers (IMO 1998, 7).

Less than a decade after the MARPOL Convention entered into force, another catastrophic oil spill occurred, spurring even stricter shipping regulations. In 1989, the oil tanker *Exxon Valdez* ran aground in Alaska's Prince William Sound. Due to heavy ice in the tanker's outbound lane, the ship's captain received permission from the Valdez Traffic Center to steer into the inbound lane to maneuver around the ice. The radar system used to monitor the region

had been downgraded by the Coast Guard in the early 1980s in order to cut costs. Additional factors were involved, including alcohol, an inadequate crew size, and a workday that exceeded the number of hours that the crew was allowed to work before taking congressionally mandated off-duty time.

A few minutes after midnight on March 24, the *Exxon Valdez* ran aground on Bligh Reef, resulting in a spill of over 11 million gallons of crude oil. At the time, it was the largest oil spill in American waters, covering 11,000 square miles at sea, 3,200 miles of coastline, and killing billions of salmon and herring eggs, hundreds of thousands of seabirds, thousands of sea otters, hundreds of seals and bald eagles, and countless other aquatic animals (PEW Charitable Trusts 2014).

The catastrophic spill motivated Congress to pass the Oil Pollution Act in in 1990, requiring all tankers bound for U.S. ports to have double hulls. The U.S. also approached the IMO, calling for double hulls to be an international mandate under MARPOL. Two additional accidents involving single hull oil tankers, including a sinking off the coast of France in 1999 and a spill off the coast of northern Spain in 2002, led the IMO to enforce the phase-out of all single hull oil tankers.

The Exxon oil spill in Alaskan waters was far from the worst oil spill the world had experienced, and with the BP spill in the Gulf of Mexico in 2010, it is far from the worst oil spill to date in American waters. Yet, the Exxon spill remains significant today, owing to the remote location of the spill and its continuing impact on commercial and subsistence fisheries. Biologists from NOAA and other state and federal agencies continue to study and monitor the region, as certain species and habitats have yet to recover (Figure 2.5).

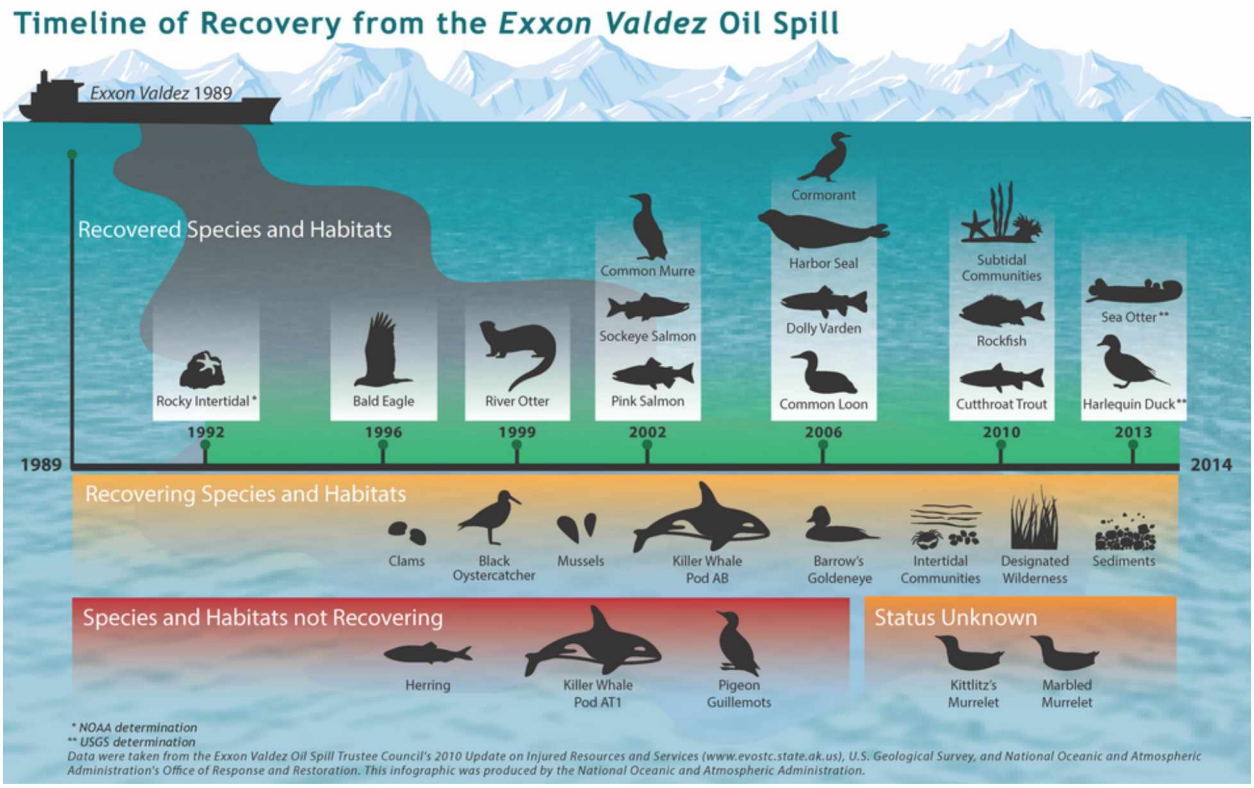


Figure 2.5. Timeline of Recovery from the *Exxon Valdez* Oil Spill
Source: (NOAA Office of Response and Restoration 2014)

As previously mentioned, herring is among the species still struggling to rebound from the disaster. The herring fishery supported both commercial and subsistence fishers in Cordova and subsistence fishers in two nearby Native villages, Tatilek and Chenega Bay. Following the spill, both the commercial and subsistence fisheries crashed, leaving both Native and non-Native residents without access to a major source of their livelihoods (Gill, Picou, and Ritchie 2014, 87). Short and long-term economical and cultural impacts of the spill in Prince William Sound continue to serve as a precaution to oil and gas development and transportation in the cold and remote Alaskan waters where response capabilities are limited.

Although reactionary regulation has resulted in safer ship construction and sailing norms, the lessons learned from these events should be clear: accidents at sea are inevitable. On October

21, 2014, the cables connecting a 134-foot Canadian barge to a towboat broke during a storm in the Beaufort Sea, leaving the barge to drift into American waters. The barge contains roughly 950 gallons of fuel and remains unmanned and out at sea. Recovery options are limited, as all nearby vessels are out of service for the season and winter sea ice quickly approached from both the north and south, locking the barge in for the winter (Hanlon 2014).

The fate of the barge and the oil onboard remain unknown. However, there is no doubt that the Arctic Ocean and surrounding seas will continue to be dangerous and unpredictable for vessel traffic and offshore resource development. Although global warming has reduced ice cover and increased ocean temperatures, the region will continue to experience strong currents and unpredictable weather patterns, creating dangerous shipping conditions.

Within the coming decades, a rise in vessel traffic in all forms, including barges and tow boats, oil and gas tankers, cruise ships, smaller fishing vessels, bulk cargo ships, and icebreakers will create a congested and hazardous marine highway in the Bering Strait. In light of the slow recovery in Prince William Sound, a proactive approach to shipping regulations in the strait would safeguard the invaluable renewable resources that the Bering Sea provides for both commercial fisheries and coastal communities.

Conclusion

The Bering Sea marine ecosystem supports an abundant and diverse array of wildlife, which has sustained the subsistence habits of coastal communities for thousands of years. Today, the Bering Sea continues to ensure the food security of these communities while also supporting commercial fisheries that contribute significantly to the local and state economies and the national and international total yield of fish. Global warming is altering the marine ecosystem in the Bering Sea, leaving communities and their food sources at risk. Meanwhile, rising interest in

shorter shipping routes will bring a rise in vessel traffic through the Bering Strait. Although the decline in oil prices worldwide has delayed offshore drilling, prices will inevitably rebound, bringing the focus back to the Arctic's offshore resources. Potential oil and gas spills, pollution, ship strikes, and noise, among other negative effects, will threaten the marine ecosystem and therefore the health of coastal communities and commercial fisheries in the Bering Sea.

Historically, marine regulation in the Bering Sea has come about following the near depletion of sought-after species. Periods of unregulated commercial endeavors in the eighteenth, nineteenth and twentieth centuries resulted in overharvested fish and marine mammals. Outside of the Bering Sea, shipping regulation has followed a similar trend, coming about only after major oil spills. Although shipping regulations worldwide are far stricter due to the lessons learned from accidents at sea, the lack of sufficiently stringent and site-specific regulation in the Bering Strait leaves the commercial fisheries and coastal communities vulnerable to a major accident or a series of smaller impacts. Although no regulation can guarantee that a collision or spill will not occur in the Bering Strait, a proactive approach to vessel traffic regulation minimizes the potential for accidents at sea and resultant harm to the marine ecosystem. A healthy marine ecosystem in the Bering Sea is essential to ensuring the food security of its coastal communities and the productivity of its commercial fisheries.

Chapter Three: Proposed solutions, regulatory options, and economic incentives for cooperation between Russia and the U.S. in the Bering Strait

Introduction

Global warming offers both economic opportunity and environmental risk, and nowhere is this balance more evident than in the Bering Strait. While the shorter Arctic trade routes made accessible by the Bering Strait promises to boost the economies many, increased traffic threatens the region's biodiversity and therefore its coastal communities and thriving commercial fisheries.

An oil or gas spill from a transiting vessel or offshore drilling operation could contaminate the marine environment, which currently provides significant value to national, state, and local economies, and substantial health benefits to the region's coastal communities. Moreover, ship-sourced pollution threatens the Bering Sea ecosystem, as ship exhaust pollutants such as black carbon will blanket the surrounding area, contaminating the habitats of subsistence species and accelerating the ice and snow melt in the region. Additionally, ship strikes and noise pollution directly threaten endangered marine mammals that provide coastal communities with a large portion of their subsistence diets. The previous chapter demonstrated that unregulated activities in the Bering Sea have historically resulted in the overexploitation of species or the contamination of the marine environment. A proactive approach to vessel traffic regulation in the Bering Strait is therefore the most assured means of promoting safe shipping while safeguarding the marine ecosystem.

This chapter will present current concerns and suggested regulations from coastal communities and both Native and non-Native coalitions. The recommendations for vessel traffic regulation include areas to be avoided, seasonal speed limits, and zero discharge zones, along with requirements for ships to utilize Automatic Identification Systems (AIS) and carry their

own spill cleanup equipment. An analysis of the effectiveness of mandatory regulations compared to voluntary initiatives suggests that internationally enforced regulations are the most appropriate tool for ensuring the most comprehensive protection of the marine environment. An overview of the existing legal framework in the Arctic will reveal current regulatory gaps in the Bering Strait, while also identifying the available avenues for more stringent regulation in region.

While the need for mandatory vessel traffic regulation in the Bering Strait is clear, implementing such international regulations requires cooperation between Russia and the U.S. and approval from the International Maritime Organization (IMO), a United Nations agency that oversees the safety and security of shipping worldwide. Analysis of the various IMO instruments that Russia and the U.S. could employ to protect the region will reveal the potential paths to regulation. However, the contrasting Arctic ambitions, strategies, and perspectives of Russia and the U.S. present obstacles to collaboration.

