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Arctic Bottleneck: Protecting The Bering Strait Region From Increased Vessel Traffic

Andrew Hartsig

Ivy Fredrickson

Carmen Yeung

Stan Senner

ARCTIC BOTTLENECK: PROTECTING THE BERING STRAIT REGION FROM INCREASED VESSEL TRAFFIC

Andrew Hartsig,[*] *Ivy Fredrickson,*[**] *Carmen Yeung*[***] *and Stan Senner*[****]

I. INTRODUCTION

Climate change in the circumpolar Arctic is reducing seasonal sea ice coverage and leading to longer periods when the ocean surface is relatively ice-free. The reduction in the temporal and geographic extent of sea ice is in turn driving increased interest in the pursuit of commercial and industrial activities throughout the Arctic, including oil and gas exploration and development, mining, tourism, and shipping. While these activities are already affecting various parts of the Arctic Ocean, the Bering Strait and surrounding waters are likely to experience especially significant impacts due to the increased vessel traffic associated with the expansion of commercial activity.

Sea ice covers the Bering Strait region for much of the year, and the area is subject to severe weather and strong ocean currents. Despite the harsh environment, these waters are remarkably productive. Fish and wildlife—including a wide variety of marine mammals and seabirds—make extensive use of the area, and many species use the Bering Strait as a vital migration corridor. Moreover, the people residing in Bering Strait communities are an integral part of the region's rich ecosystem. For thousands of years they have depended on the marine resources of the region to support their way of life.

As seasonal sea ice diminishes and industrial activity in the Arctic grows, the Bering Strait will continue to experience increasing levels of

* Arctic Program Director for Ocean Conservancy, a national marine conservation organization.

** Staff Attorney for Conservation Programs, Ocean Conservancy.

*** Conservation Biologist, Ocean Conservancy.

**** Director of Conservation Science, Ocean Conservancy.

vessel traffic. Increased maritime traffic in the narrow, often icy waters of the Bering Strait could elevate the risk of maritime accidents that lead to injury and loss of life. Increased vessel traffic may also result in more pollution, ship strikes on marine mammals, chronic and catastrophic spills, and other unanticipated environmental impacts. These threats are of particular concern due to the region's lack of infrastructure and limited resources to support search and rescue, spill response, and restoration activities. In a part of the ocean as biologically rich and fragile as the Bering Strait region, these increased environmental impacts could have serious consequences.

At present, there are few protective measures in place to improve safety, reduce the risk of accidents, or mitigate environmental impacts associated with increased commercial vessel traffic in the Bering Strait and surrounding waters. With vessel traffic in the region likely to expand significantly, the status quo must change. Given the Bering Strait region's status as a gateway between the Pacific and Arctic oceans, its significance as a wildlife migration corridor, its biological productivity, and its importance to the subsistence economies of surrounding communities, the United States should work with the Russian Federation and the international community to adopt and implement heightened safety, prevention, management, and mitigation measures in order to protect the region from the impacts of increased vessel traffic.

This Article outlines the environmental and socio-economic characteristics of the Bering Strait region, explores the legal framework that governs shipping traffic in the Strait, identifies the institutions that are best positioned to adopt and implement changes in policy and governance, and examines the legal tools and instruments available to regulate vessel traffic that will improve safety and protect the people and biological resources of the region. Part II of this Article describes some of the attributes of the Bering Strait and its surrounding waters, including geographical features, the role of seasonal sea ice, biological characteristics, neighboring human communities, and the ongoing and anticipated impacts of climate change and ocean acidification. Part III describes the status and expected future growth of maritime traffic in the region. Part IV of this Article explains the overarching legal regime established by customary international law and the 1982 United Nations Convention on the Law of the Sea, with particular emphasis on those portions of the law that relate to international straits, ecologically important areas, and ice-covered waters. Part V identifies and describes institutions that could facilitate the adoption and implementation of improved safety and environmental protection measures in the Bering Strait region and evaluates some of the specific instruments and tools

that these institutions could employ. Finally, Part VI recommends that the United States, the Russian Federation, other Arctic nations, and the international community act now—in advance of a crisis—to adopt and implement specific measures designed to improve safety, reduce the threat of accidents, and prevent and mitigate environmental threats that are likely to develop as a result of increased vessel traffic in the Bering Strait region.