For generations, Russia has recognized its Arctic coastal waters as an important transportation corridor and economic lifeline, leading Moscow to invest heavily in the nation's Arctic infrastructure. The Russian icebreaker fleet is the largest and most advanced in the world and its network of support stations along its Arctic coast is growing. Both domestic and international observers recognize the nation's intent to transform the Northeast Passage into the next great trade route. In contrast to Russia, the U.S. has never placed its Arctic region and its role in Arctic shipping high on its national agenda. While recent policies from the Obama administration suggest that the nation's Arctic ambition is increasing, its outdated infrastructure in the form of icebreakers and coastal support facilities suggests otherwise.

This chapter's analysis of past and present relations between the U.S. and Russia and both nations' Arctic ambitions demonstrates that reaching an agreement on a bilateral

management strategy for the Bering Strait is a daunting proposition. Yet, an agreement would not be unprecedented, as both nations have demonstrated a willingness to sign international legislation when economic and/or strategic factors offer enough incentive to do so. Despite the barriers to cross-border cooperation, ensuring safe shipping through the Bering Strait furthers both nations' economic and strategic interests. While there are gaps in the region's current regulation, there are frameworks available to ensure the highest standards of ship safety and the best protection of the Bering Sea's marine resources as the Bering Strait becomes the next chokepoint of international trade.

Local Concerns and Recommended Regulations

In early February of 2013, Nome hosted the Bering Strait Maritime Symposium, a meeting organized to address the recent increase in shipping through the region. The testimonies given throughout the symposium highlighted the ship-sourced pollution already appearing throughout the region: "We found lettuce and carrots washed up on our shores," one resident claimed. "We know they aren't from us because in our store there are no carrots and lettuce." She also witnessed ship crews washing down their decks while anchored at Port Clarence and observed oil sheen in the water from passing ships. "Who do we report that to?" she asked (Haeker 2013, 4).

Many residents from nearby coastal communities participating in the symposium felt equally unprepared and uninformed about the rise in vessel traffic and what that meant for their communities. Symposium organizer and Nome's Marine Advisory Program agent, Gay Sheffield, expressed similar concerns in her opening remarks: "We hear all these things about ship traffic, tour ships, [and] adventurers… coming our way, but what does that mean to us? Somebody tell us how this works, because we don't feel prepared for all this." Before the symposium began,

Sheffield asked participants what they perceived to be the greatest threat from increased vessel traffic. The number one concern of those she spoke with was the harmful effect that pollution will have on marine subsistence resources. Residents also expressed fears that increased ship traffic could further alter the migratory paths of marine mammals, fish, and birds that make up a large percentage of their diets and are already changing in response to the effects of global warming (Haeker 2013, 4).

The Bering Strait Maritime Symposium provided communities with a platform to express their concerns and prepare for the changes that are occurring along their coastlines. Native organizations are also taking a more active role in federal marine management in the Bering Strait. The recently established Arctic Marine Mammal Coalition (AMMC) consists of five Alaska Native organizations that work with federal regulatory agencies to monitor and manage marine mammals.

In 2013, in response to a request from U.S. Coast Guard Commander James Houck, the AMMC provided the following recommendations for improving maritime safety: direct all ship traffic to the East of St. Lawrence Island, establish the Bering, Chukchi, and Beaufort Seas as zero discharge zones, recommend speed limits of 10 knots during migration times, and place an AMMC observer on every large vessel that transits the strait (Haeker 2013, 4).

The recommendations provided by AMMC are not unique. Between 2010 and 2012, Kawerak, the Native non-profit corporation from the Bering Strait region, undertook the *Ice Seal and Walrus Project*. The project's researchers interviewed eighty-two elders and hunters from nine Bering Strait communities to gather data on subsistence habits. The project also hosted focus groups, community meetings, and a workshop. Among the most common threats to their subsistence way of life that project participants identified were prey depletion by fishermen,

noise pollution, ship-sourced pollution, policies that do not take local use patterns or local environments into consideration, and the safety of small hunting vessels as traffic of larger transiting vessels increases (Kawerak 2014, 2–3).

In January 2014, Kawerak published a summary of the threats to seal and walrus hunting in the region. Overall, Kawerak suggested a proactive approach to regulation in the Bering Strait, as noise, ship-sourced pollution, or an oil spill could, "prove devastating to the marine environment and marine mammal populations that concentrate in the region," (Kawerak 2014, 2–3). The report noted the harsh and unpredictable weather and the remoteness of the region, which create dangerous conditions and often long wait times for emergency responders. Since response times can be lengthy, Kawerak recommended that all large ships transiting through the Bering Strait not only be Polar Class vessels, but also carry their own spill cleanup equipment. In order to educate and empower local communities, Kawerak suggested that locals from coastal communities such as Little Diomede, Wales, Gambell and Savoonga receive training to serve as local responders (Kawerak 2014, 4).

Additional recommendations included designating the Bering and Chukchi Seas as zero discharge zones, imposing stricter speed limits during the spring and fall migration times (March-June and October-November), and designating the marine areas surrounding Little Diomede, King Island, and St. Lawrence Island as areas to be avoided due to their high concentration of marine mammals and therefore high concentration of hunting activities. Kawerak also recommended that all vessels have Automatic Identification Systems (AIS), which would enable information exchange between the Coast Guard, transiting vessels, and local communities and ports (Kawerak 2014, 3–5). The widespread use of AIS would reduce accidents,

expedite response to vessels in distress, and allow the Coast Guard to ensure that transiting vessels comply with mandatory regulations (Huntington et al. 2014, 123).

The Shipping Safety Partnership, a coalition of non-governmental organizations (NGOs), Alaska Natives, and commercial fishermen that formed in response to an oil spill in the Aleutian Islands in 2004, recommended similar regulations for vessel traffic in Arctic waters. Following the oil spill, the Partnership called for mandatory vessel tracking and communication systems, routing measures, areas to be avoided, better aids to navigation, and enhanced emergency response plans, among others (Steiner 2014). The overlap in recommendations from the Bering Strait Maritime Symposium, the Arctic Marine Mammal Coalition, Kawerak, and the Shipping Safety Partnership suggests that Native organizations, elders and hunters, NGOs, and commercial fishermen share common concerns and support similar regulations for safeguarding the marine environment from the effects of increased shipping. The recommendations compiled aid in the development of a site-specific and regionally accepted approach to managing vessel traffic in the Bering Strait.

Mandatory vs. Voluntary Regulations

The U.S. has already begun exploring voluntary routing measures for the Bering Strait, though the proposed measures are insufficient. Along with their lack of adequate protection, the voluntary nature of the proposed measures is a shortcoming. Any voluntary initiative will fail to ensure the highest and most comprehensive protection of the marine environment in the region, as ship-sourced pollution, especially in the case of large-scale oil spills, does not respect national boundaries. Pollutants have the potential to spread irrespective of boundaries owing to the region's strong currents, which contribute to the navigational challenges for vessel traffic in the region as well.

Despite prospects of an "ice free" summer shipping season, conditions will remain risky and unpredictable through the Bering Strait for decades to come, with the continued potential for drifting ice. At a conference on ocean mapping held in Quebec in 2005, Retired Canadian Coast Guard Captain David Snider warned that the varying ice conditions throughout the Arctic will present challenges to navigators that are, "beyond the scope of present or even future expectations of average mariner training and experience," (Snider 2005 in Chircop 2009, 360). Conditions could also change rapidly, leaving unprepared and out-of-contact vessels in danger. The potential for rapidly changing conditions necessitates the use of vessel tracking and communication systems, and enforcing the use of tracking and communication systems on vessels from any nation requires the implementation of mandatory regulation.

Corporate Social Responsibility (CSR), a form of corporate self-regulation, encourages the use of voluntary initiatives in the place of mandatory regulation, and can be effective at establishing norms that promote sustainable development and environmental protection. Despite the varied success of voluntary initiatives in other regions around the world, the Arctic is a unique and vulnerable region that warrants the use of mandatory regulation. Current vessels and vessel regulations widespread throughout southern shipping lanes were developed for different environments, and are therefore ill prepared and ill suited for Arctic waters (Chircop 2009).

Mandatory regulation, whether in the form of tracking and communication devices, routing measures, speed limits, or areas to be avoided would apply to all vessels traveling through the Bering Strait, whereas voluntary initiatives would apply only to the vessels that have chosen to take part in a specific initiative. The remoteness and uniqueness of the marine environment, along with the unpredictability of shipping conditions in the Bering Strait and all throughout the Arctic warrant the use of mandatory regulation.

As the Bering Strait is an international waterway, regulation must be international in scope. International vessel traffic regulation for the entire Arctic marine area is in the process of ratification, though that regulation has its own obvious shortcomings. The following analysis of current regulation regimes reveals a regulatory gap in the Bering Strait, though there are frameworks in place, through the implementation of certain International Maritime Organization (IMO) instruments that could fill these gaps.

Legal Frameworks for the Arctic Ocean

Many of the international regulations applicable to the Arctic marine area were drafted decades ago, when the region remained largely iced-in and unexplored. The effects of global warming and the technological advancements made since the late twentieth century have allowed for further exploration and exploitation of the Arctic marine area. Vessels can now navigate through ice-choked waterways, as ice breaker technology has progressed and summer ice has receded, though many navigational charts are out of date, with some dating back to nearly a century ago (Rosen 2015).

Owing to the rising interest in the region and its outdated legal framework and navigational charts, the Bering Strait is unprepared for the traffic to come. The gaps in regulation leave the region vulnerable to accidents and spills. Yet, IMO instruments that allow coastal states to impose stringent regulation while ensuring freedom of navigation exist. These instruments provide Russia and the U.S. with the most appropriate means for protecting the Bering Sea marine ecosystem and its immense value to commercial fisheries and coastal communities.

United Nations Convention on the Law of the Sea (UNCLOS)

Today, UNCLOS is perhaps the most significant and widely accepted legal framework governing the global seas, with 167 signatory states. As mentioned in the previous chapter, the U.S. has neither signed nor ratified the convention, though it adheres to all but the one section of the convention, that which addresses the right to mine and explore the seabed beyond a state's territorial waters (Remy 1992, 1248).

The five Arctic coastal states (Russia, the U.S., Canada, Norway, and Demark) affirmed the legitimacy and applicability of UNCLOS in the Arctic region when they met in Greenland 2008 for the Arctic Ocean Conference to discuss global warming, the marine environment, and maritime safety in the Arctic Ocean. The five coastal states did not propose a new legal framework to address the issues threatening the Arctic marine environment. Instead, in the resulting *Ilulissat Declaration,* they recognized that, "an extensive international legal framework applies to the Arctic Ocean… Notably, the law of the sea provides for important rights and obligations concerning the lineation of the outer limits of the continental shelf, the protection of the marine environment, including ice-covered areas, freedom of navigation, marine scientific research and other uses of the sea." All states involved "remain committed to this legal framework," and, "see no need to develop a new comprehensive international legal regime to govern the Arctic Ocean" (Arctic Ocean Conference 2008, 1–2).

Although the five states did not explicitly name UNCLOS as the legal framework governing the Arctic Ocean and surrounding seas, mostly likely owing to the fact that the U.S. is not yet party to the convention, they clearly referred to the UN convention. The *Ilulissat Declaration* is essential to understanding the future of marine management and governance in the Arctic region, as it signifies a commitment to UNCLOS and a unified opposition among all

Arctic coastal states to developing an Arctic-specific legal framework. Therefore, the following sections highlight the most applicable avenues for regulations made available through UNCLOS, as UNCLOS is the agreed upon legal framework for the Arctic marine area.

UNCLOS defines international straits as, "straits which are used for international navigation between one part of the high seas or an exclusive economic zone and another part of the high seas or an exclusive economic zone," (UN General Assembly 1982, Art. 37). Because the Bering Strait serves as the only connecting waterway between the high seas in the Pacific Ocean and the high seas in the Arctic Ocean, and because it has hosted international maritime traffic for centuries, the Bering Strait qualifies as an international strait.

Within the section outlining the duties of ships transiting through an international strait, UNCLOS requires that ships "comply with generally accepted international regulations, procedures and practices for safety at sea, including the International Regulations for Preventing Collisions at Sea" (UN General Assembly 1982, Art. 39, 2a). The Convention on the International Regulations for Preventing Collisions at Sea (COLREG) is an International Maritime Organization (IMO) convention that applies to all vessels in the high seas and in all waters connected to the high seas. UNCLOS further requires transiting ships to "comply with generally accepted international regulations, procedures and practices for the prevention, reduction and control of pollution from ships," (UN General Assembly 1982, Art. 39, 2b). The International Convention for the Prevention of Pollution from Ships (MARPOL), also an IMO convention, outlines the generally accepted international regulations for the prevention, reduction and pollution of ships.

Along with holding transiting ships accountable to the current maritime regulations outlined in various IMO conventions, UNCLOS enables coastal states to apply additional

regulations to ships transiting international straits through applicable IMO conventions. UNCLOS specifies the types of additional regulations that coastal states may impose, suggesting that, "states bordering straits may designate sea lanes and prescribe traffic separation schemes for navigation in straits where necessary to promote the safe passage of ships" (UN General Assembly 1982, Art. 41, 1). The various articles within UNCLOS that enable states to propose more stringent regulation through the use of IMO conventions further solidifies their applicability to future regulation in the Bering Strait.

International Maritime Organization (IMO)

The IMO is a specialized agency of the United Nations established in 1958 to address issues affecting international shipping, including maritime safety standards, efficiency of navigation, and ship-sourced marine pollution. Between 1973 and 1982, the IMO was active in amending UNCLOS, although UNCLOS only refers to the IMO once as the expert organization in the field of navigation and ship-sourced pollution. Following this brief mention of the IMO, UNCLOS refers to the "competent international organization" in relation to international shipping rules and standards, maritime safety and navigation, and the prevention and control of marine pollution. The direct reference to various IMO conventions, including the Convention on the International Regulations for Preventing Collisions at Sea (COLREG), further solidifies the IMO as the "competent international organization" referred to by UNCLOS. The initial mention and the reoccurring references to its various conventions reinforce the organization's role as the leading authority in maritime regulation and therefore its applicability to enforcing regulation in the Bering Strait.

To date, 170 states, including Russia and the U.S., are members of the IMO. The widespread acceptance of the IMO aids to the "uncontested legitimacy" of the organization's

various conventions (IMO Secretariat 2011, LEG/MISC.7:8). Since the ratification of UNCLOS in 1982, formal acceptance of the IMO's most relevant conventions has increased significantly. The three most comprehensive conventions regarding vessel safety and marine pollution prevention are the International Convention of Standards of Training, Certification, and Watchkeeping for Seafarers (STCW), the International Convention for the Prevention of Pollution from Ships (MARPOL), and the International Convention for the Safety of Life at Sea (SOLAS). All three have been ratified by 150 or more states, including Russia and the U.S., representing 99 percent of the world's merchant fleet (IMO Secretariat 2011, LEG/MISC.7:11).

The International Convention for the Prevention of Pollution from Ships (MARPOL)

As noted in the previous chapter, the IMO established MARPOL in response to a series of oil spills that contaminated various marine ecosystems around the world in the 1960s and '70s. MARPOL not only addresses the prevention of pollution by oil, but the convention also contains annexes on the control of pollution by noxious liquid substances in bulk, prevention of pollution by harmful substances carried by sea in packaged form, pollution by sewage from ships, pollution by garbage from ships, and prevention of air pollution from ships.

MARPOL offers states the option to further restrict marine pollution in specified areas. A MARPOL special area requires a higher level of protection from pollution due to its ecological significance and rate of vessel traffic. In a marine area that borders more than one state, coastal states must cooperate on a proposal to the IMO to limit pollution under a specified annex or set of annexes before the IMO designates a given marine area as a MARPOL special area. Examples of MARPOL special areas that restrict pollution in various annexes include the Mediterranean Sea (oil and garbage), the Baltic Sea (oil, sewage, and garbage), and the seas surrounding Antarctica (oil, noxious liquid substances, and garbage).

Annex VI of MARPOL provides a baseline for further restriction of specific ship-sourced pollutants through the delineation of Emission Control Areas (ECAs). Currently, there are four ECAs worldwide: the Baltic Sea, the North Sea, the U.S. Caribbean Sea, and the marine area surrounding North America, excluding any regions above 60° North. Both the North American and U.S. Caribbean ECAs limit sulfur oxide (SOx), nitrogen oxide (NOx), and particulate matter (PM) emissions, whereas the North Sea and Baltic Sea ECAs limit only SOx emissions. Although Russia ratified the Baltic Sea MARPOL special area in 2008 and reached an agreement with all Baltic States to also limit emissions from NOx as well as SOx in the Baltic Sea ECA beginning in 2016, Russia recently called for a five-year delay on limiting NOx emissions. Konstantin Palkikov, Russia's director of the Department of State Policy for Marine River and Transport, reasoned that the diesel installations needed to limit NOx emissions were not yet economically viable, diminishing the potential profit for shippers in the Baltic Sea (Port News 2013). As noted in UNCLOS, all coastal states must reach an agreement on stricter shipping standards before the IMO enforces any new international regulations in a marine area. Despite the delay, Russia has since insisted that it will adhere to the newly negotiated date, January 1, 2021, when NOx emissions will be limited in the Baltic Sea (Prylipko 2014, 30).

Particularly Sensitive Sea Areas

MARPOL special areas and Emission Control Areas are both effective in reducing ship-sourced pollution, but neither contains any routing measures or tracking requirements, which are vital to ship safety in highly trafficked or dangerous shipping lanes. For further protection against an accident at sea, the IMO offers the option for coastal states to designate a Particularly Sensitive Sea Area (PSSA). The IMO defines a PSSA as, "an area that needs special protection through action by the IMO because of its significance for recognized ecological, socio-economic,

or scientific attributes where such attributes may be vulnerable to damage by international shipping activities," (IMO 2005, 1.1.2). Along with protecting ecologically or scientifically significant areas, the IMO can designate a PSSA if an area is, "of particular importance for the support of traditional subsistence or food production activities for the protection of the cultural resources of the local human populations," (IMO 2005, 4.4.13). The Torres Strait, between the EEZs of Australia and Papua New Guinea, is one of the fourteen PSSAs worldwide. The waterway contains numerous islands and shallow coral reefs, creating a complex topography for transiting vessels due to its shallow and fast moving waters (Roberts 2006). The Torres Strait is also home to an indigenous population that is largely reliant, both economically and culturally, on the region's marine resources, a situation comparable to that in the Bering Strait (Lawrence and Lawrence 2006, 21).

The Baltic Sea is another one of the fourteen PSSAs worldwide, though it does not include Russian waters. The Baltic States, including Denmark, Estonia, Finland, Germany, Latvia, Lithuania, Poland and Sweden, submitted a joint proposal to the IMO for a Baltic Sea PSSA. Russia initially objected to the proposal, as the PSSA would encompass the entire Baltic Sea, including Russian territorial waters, which were subject to Russia's sovereign rights and jurisdiction. Not only did Russia object to the PSSA infringing on its territorial waters, but it was also unable to agree on the exact coordinates of the Russian EEZ in the Baltic Sea (Kraska 2011, 370). Eventually, the entirety of Russia's marine area was excluded from the Baltic Sea PSSA, which the IMO adopted in 2005.

In order to protect a certain area vulnerable to ship traffic, the application for a PSSA must include associated protective measures (APMs) which should prevent, reduce, or eliminate the area's vulnerability to international shipping (IMO 2005, 3.3.2). The most common APMs

utilized in PSSAs include the designation of north and southbound lanes, the establishment of no-anchor zones or areas to be avoided, the strict application of MARPOL discharge and equipment requirements for ships such as oil tankers, and the installation of Vessel Traffic Services, among others. Largely owing to the region's remoteness and therefore prior lack of traffic, the Arctic does not have any MARPOL Special Areas, MARPOL Emission Control Areas, or Particularly Sensitive Sea Areas.

Polar Code

Both the International Convention for the Safety of Life at Sea (SOLAS) and the International Convention for the Prevention of Pollution from Ships (MARPOL) regulate ships engaged in international transits worldwide, though, until recently, neither provided specific regulations for ships transiting through Arctic waters. In order to address this gap in regulation, the IMO began drafting a mandatory code for vessel safety and pollution prevention in polar waters in 1993. A new chapter in SOLAS makes the International Code for Ships Operating in Polar Waters, i.e. the Polar Code, mandatory for all ships transiting Arctic and Antarctic waters. The Polar Code covers "design, construction, equipment, operational, training, search and rescue and environmental protection matters relevant to ships operating in the inhospitable waters surrounding the two poles" (IMO 2015, 1) (Figure 3.1).

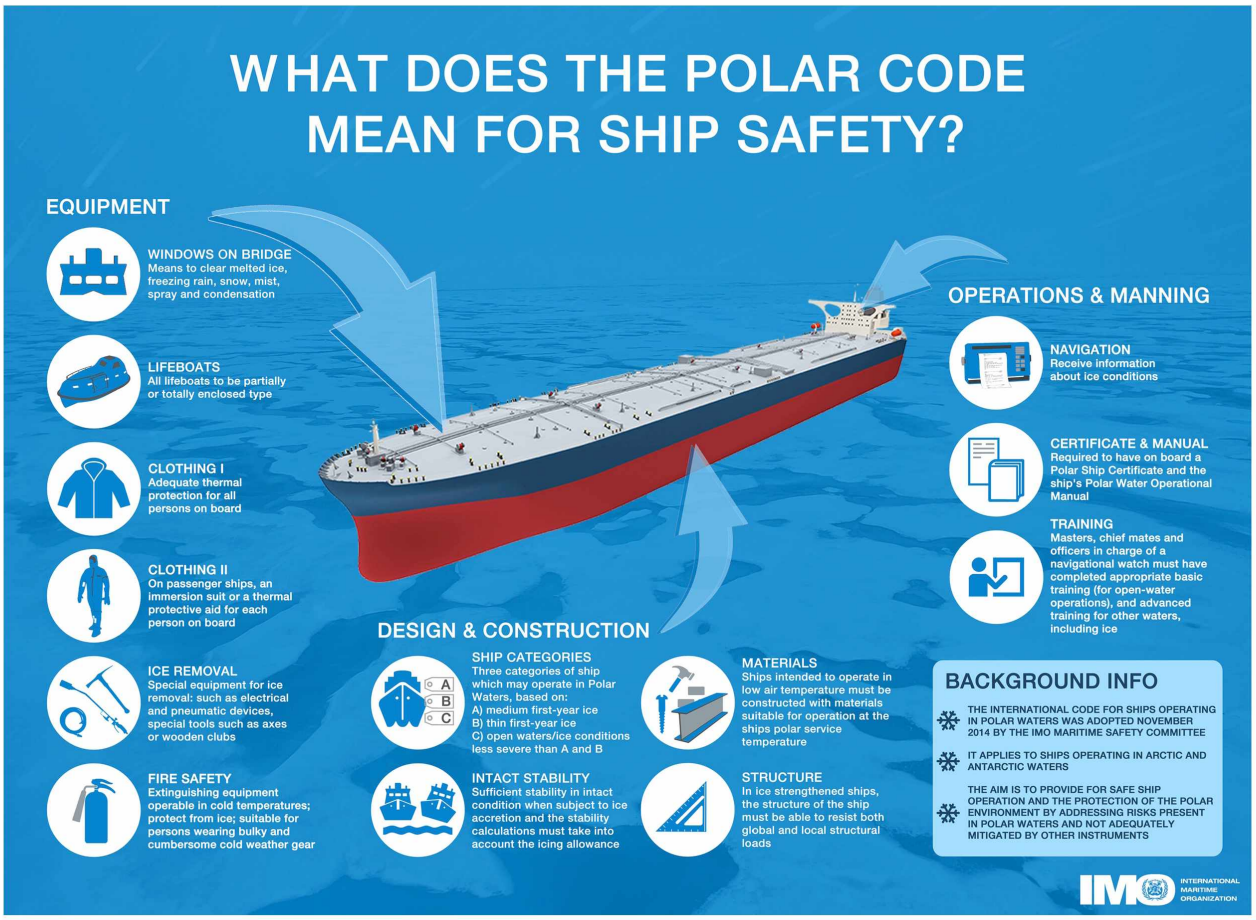


Figure 3.1. What does the Polar Code mean for ship safety?
Source: (IMO 2015)

The code also includes amendments to MARPOL to bring the Polar Code into force under Annexes I (prevention of pollution by oil from ships), II (noxious liquid substances), IV (sewage) and V (garbage). In November 2014, the Maritime Safety Committee (MSC) of the IMO approved the Polar Code, along with its associated amendments, while the IMO's Marine Environment Protection Committee (MEPC) took the final step in approving the code and amendments at its 68th session in May 2015. Polar Code could enter into force as early in January 1, 2017.

Regulatory Gap

Despite ensuring a baseline of regulation addressing vessel safety and pollution prevention, the Polar Code and its associated amendments fail to address the use of heavy fuel oil (HFO), the emission of toxic pollutants such as black carbon from ship exhaust (MARPOL Annex VI), and the regulation of ballast water discharges in Arctic waters. Currently, HFO is used to fuel ships transiting through Arctic waters and is also transported through Arctic waters as cargo. Although most communities throughout the Arctic use diesel for heating and electricity, many Russian communities still require shipments of HFO to power and heat their communities, as HFO is a cheaper alternative to diesel (Dumbrille 2015). Although cheaper, HFO has a much higher sulfur content than diesel oil, making emissions from HFO-burning engines more toxic and harmful to the surrounding environment and atmosphere (Wang 2014).

Largely due to its continued use in Russian communities, the Polar Code did not include a ban on the use or transportation of HFO. The IMO already bans the use and transportation of HFO in Antarctic waters due to the fuel's higher sulfur content and therefore higher black carbon emissions. An accidental spill of HFO is also far more detrimental to the marine environment than a spill of lighter, more refined fuel such as diesel, as lighter fuels naturally disperse and evaporate more quickly than HFO (Harun 2014). The failure to ban the use and transportation of HFO in Arctic waters puts the marine environment and coastal communities in areas of increasingly concentrated vessel traffic, such as the Bering Strait, at a higher risk of higher black carbon emissions and a more devastating oil spill.

The omission of MARPOL Annex VI, which limits the emission of sulfur oxide (SOx), nitrogen oxide (NOx), and black carbon, in the Polar Code also threatens the health and livelihood of the marine environment and coastal communities in the Bering Strait. Although the

Arctic Council recently adopted a framework to reduce black carbon emissions, the framework is non-binding, therefore lacks the authority afforded to binding international agreements. The framework also fails to address SOx and NOx emissions. Annex VI of MARPOL specifically sets a cap on the percentage of sulfur and nitrogen content in fuel oils and prohibits the deliberate emission of ozone depleting substances such as chlorofluorocarbons (CFCs). As previously noted, coastal states can further restrict ship-sourced air pollution through the delineation of Emission Control Areas (ECAs), of which there are only four worldwide. The North American ECA includes the waters surrounding the U.S. and Canada, but does not include any regions above 60° North, due to the region's historically low levels of traffic. Thus, additional ECAs would need to be established in the Arctic region to further restrict pollution from ship exhaust.

Although the Polar Code will provide a baseline of vessel safety and pollution prevention regulation in the Arctic, it will not provide regulations sufficient to protect the commercial fisheries and ensure the food security of coastal communities in the region. Regulation of vessel traffic through the Bering Strait must be site specific, taking into account the hunting and harvesting areas of subsistence communities and the unique vulnerability of the marine environment, just as the protective measures associated with the Torres Strait Particularly Sensitive Sea Area (PSSA) do. Regulation must apply to the entire marine area in the Bering Strait in both Russian and American waters, as marine subsistence resources such as whales, seals, and walruses, and the most commercially sought after species of fish, such as pollock and cod, spawn, feed, and migrate irrespective of maritime boundaries. Marine pollution also knows no boundaries, as oil, garbage, sewage, ship exhaust and other forms of ship-sourced pollution can easily travel from Russian to American waters and vice versa. The Polar Code provides a baseline of regulation, which will enter into effect in 2017, but as previously noted, the code falls

short on safeguarding the marine environment. It also fails to include specific routing measures in narrow waterways, such as the Bering Strait, and does not contain any requirements for ships to be equipped with Automatic Identification Systems (AIS), as communication infrastructure is lacking throughout the Arctic. Therefore, Russia and the U.S. should adopt more stringent IMO regulations available through the designation of a Particularly Sensitive Sea Area (PSSA), an Emissions Control Area (ECA), or a MARPOL special area in the Bering Strait, all of which require an agreement to collaborate between the two nations.

Potential for Cross-Border U.S.-Russia Collaboration

Despite the need for collaboration on this pressing issue, the history of U.S.-Soviet/Russia relations complicates any future cooperation between the two nations. The Cold War set the stage for a U.S.-Russian relationship fraught with mistrust. However, regime building in the Arctic since the fall of the Iron Curtain has provided new opportunities and spurred new attitudes towards cooperation north of the tree line. Mikhail Gorbachev's 1987 Murmansk speech initiated a new era of cross-border relations among Arctic nations, as he called for the Arctic to be a zone of peace and advocated for more cross-border initiatives. Gorbachev encouraged nations to collaborate on scientific research, cooperate on environmental conservation, and restrict military buildup in the Arctic (Gorbachev 1987).

The Murmansk speech and the subsequent collapse of the Soviet Union provided increased opportunities for cooperation, spurring Canada and Finland to establish the Arctic Environmental Protection Strategy (AEPS), which by 1996 had transformed into the Arctic Council, an international forum whose main objective is to ensure environmental protection and promote sustainable development in the Arctic. The eight Arctic nations (the U.S., Russia, Canada, Denmark, Finland, Iceland, Norway, and Sweden) were all signatories to AEPS and

therefore became member states of the Arctic Council (Hønneland and Stokke 2007, 50: 2–3). Today the Arctic Council encourages dialogue and collaboration between Arctic nations. Through its binding and non-binding agreements, the Arctic Council has established norms in oil spill prevention, search and rescue, and environmental protection. Despite the many accomplishments since 1996, events leading up to the formation of the Council provide insight into Russia and the U.S.'s skepticism of surrendering any sovereignty to an international organization.

Though active members of the Council today, both the U.S. and Russia had reservations regarding the power and scope of the Arctic Council at the time of its formation. The U.S. objected to the Council's potential infringement on its military and security rights. The American environmental lobby also had strong reservations regarding the rights afforded to indigenous peoples by the proposed Council, arguing that they ran counter to the strong marine mammal protection laws in the U.S. (Hønneland and Stokke 2007, 50:179). The governments of Russia and the U.S. shared concerns over the rights and roles of indigenous peoples, reservations that led to a dilution of indigenous rights in the Council (Hønneland and Stokke 2007, 50:29). The concerns raised by Russia and the U.S. during the formation of the Arctic Council demonstrate both nations' strong preferences towards protecting state sovereignty and their reluctance to compromise their sovereignty through international agreements.

The U.S.'s reservations regarding the power and scope of the Arctic Council reflect the nation's longstanding reluctance to join international organizations or sign international treaties that may infringe on its rights. The Kyoto Protocol, an international treaty ratified by 191 states, and UNCLOS, an international convention with 167 signatory states, demonstrate two of the most widely accepted international accords that the U.S. failed to ratify. President Clinton signed

the Kyoto Protocol in 1997, though the Senate failed to ratify it, citing potential strains on U.S. economy, as certain nations would be given a free ride while energy prices rose in the U.S. (Dewar and Sullivan 1997). Despite renegotiating the section of UNCLOS that the U.S. initially objected to, which requires the transfer of seabed mining technologies to developing nations, and gaining a permanent seat and veto power on the International Seabed Authority, the Clinton, Bush and Obama administrations have all failed to ratify the Convention. With both accords, the U.S.'s reluctance stemmed from fears of economic losses. As bilateral regulation in the Bering Strait would be economically advantageous rather than costly to the U.S., the nation's history of involvement in binding international treaties suggests that there would be no economic impediments to cooperation.

The Redistribution of State Power and the Rise of NGOs

Up until the end of the twentieth century, the assumption that states were the sole bearers of power and influence was widely accepted in the field of international relations. However, the proliferation of international agreements and the increase in number and scope of non-governmental organizations (NGOs) initiated a steady redistribution of power among states, markets, and societies (Mathews 1997, 50). The growth of international trade initiated a truly global economy, which further accelerated the spread of power among non-state actors. The growth of trade coupled with the end of the Cold War signified a new beginning, not only for the relationship between Russia and the U.S., but for the entire international community.

Since the end of the Cold War, traditional threats, including nuclear proliferation, have dwindled, while non-traditional threats such as terrorism, drug trafficking, and environmental deterioration are rising (Mathews 1997, 51). Despite the fact that non-traditional threats are frequently intrastate in nature, the globalization of telecommunications elevates intrastate

conflicts into international issues. Russia's annexation of Crimea and the region's ongoing clashes in the region offers one example of an intrastate conflict that has global implications, largely owing to how widespread and easily accessible the coverage of the conflict has been. As political analyst Jessica Mathews explains, the instantaneous access to information offered by the Internet, "multiplies the number of players who matter and reduces the number who command great authority" (Mathews 1997, 51). Although the instantaneous access to and spread of information often amplifies conflicts, whether international or intrastate, it also affords far more power and influence to the global audience.

One organized audience that has taken advantage of the easy access to and spread of information for the sake of political influence is the non-governmental organization (NGO). In an article on the shift in state sovereignty and the globalization of politics since the Cold War, Mathews argues that NGOs have risen up to share the burden of and authority over non-traditional threats (Mathews 1997). Within the Bering Strait, NGOs have organized conferences and workshops, published journal articles and policy recommendations, and have therefore proven essential in drawing attention to how unprepared the region for the rising vessel traffic and offshore development in the region.

Though the redistribution of power and the rising influence of NGOs suggest that cross-border cooperation has far fewer impediments and far more instigators than ever before, ultimately, the regulation of vessel traffic through the Bering Strait depends on the willingness of the U.S. and Russia to cooperate on a proposal to the IMO.

Past cross-border initiatives between other neighboring nations and both nations' willingness to sign binding international treaties provide insight into the potential for cross-border collaboration between Russia and the U.S. in the Bering Strait. Russia's relationship with

Norway suggests that, despite initial reservations immediately after the fall of the Soviet Union, Russia is willing to agree to bilateral regulation if it is clearly in the nation's best economic interest. The U.S.'s relationship with Canada suggests that it would be willing to collaborate on Arctic endeavors if they prove economically and strategically advantageous.

Russia-Norway Collaboration

Russia and Norway border the Barents Sea, which hosts both large-scale fishing and shipping operations that require bilateral regulation, a situation similar to the Bering Sea. The most comprehensive initiative between Russia and Norway is the Barents Euro Arctic Council (BEAC), formed in 1993. The original objectives of the BEAC were to ensure stability and promote prosperity in the region by fostering mutually advantageous cross-border relationships (Stokke and Tunander 1994, 12). The BEAC sought to encourage trade and business relations among states on either side of old East-West divide. Despite the overwhelming desire for a more economically free-flowing region, political analyst Geir Hønneland suggests that while still recovering from the Cold War and the collapse of the Soviet Union, Russia was suspicious that Norway and other nations were attempting to take advantage of the nation's weakened state. Due to Russia's strong suspicions, the focus of BEAC shifted towards soft policy initiatives such as cultural exchange programs (Hønneland 2009, 36–37).

The Russian-Norwegian cross-border relationship has achieved far more success with the Joint Norwegian Russian Fisheries Commission. Established in 1973, the commission has since met annually to agree on total allowable catch levels for the Barents Sea fishery. Russia has a strong incentive to collaborate on fisheries agreements with neighboring nations, as 25 percent of its total catch comes from the North Basin, which includes the Barents Sea (Food and Agriculture Organization 2008, 21).

One of the most recent cross-border agreements between Russia and Norway was reached in 2010, when the two states ended a nearly forty year long border dispute in the Barents Sea. The dispute was over 68,000 square miles, or approximately 12 percent of the sea's area, which is expected to contain vast amounts of oil and gas reserves. Reaching an agreement meant that both nations can now legally exploit the marine resources in their newly designated marine areas. At a news conference following the agreement, the Norwegian Prime Minister Jens Stoltenberg proclaimed that, "this is a confirmation that Norway and Russia, two large polar nations, do not have a policy about racing [to stake claims], but a policy about cooperation," (Gibbs 2010).

Although the relationship between Russia and Norway has never been as fraught with tension as that between Russia and the U.S., these examples of collaboration suggest some potential for cooperation between Russia and the U.S., as both relationships revolve around a sub-Arctic sea that is host to both the fishing and shipping industries of the neighboring nations. As demonstrated in the BEAC initiative, Russia's tendency to distrust the motives of other countries poses a potentially serious barrier to future collaboration with U.S. Yet, Russia's willingness to collaborate on economically advantageous initiatives such as the Joint Fisheries Commission and the border delineation suggests that it may recognize the economic benefits of ensuring the safe passage of ships accessing the Northeast Passage via the Bering Strait. It is within Russia's economic interest to promote safe shipping not only to promote the use of the Northeast Passage as a global trade route, but also to prevent a major oil spill in the region. The Russian Far East fishery, which includes the Okhotsk Sea, the Bering Sea and the East Kamchatka zone, accounts for 60 percent of total fishery production for Russia (Food and Agriculture Organization 2008, 20).

U.S.-Canada Collaboration

The history of U.S.-Canada relations also sheds light on the potential for successful collaboration between the U.S. and Russia, as the U.S. shares a maritime boundary in the Arctic with Canada. Although the U.S. and Canada were close allies throughout the Cold War and maintain a high level of mutual trust, the two nations' interests in the Arctic have at times placed them at odds, especially regarding sovereignty concerns in Arctic waters. As related in Chapter 1, the American oil tanker *Manhattan's* transit through the Northwest Passage in 1969 in search of an economically viable route to transport oil from Alaska's North Slope to the East Coast ignited outcries for a stronger stance on sovereignty from the Canadian people and government. A similar incident occurred in 1985 when the U.S. Coast Guard icebreaker *Polar Star* transited through the Northwest Passage without permission from the Canadian government.

Along with disagreeing over the freedom of international navigation through Northwest Passage, Canada and the U.S. disagree over their maritime boundary in the Beaufort Sea. The dispute involves overlapping claims of 6,250 square nautical miles of a marine area that is potentially rich in oil and gas resources. In both the Northwest Passage and Beaufort Sea boundary disputes, Canada and the U.S have agreed to disagree. Despite these disagreements, the U.S. and Canada have continued to build upon their mutually beneficial relationship, most recently in their offshore Arctic areas. In 2007, the U.S. and Canada began a joint exercise to map their respective continental shelves in the Arctic Ocean. The U.S. relies on seismic reflection data gathered by the Canadian icebreaker the *Louis S. St.-Laurent*, while Canada gains additional icebreaking capabilities from the American icebreaker the *Healy* and the multi-beam bathymetric data it collects. The Extended Continental Shelf Initiative provides both nations with essential data, while saving millions of dollars, as the collaboration averts double mapping of this

region of shared interest. Along with increased transparency, the bilateral initiative enhances scientific and diplomatic cooperation between Canada and the U.S.

The longstanding mutual trust that has allowed for the U.S. and Canada's deeply integrated strategic defense operations differs strikingly from Russia's tense relationship with Western nations. Nevertheless, it is in both nations' best economic interest to continue with the trend of cooperation to regulate marine traffic and safeguard marine resources in the Bering Strait. That being said, the relationship between the U.S. and Russia presents additional complications owing to residual Cold War mentalities.

Past and Present U.S.-Russia Relations

Despite the economic incentives to ensuring safe shipping through the Bering Strait, the persisting Cold War mentality and the current economic sanctions and political tensions resulting from Russia's annexation of Crimea and resulting violence in the Ukraine may limit cooperation between the U.S. and Russia in the near future. The end of the Cold War and the subsequent collapse of the Soviet Union left Russia politically weak and economically unstable. In his 2010 article on the future of U.S.-Russian relations, Director of the Center for Strategic and International Studies' Russia and Eurasia Program Jeffrey Mankoff argues that, "the Cold War remains the prism through which US.-Russian relations are filtered." Mankoff reasons that the Cold War mentality persists largely because those currently in power in both Washington and Moscow gained experience and rose to their positions during the Cold War era (Mankoff 2010, 1).

Along with a majority of the older generations, Mankoff notes that the Russian youth still harbor distrust and resentment towards the West, as the entire Russian population continues to suffer from the economic and social scars sustained from the collapse of the Soviet Union

(Mankoff 2010, 6). Many Russians blame the West, and the U.S. in particular, for the economic struggles that older generations continue to endure since the fall of the Soviet Union. Russian youth blame recent economic conditions in Russia on the 2008 financial crisis in the U.S. Although they favor a more globalized world, Russian youth continue to harbor a strong resentment towards the liberal capitalist West, and, as Mankoff notes, many even consider the U.S. to be Russia's number one enemy (Mankoff 2010, 12).

At the time of his article, Mankoff implies that, with rising threats in the Middle East, Russia was not considered a top foreign policy priority for the U.S. The weakened state of the Russian economy since the fall of the Soviet Union also allowed the U.S. to focus on more pressing threats. Much has changed in the five years since the publication of Mankoff's article, including Russia's ostracism by Europe and the U.S. due to its controversial annexation of Crimea and its meddling in the Ukraine. In a recent lecture on the current state of relations between Russia and the U.S., former U.S. ambassador to Russia Michael McFaul stressed that the relationship between the two superpowers is more strained today than it has been at any time since the Cold War (Coven 2015).

As rising oil prices over the last decade helped propel Russia into a rising world power, Russian nationalism is stronger than ever. In a 2013 survey, Russian President Vladimir Putin's approval rating was at 64 percent, while in August 2014, after the annexation of Crimea, it rose even higher to 84 percent. Analysts suggest that the sharp spike in nationalistic sentiment post-Crimea shows "a stunning rallying around the flag" (Greene and Robertson 2014). The same surveys asked Russian respondents about their attitudes towards the U.S. Prior to the annexation of Crimea and the resulting sanctions, 42 percent of Russians considered the U.S. an enemy, while in July 2014 the percentage jumped to 53 (Greene and Robertson 2014). The annexation of

Crimea in 2014 has heightened tensions with the West and spurred economic sanctions from many countries, the U.S. included. Although Russians who experienced the height of the Cold War may always harbor resentment for the West in general and the U.S. in particular, Russia's current alienation and Putin's strong political will are solidifying the younger generation's mistrust of the West and ill will towards the U.S.

The resentment between the two nations is not one-sided. Survey's conducted by the Pew Research Center reveal that, although unfavorable opinions of Russia rose considerably after its annexation of Crimea, Americans already harbored negative perceptions of their neighbors to the west. In 2013, 43 percent of Americans had unfavorable opinions of Russia, while in 2014, following the annexation of Crimea, the percentage jumped to 72 (Pew Research Center 2014, 3).

The resentment and mistrust both nations harbor for one another and the current tensions between the two nations may well impede cross-border collaboration in the Bering Strait. Among other sanctions, the U.S. canceled all joint military exercises, including the biannual Northern Eagle exercise between Russia, the U.S. and Norway in the northern Barents Sea. The Northern Eagle exercise began in 2004 as an exercise between Russia and the U.S., which included search and rescue drills, anti-piracy training, helicopter resupply training, and air defense drills in Arctic waters. Norway joined the exercises in 2008 and has since described them as an example of relationship bridge building and an effective tool for cooperation among states in the Arctic (O'Dwyer 2012).

Despite the cancelling of all joint military exercises with Russia, the U.S. and Russia continue to communicate and collaborate on nonstrategic issues via NGOs. In early November 2014, the Worldwide Wildlife Foundation (WWF) hosted a workshop in Anchorage, Alaska titled, "Oil Spill Prevention and Response: Working across U.S.-Russian Boundaries for Arctic

Stewardship." The workshop brought together representatives from both Russian and American WWF offices and representatives from various governmental and non-governmental U.S. organizations including the National Park Service, NOAA, the Ocean Conservancy, the U.S. Coast Guard, the International Union for Conservation of Nature (IUCN), the University of Alaska, the U.S. Fish and Wildlife Service (USFWS), the National Audubon Society, and many others. Russian representatives from the Ministry of Transport, the Association of Traditional Marine Mammal Hunters of Chukotka, and the Institute of Marine Conservation in Vladivostok, among others, attended the workshop.

The WWF workshop focused specifically on preventing and responding to oil spills in the Bering Strait region. Representatives discussed local concerns and state and federal efforts in oil spill preparedness while prioritizing necessary steps to safeguard the marine environment. In a presentation on integrated marine management in the Russian Arctic, Alexey Knizhnikov of WWF Russia noted the long-term co-management of the Barents Sea with Norway as proof of the nation's willingness to cooperate on bilateral management regimes (Knizhnikov and Moiseev 2014).

More recently, in March 2015, representatives from every Arctic nation, including Russia, attended a two-day Arctic Coast Guard Forum (ACGF) in Washington. The ACFD will be an on-going cooperative initiative between all Arctic nations in attempt to strengthen maritime cooperation and coordination throughout the region (U.S. Coast Guard 2015). The U.S.'s willingness to host and Russia's willingness to travel to and cooperate in the forum imply that both nations are able to set their differences aside over issues of safety and security in the Arctic.

Bilateral and multilateral initiatives such as the WWF oil spill prevention and response workshop and the Arctic Coast Guard Forum suggest that, despite persisting Cold War mistrust

and the ongoing repercussions of Russia's annexation of Crimea and actions in the Ukraine, government officials and NGOs from both sides of the Bering Strait can to work together on addressing the region's pressing issues. The rising influence of NGOs in an increasingly globalized world indicates that organizations such as WWF may move nations such as Russia and the U.S. toward cooperation on a bilateral management regime for the Bering Strait. Along with the efforts of NGOs, the Arctic ambitions of both Russia and the U.S. further suggest that reaching an agreement on vessel traffic regulations is not inconceivable, given each nation's recent investments and political commitments.

Arctic Ambitions

Russia

Although the Arctic has long been "on Russia's radar," interest and investment in its offshore Arctic area has become the main focus of the nation's Arctic policies in the twenty-first century. Throughout Vladimir Putin's presidency, the federal government has adopted several new policies addressing the Arctic, including a new Russian maritime doctrine to 2020, a policy plan for naval construction and transport, and a defense strategy for the state's borders and coastal zones (Heininen, Sergunin, and Yarovoy 2014, 16–17).

Russia's twenty-first century commitment to integrate the Arctic into its national strategies is in large part due to the vast and valuable offshore natural resources. In 2007, at President Putin's directive, a Russian expedition planted a titanium flag on the seabed of the North Pole. Although today the international community largely perceives this seemingly aggressive act as a instead a symbolic act directed towards a domestic audience, it occurred around the time that Russia submitted its first claim to the United Nations for 460,000 square miles of continental shelf reaching to the North Pole.

This twenty-first century land grab on the floor of the Arctic Ocean and the policies that followed demonstrate Russia's determination to develop its offshore resources. In 2008, Russia published an updated strategy for the Arctic through 2020. Less than a year later, Russia released its National Security Strategy through 2020, which emphasized the strategic importance of energy resources, reaffirming its commitment to its offshore Arctic territory.

Along with securing its natural resources in the Arctic Ocean and surrounding seas, Russia has publically committed to developing the Northeast Passage as an international trade route. The most recent Russian Arctic policy identified the Northern Sea Route (a term either used interchangeably with the Northeast Passage or used to describe the section of the Northeast Passage in Russian waters) as a strategic national interest in the Arctic (Cohen 2011, 26). At an Arctic Forum hosted by the Russian port city of Archangelsk in 2011, President Putin further stressed the importance of the Northern Sea Route "as an international transport artery that will rival traditional trade lanes" (Bryanski 2011). In order to promote and protect the Northern Sea Route, Russia has committed to several significant infrastructural investments throughout the region.

Russia's fleet of eighteen icebreakers exceeds those of Finland, Sweden, Canada and the U.S. combined. Russia recently invested $1.1 billion in what will be the world's largest and most powerful icebreaker to be launched by 2017. The nation also aims to expand its response capabilities in the region. In April 2014, President Putin encouraged the speedy completion of modern navigation infrastructure, communications, technical services and emergency response centers all along the Northern Sea Route (RIA Novosti 2014). At an Arctic Council meeting held in the Russian port city of Naryan-Mar on the Barents Sea in August 2014, Russia announced its intentions to develop Radio-Technical and Information systems (RTI) that will provide real-time

data regarding potential risks in the region to transiting vessels. The RTI systems will also be capable of alerting the closest response agencies in the case of an oil spill or accident at sea.

Perhaps most revealing of Russia's commitment to develop and promote international trade through Northeast Passage was a $20 million investment in the construction of ten search and rescues centers along the route. The search and rescue centers will be situated along the Russian Arctic coastline, from Murmansk in the west to Provideniya in the east (Figure 3.2). Three of the ten proposed stations are already open, with all centers planned to be operational by the end of 2015, though there has been little information on the status of the remaining seven stations (Nilsen 2014). Russia also announced plans to construct sixteen deep-draft ports, thirteen airfields, and ten air-defense radar stations along its Arctic coast by the end of 2015 (Bora 2014). Despite falling oil prices and economic sanctions, the Russian government increased defense spending by 30 percent for 2015, a portion of which has been dedicated to expanding its military presence and infrastructural support systems along its Arctic coastline (Isachenkov 2015).

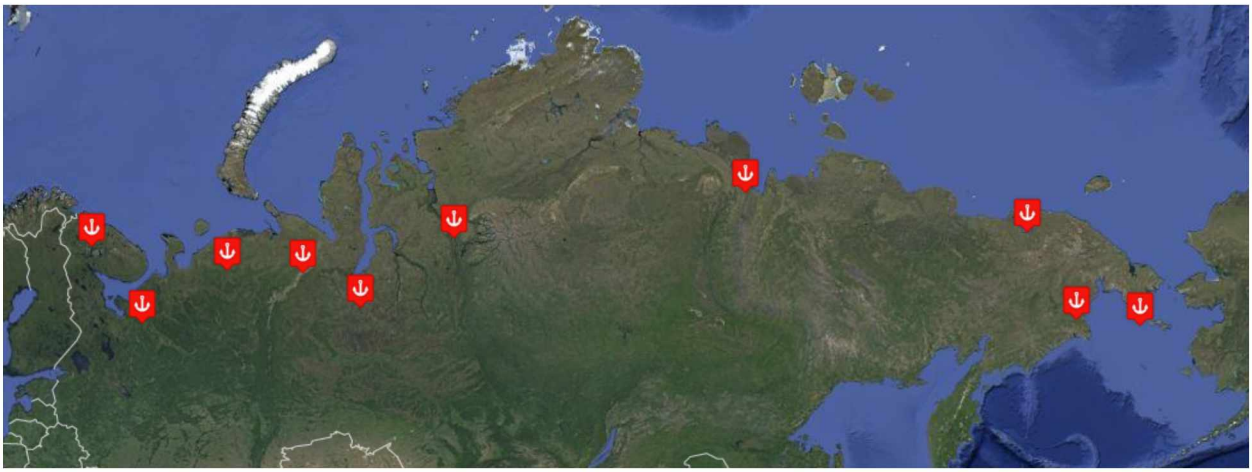


Figure 3.2. The Locations of Russia's Ten New Search and Rescue Stations
Source: (Adomanis 2012)

United States

Compared to Russia, the U.S. lags in its commitment to develop its Arctic territory. In an article comparing the maritime capabilities of Russia and the U.S. in the Arctic by Rick Larsen, a U.S. Representative serving on both the House Armed Services Committee and the House Transportation and Infrastructure Committee, Larsen blames the lack of U.S. investment in the region on the nation's lack of Arctic awareness. He suggests that the policymakers in Washington have always considered the U.S. an Atlantic nation, while those on the West Coast have long considered the U.S. to be an Asia-Pacific nation (Larsen 2013). Very few outside of Alaska consider the U.S. to be an Arctic nation, which has resulted in the low prioritization of and therefore low investment in the American Arctic.

Historically the U.S. has not had a national strategy for the Arctic. Instead, beginning in 1971, the Arctic has been subsumed in national security directives. President Obama has proven more proactive regarding U.S. Arctic interests both domestically and internationally. Obama sent Hillary Clinton, then Secretary of State, as a high-level envoy to the 2011 Arctic Council meeting in Greenland and signed the Arctic Council Search and Rescue protocol as well as the Council's Marine Oil Pollution Preparedness and Response plan. In 2012, the U.S. released its first strategy specifically devoted to its Arctic territory, the "National Strategy for the Arctic Region," demonstrating the nation's increased Arctic awareness. Since then, federal agencies including the U.S. Navy, NOAA, the Department of the Interior and the U.S. Coast Guard have all released their own Arctic strategies addressing national security, infrastructure development, and environmental conservation in the region.

Despite its recent political acknowledgement of the challenges and opportunities in the American Arctic, the U.S. continues to lag behind many other Arctic nations in its preparedness

for increased vessel traffic and offshore oil and gas activities. Compared to Russia's expanding fleet of icebreakers, the U.S. has only one heavy icebreaker, the *Polar Star*, and one medium icebreaker, the *Healy*. While the *Healy* operates mainly in the Arctic, the *Polar Star* splits time between the Arctic and Antarctic, playing a vital role in resupplying the two U.S. research centers in Antarctica. The *Polar Star* is also nine years beyond its decommission date, with recent upgrades expected to extend its life anywhere from five to twenty years (Knickmeyer 2014). In 2010, the U.S. Coast Guard released the High Latitude Study, which declared that the U.S. needs at least three heavy and three medium icebreakers to carry out its polar missions (U.S. Coast Guard 2010, 12).

The region's lack of a deep-draft port along its coastline further weakens the inadequate vessel support system in American Arctic waters. The closest American deep-draft port is Dutch Harbor in the Aleutian Islands. The only Russian deep-draft port open to international vessels near the Bering Strait is at Provideniya, on the Chukotka Peninsula. A deep-draft port in American waters would help ensure the highest standard of safety for the increasing vessel traffic passing through the region each season. It would also offer support to American offshore oil and gas endeavors, thereby aiding the nation's energy independence. Finally, an additional port and increased Coast Guard presence along the Alaskan coastline would enhance U.S. national security, which has been a priority in the nation's various Arctic strategies.

In 2008, the U.S. Army Corps of Engineers (ACE) collaborated with the State of Alaska to study the feasibility of an Arctic deep-draft port, and in 2013, ACE released its initial findings in the "Alaska Deep-Draft Arctic Port System Study." The joint federal-state study analyzed fourteen port locations along 3,000 miles of Alaska's coastline beginning with Bethel in the south and reaching as far east as the U.S.-Canadian border. Upon additional input and further

analysis, ACE recently recommended Nome as the site of America's future Arctic deep-draft port. ACE will present the study's complete findings and recommendations to both the state and Congress for approval later this year. The project will undoubtedly receive approval in Alaska, though it is unclear whether Congress will support the project owing to a general indifference among legislators towards Arctic infrastructure investments (Kuersten 2015).

Despite congressional apathy, another federally funded study focused on safety in the Bering Strait is underway. The U.S. Coast Guard recently conducted a Port Access Route Study (PARS), which the federal government requires before establishing new or adjusting existing sea lanes or traffic separation schemes in American waters. The Bering Strait PARS commenced in 2010 to evaluate the need for new vessel routing measures in the region, which would enhance navigational safety and increase vessel traffic efficiency through the region. After receiving and addressing comments from the 2010 study, the Coast Guard expanded on the study's findings in December 2014. The 2014 version proposed voluntary routing measures that included north and southbound shipping lanes and four precautionary areas, located at the starting and ending points of each section of the north and southbound lanes (Figure 3.3). The period for public comment on the study's recommendations will close in July 2015.

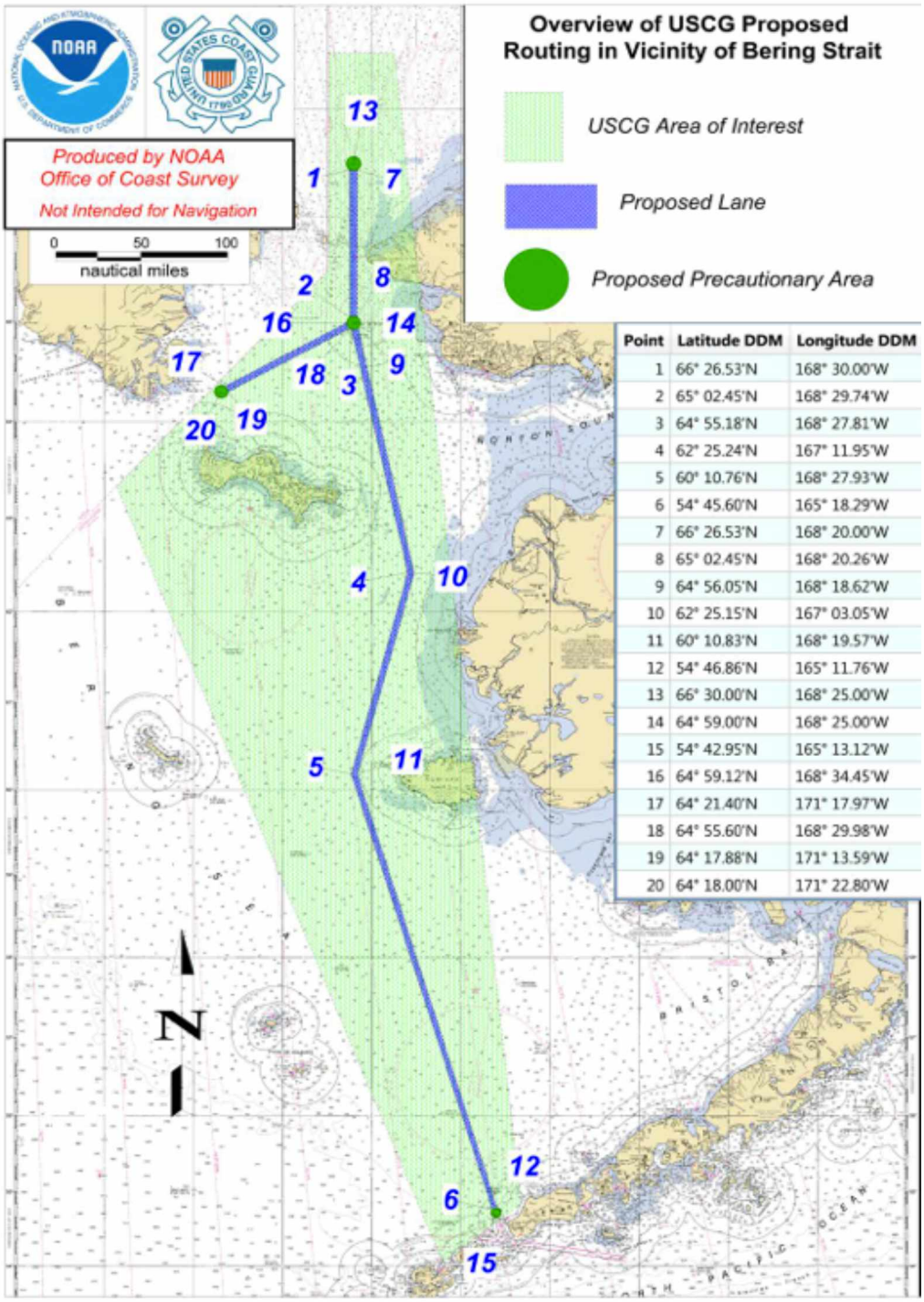


Figure 3.3. Overview of the U.S. Coast Guard's Proposed Routing in the Bering Strait
Source: (U.S. Coast Guard 2014b, 1)

Although the Port Access Route Study suggests a rising interest in ensuring safe shipping through the Bering Strait, the resulting regulations will be limited in scope and effectiveness. The

proposed north and southbound shipping lanes and precautionary areas would only apply to American waters, meaning that vessels outside American waters would not have to adhere to suggested shipping lanes. Inadequate regulation, whether mandatory or voluntary, in any traversable region of the Bering Strait area leaves the entire marine environment at risk. If an oil spill were to occur in Russian waters, chances are high that American waters would also suffer from the effects of the spill. The Bering Strait is an international waterway and therefore requires international regulation to ensure the highest and most comprehensive protection of the marine environment.

The U.S. Coast Guard is already looking beyond the scope of national initiatives. In July 2014, U.S. Coast Guard Vice Admiral Peter Neffenger testified before the House Transportation and Infrastructure Subcommittee on Coast Guard and Maritime Transport on implementing U.S. policy in the Arctic. He called House members' attention to the ongoing analysis of current vessel traffic density and possible management options reviewed in the Bering Strait PARS. Neffenger recommended the U.S. coordinate with other Arctic nations (i.e. Russia), to help determine ship routing recommendations to the IMO (Neffenger 2014).

Although the U.S. has not yet committed to investing in a search and rescue support station in the region, federal agencies have collected and shared data on vessel traffic and offshore activities in and around the Bering Strait. NOAA collaborated with the Department of the Interior's Bureau of Safety and Environmental Enforcement (BSEE) and two additional agencies to develop the Environmental Response Management Application, known as Arctic ERMA. The web-based GIS tool serves as a platform for all the available and up-to-date information needed for emergency response in the Arctic, including extent and concentration of

sea ice, location of ports and pipelines, and vulnerable environmental resources (NOAA Office of Response and Restoration 2015).

The recently released policies, ongoing studies, and in-place monitoring programs initiated by state and federal agencies suggest a growing commitment to America's Arctic. Another sign that the U.S. aims to develop its Arctic region and increasingly identifies as an Arctic nation came in July of 2014, when the State Department appointed former Coast Guard Commandant Admiral Robert Papp as the U.S.'s first representative for the Arctic. In the press statement announcing Admiral Papp's appointment, Secretary of State John Kerry stated that his overarching duty would be to elevate Arctic issues in America's foreign policy and national security strategy, "because the United States is an Arctic nation, and Arctic policy has never been more important, particularly as we prepare to Chair the Arctic Council in 2015," (Kerry 2014). Admiral Papp has since outlined the U.S.'s agenda for the Arctic Council Chairmanship, which will focus on Arctic Ocean safety, security and stewardship, improving economic and living conditions, and addressing the impacts of global warming (Exner-Pirot 2015). The chairmanship presents the U.S. with an opportunity not only to set priorities for the Arctic Council between 2015 and 2017, but it also provides an opportunity to promote an American national identity inclusive of the Arctic.

In an effort to further prepare for the Chairmanship, President Obama issued an Executive Order for Enhancing Coordination of National Efforts in the Arctic in January 2015. The order recognizes the ecological, cultural, and economic value of America's Arctic region while also acknowledging the changes taking place in Alaska due to the effects of global warming. As the region opens up to increased development, the order seeks to improve coordination and streamline communication among stakeholders in the American Arctic,

including federal, state, local, and Alaska Native tribal governments, along with Alaska Native organizations, and both private and non-profit groups (The White House 2015).

President Obama has also signaled his intent to protect Alaska's coastal areas, which are rich in a diverse array of resources. In December 2014, Obama banned oil and gas development in Bristol Bay, which produces more than 40 percent of the world's sockeye salmon and derives $2 billion in profit from commercial fishing and $100 million in recreational fishing and tourism each year (Somanader 2014).

Alaska's Deep-Draft Port Study, the Bering Strait PARS, the appointment of America's first Arctic representative and the Executive Order to enhance communication and coordination among Arctic stakeholders all signify an increased awareness of America's strategic interests in the Arctic, while the commitment to protect Alaska's profitable fisheries from the effects of outside development signals an increased awareness of America's considerable economic interests in the region.

Despite past tensions, looming apprehensions, and present disputes, the economic and strategic interests of both Russia and the U.S. in their respective Arctic regions suggest that agreeing upon a bilateral management regime for vessel traffic in the Bering Strait would not be unprecedented. Russia's economic instabilities combined with their ambitious plans to develop the Northeast Passage suggest that cooperation with the U.S. is in Russia's economic interest. As the U.S. begins its two-year chairmanship of the Arctic Council, investing in infrastructure and regulations that will support safe shipping through the Bering Strait will promote sustainable development in the region, increase coordination with Alaskans, and elevate the Arctic in the American national consciousness. Given the political climate, neither nation will likely absolve the other of its past or present actions. However, Russia's large-scale infrastructure investments

along the Northeast Passage, both nations' commitments to enhance vessel safety in Arctic waters, and their economic interests in safeguarding the health of the commercial fisheries in the Bering Sea portend recognition of the benefits of a collaborative regulatory framework for the Bering Strait.

Discussion

The end of World War II brought a redistribution of state power and a rise in the number and influence of non-governmental organizations. Although the Cold War continued into the late twentieth century, the Iron Curtain eventually fell, and so too did the threat of nuclear warfare. While tension between Russia and the U.S. has increased in the last year, history reveals attempts and advantages to remaining allies rather than enemies.

The last time the U.S. chaired the Arctic Council, between 1998 and 2000, the minimum sea ice extent in the Arctic covered 2.3 million square miles. In September of 2012, minimum sea ice extent reached a record low of 1.3 million square miles. Although the thickness and extent of the sea ice is strikingly different today, there are many parallels between American and Russian relations and economic conditions from then and now.

In 1998, the U.S. Department of Defense published the U.S. Security Strategy for the East Asia-Pacific Region. One of the main goals of the strategy was to expand regional cooperation with Russia (U.S Department of Defense 1998). The strategy noted that, "Military exercises and cooperation, port visits, and both senior-level and staff-level exchanges with the region's armed forces have enhanced transparency and trust," which have, "reduced suspicions left over from the Cold War." Along with deemphasizing historical tensions and minimizing longstanding disputes in the region, the strategy also expressed hope that continuing transparent

and cooperative relations with Russia "can contribute substantially to the regional economic growth and buttress regional peace" (U.S Department of Defense 1998, 2.8).

In recent months, owing to declining oil prices and Western imposed economic sanctions, the Russian ruble has lost 20 percent of its value. In 1998, Russia was experiencing an even worse financial crisis, as the ruble declined by 70 percent. The Russian economy eventually rebounded, due in large part to rising oil prices, though the nation's economy took nearly a decade to recover (Person 2014). Russia cannot afford to postpone its economic aspirations for another decade. Putin's determination to transform the Northeast Passage into a global trade route and therefore propel Russia to the status of a world power should motivate cooperation with the U.S.

Increased traffic along Russia's Arctic coast would fuel the nation's economy, as its northern ports would service more transiting vessels and the government would collect more fees from shippers. Along with the revenue brought in by transiting vessels, providing access to an international trade route would offer Russia the opportunity to rebuild its reputation as an essential asset to the global economy.

Yet, Russia will not be able to attract international trade relying solely on the fact that trans-Arctic routes offer attractive distance savings. Alternative trade routes must not only shorter be but also safer. A route that boasts little to no risk of accidents at sea and no piracy has the best chance of competing against southern sea lanes. The world's current chokepoints, such as the Suez Canal and the Strait of Malacca, experience congestion and piracy, among other impediments to safe and efficient trade. Regulation that ensures the highest standards of safety through the Bering Strait would therefore enhance the region's attractiveness to international shippers. The highest standards of safety would also safeguard the Russian Far East commercial

fishery, which produces 68.5 percent of all catches in Russia, an economic storehouse Russia cannot afford to jeopardize (Food and Agriculture Organization 2008, 21).

The U.S. must also see cooperation in its best interest. The recent economic sanctions and canceled military missions with Russia suggest that, despite it being in the nation's best interest to promote safe shipping and protect the marine ecosystem in the Bering Sea, the U.S. is resisting cooperation with Russia. While military cooperation with Russia does not appear likely in the foreseeable future, collaboration to promote transit safety and environmental conservation presents low risk to American security while offering substantial benefits.

President Obama's effort to reestablish relations with Cuba suggests the federal government's willingness to begin to mend affairs with a Cold War enemy. Proponents suggest that normalized relations between the Cuba and the US will benefit both nations economically and strategically (Glickman 2014; Stallworth 2015). Although a more contentious and complicated situation, the recent nuclear agreement reached with Iran, which will result in increased engagement and the lifting of sanctions, also suggests that collaboration with Russia is not inconceivable. In an interview with *The New York Times* following the accord, President Obama described Iranian President Hassan Rouhani as, "deeply suspicious of the West," which he acknowledged would not change immediately (Friedman 2015). Despite a history of violence and aggression towards the West, Obama suggested that an agreement with Iran is low-risk but could potentially offer great rewards by opening up borders and increasing transparency.

The same holds true for relations between Russia and the U.S., especially with regard to environmental and safety regulations, which pose no threat to Russian or American security. Although corruption continues to plague Russian governance and its economy is in a weakened

state, collaboration with the U.S. could potentially influence Russian governance, improve U.S-Russian relations, and economically benefit both nations.

Conclusion

What was once an ice-choked region that offered little economic benefits to its coastal states, besides the subsistence resources that sustained Native peoples in the region for thousands of years, is now increasingly accessible to resource development and trade. Global warming is opening the Arctic to potential stakeholders from around the world interested in the wealth of resources accessible in the region. Despite the immense opportunities increasingly accessible in the Arctic, the region is ill prepared for the expected rise in vessel traffic and industrial activity.

An overview of the existing applicable legal framework for the Arctic reveals the gaps in regulation for vessel traffic, which puts the marine ecosystem and shippers at risk of accidents at sea. The Polar Code is essential in setting the foundation for regulation in Arctic waters, though the Code falls short of ensuring the highest level of protection for mariners, the marine ecosystem, and the region's coastal communities. Analysis of the effectiveness of mandatory and voluntary regulatory regimes suggests that the unique vulnerability of the Arctic region warrants mandatory vessel traffic regulations in the Bering Strait. The various regulatory instruments established through the International Maritime Organization (IMO) offer potential frameworks for more comprehensive and site-specific regulation. Through the International Convention for the Prevention of Pollution from Ships (MARPOL), Russia and the U.S. could impose more stringent regulations on ship-sourced pollution through the designation of a MARPOL special area or an Emission Control Area (ECA). The IMO also offers a more comprehensive set of regulations with the designation of a Bering Strait Particularly Sensitive Sea Area (PSSA).

Notwithstanding the various options for more stringent and site-specific regulation, the U.S. and Russia must be willing to collaborate on an application to the IMO to increase regulation in the Bering Strait. The commitment expressed by Russia to develop its Arctic resources, including international shipping and offshore oil and gas operations, should imply the nation's eagerness to ensure the highest standards of safety in the Bering Strait. Russia's history of cooperation with Norway suggests the nation's willingness to take part in cross-border management strategies when the strategy works to Russia's economic advantage. The Arctic ambition of the U.S. pales in comparison to that of Russia, though recent federal policies and actions suggest that the U.S. finally recognizes itself an Arctic nation and will begin to realize its potential in the region.

Although Cold War perceptions have diminished, Russia's persisting distrust of the West in general and the U.S. in particular have hindered cooperation between the two nations for decades. Sanctions against Russia and cancelled military exercises by the U.S. also threaten to impede cooperation between the two nations. Despite these barriers, both nations' current economic and strategic interests would be furthered by cooperation over regulation in the Bering Strait. Russia would increase its economic stability and enhance its political stature with the promise of safe shipping through the Bering Strait, while the U.S. would have the potential to increase its influence in Russia and its Arctic awareness at home. A cooperative approach to more stringent and site-specific regulation in the Bering Sea would thus benefit Russia and the U.S., while also safeguarding the marine environment that plays a vital role in the livelihoods of commercial fisheries and subsistence communities on both sides of the strait.

Conclusion

For thousands of years, the growth and success of societies have depended on their access to waterborne trade. The shortest routes between markets offered various efficiency-related benefits, and as transoceanic trade grew, chokepoints formed where the most desirable sea lanes narrowed. Today, as 90 percent of all world trade is transported on oceans or waterways, chokepoints play a vital role in the global economy. Demand for goods is expected to continue to rise, along with the global population and living standards in the developing world, creating a strain on the already congested chokepoints of international trade. Piracy contributes an additional strain on certain chokepoints, such the Strait of Malacca and Bab el-Mandeb, costing the world economy billions of dollars each year (The World Bank 2013, 5).

The threat of piracy, continuing congestion of chokepoints, and the growing demand for goods worldwide are prompting shippers to look to the North for shorter and safer trade routes. For centuries, the Northeast and Northwest Passages attracted the attention of mariners for their potential distance savings, though historically these routes have proved impassable due to the region's harsh environment and persisting sea ice. However, the impediments to trans-Arctic trade promise to dissipate in the coming decades, as the effects of global warming thaw the Arctic Ocean and investment in icebreakers and coastal support stations and technologies continues to rise.

The Bering Strait will play a vital role in the future of trans-Arctic trade. The waterway offers the only route connecting the Pacific and Arctic Oceans and is therefore a necessary entry or exit point for all trans-Arctic traffic. Owing to the Bering Sea's thriving marine ecosystem, the region has supported human life for thousands of years. The productive ecosystem has proved profitable for seal and otter harvesters, whalers, and fishermen since the middle of the eighteenth

century. Today, interest in the Bering Sea has shifted towards the promise of shorter shipping routes between the East and West, spurring investments in ice-breaking technologies and support facilities along Arctic routes. Moreover, interest in the entire Arctic region is also on the rise, as predictions of large offshore oil and gas reserves attract the attention of resource extraction industries. Despite the increasing anticipation of the Arctic's economic potential, the region has not yet experienced a dramatic rise in vessel traffic, largely owing to persisting sea ice and inadequate infrastructural support throughout the region.

The history of maritime trade suggests that time and distance savings offered by trans-Arctic trade routes will eventually motivate states to take full advantage of these efficiencies. Increased traffic through the Bering Strait will imperil the thriving marine ecosystem that supports the region's commercial fisheries and coastal communities. The significant value that the Bering Sea provides to national, state, and local economies and the substantial health benefits the sea's resources offer to the region's coastal communities warrant proactive regulation of vessel traffic in the Bering Strait. A major oil spill or a series of smaller spills could devastate the region. Ship-sourced pollution also poses a threat to the marine ecosystem, as ship exhaust will settle on the surrounding ice cover and coastal areas, contaminating the habitats of subsistence species and accelerating the ice and snow melt in the region. Additionally, ship strikes and noise pollution will threaten the already endangered marine mammals that provide coastal communities with a large portion of their subsistence diets.

As the inevitable rise in vessel traffic through the Bering Strait looms in the future, now is the time to ensure the highest standards of safety and the best protection of the Bering Sea's marine resources. Historically, governments and international organizations have tended to enact regulation *in response to* major environmental disasters. Given the likelihood of increased traffic

in the Bering Strait and the inevitability of accidents, this thesis argues for proactive regulation to mitigate environmental harms from increased human activity in the Arctic, specifically in the Bering Strait. The International Maritime Organization (IMO) offers various instruments for imposing site-specific shipping regulations, such as north and southbound lanes, speed limits, and areas to be avoided. However, before IMO instruments such as Emission Control Areas or Particularly Sensitive Sea Areas (PSSAs) can be adopted, Russia and the U.S. must agree to cooperate on a proposal to the IMO.

Historical mistrust between Russia and the U.S., as well as their general reluctance to commit to bilateral or multi-lateral agreements that constrain their sovereignty, has long hindered cross-border cooperation between the two nations. Russia's annexation of Crimea and the resulting violence in the Ukraine have further strained the nation's relationship with the U.S. Despite these barriers to cooperation, ensuring safe shipping through the Bering Strait furthers both nations' economic and strategic interests, as the Russian and American commercial fisheries in the Bering Sea contribute significantly to each nation's total annual catch.

Along with protecting the region's commercial fisheries, ensuring safe shipping through the Bering Strait would increase Russia's economic stability and enhance its political stature. The nation's ability to attract international vessel traffic through the Northeast Passage is dependent on the route's reputation as a safe and reliable alternative to southern routes. Cooperation with Russia would also allow the U.S. to safeguard its Arctic interests and potentially increase its influence in Russia. As the U.S. begins its chairmanship of the Arctic Council and as nations and indigenous groups throughout the Arctic call for the region to remain a zone of peace, the U.S. and Russia are in a unique position to demonstrate international leadership. A proactive cross-border management regime in the Bering Strait would further both

Russia and the U.S.'s economic and strategic interests, safeguard the region's immensely valuable yet exceptionally vulnerable marine resources, and promote peaceful relations in the coming 'age of the Arctic.'

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