II. PHYSICAL, BIOLOGICAL, AND CULTURAL ATTRIBUTES OF THE BERING STRAIT REGION

The Bering Strait and surrounding waters are a unique part of the global ocean. Although sea ice covers the area for much of the year, the Bering Strait is the only marine gateway between the Pacific and the Arctic oceans. Biologically, it is tremendously productive and provides a habitat and a migration corridor for a diverse array of species. People living in the region's communities practice a subsistence way of life that is dependent on the continued productivity and composition of the region's marine ecosystem. At the same time, the region is already feeling the effects of rapid climate change and ocean acidification. The following sections offer more detail on these attributes of the Bering Strait region.

A. Geography and Seasonal Sea Ice in the Bering Strait Region

This Article refers to the northern Bering Sea, the Bering Strait, and the southern Chukchi Sea as the "Bering Strait region." The region includes the marine area between North America and Asia from roughly 63º and 69º north latitude; it extends from St. Lawrence Island and the northern Bering Sea north through the Bering Strait to the southern Chukchi Sea and Cape Lisburne.

The northern Bering Sea includes Chirikov Basin, which spans across United States and Russian waters north of St. Lawrence Island and west of Norton Sound.[1] In the southern Chukchi Sea north of the Bering Strait lies Hope Basin. It is relatively shallow, with water depths ranging from roughly 65 to 200 feet.[2] The Bering Strait itself is a narrow stretch of ocean that separates Alaska's Seward Peninsula on the east from the

1. Melanie A. Smith, Place-based Summary of the Arctic Marine Synthesis (Audubon Alaska) Sept. 2011, at 11, *available at* http://ak.audubon.org/sites/default/files/documents/place-based_summary_of_the_arctic_marine_synthesis_final.pdf.

2. *Id.* at 23.

Russian Federation's Chukotka Peninsula on the west.[3] The Strait is approximately 55 miles wide at its narrowest point, and its maximum depth is less than 200 feet.[4] Big Diomede Island (Russian Federation) and Little Diomede Island (United States) lie roughly in the middle of the passage.[5] However, above all, the Bering Strait is the only direct marine passage between the Pacific and Arctic oceans.

In the Chirikov Basin, three major ocean currents meet before flowing north through the Bering Strait and into Hope Basin.[6] This northerly flow of nutrients sustains a huge biomass of benthic invertebrates,[7] marine mammals,[8] and seabirds.[9] In Hope Basin, the three ocean currents are joined by a fourth current that typically flows east along the northern Chukotka coast.[10] Together, these currents full of relatively warm and nutrient-rich water serve as nourishment to high levels of phytoplankton, zooplankton, and benthic productivity.[11]

In addition to the mix and flow of ocean currents, the seasonal advance and retreat of sea ice plays a critical role in the Bering Strait region. Typically, ice forms in the region in October or November and remains until May, June, or July.[12] This sea ice is not a continuous, uniform sheet; it is a dynamic, diverse, ever-changing habitat. First-year sea ice can become more than a meter thick over the course of the winter, and thicker multi-year pack ice from the Arctic Ocean is sometimes pushed south through the Bering Strait and into the Bering Sea.[13]

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3. *Id.* at 6.

4. *Id.* at 15.

5. *Id.* at 17.

6. L.K. COACHMAN ET AL., BERING STRAIT: THE REGIONAL PHYSICAL OCEANOGRAPHY 75-76 (1975).

7. Jacqueline M. Grebmeier & C. Peter McRoy, *Pelagic-Benthic Coupling on the Shelf of the Northern Bering and Chukchi Seas. III. Benthic Food Supply and Carbon Cycling*, 53 MARINE ECOLOGY PROGRESS SERIES 79, 87-88 (1989).

8. Sue E. Moore et al., *Cetacean Habitat Selection in the Alaskan Arctic During Summer and Autumn*, 53 ARCTIC 432, 443-45 (2000).

9. Alan M. Springer et al., *The Paradox of Pelagic Food Webs in the Northern Bering Sea—I. Seabird Food Habits,* 7 CONT'L SHELF RESEARCH 895, 909 (1987).

10. Thomas J. Weingartner et al., *The Siberian Coastal Current: A Wind- and Buoyancy-forced Arctic Coastal Current*, 104 J. OF GEOPHYSICAL RESEARCH 697, 706-707 (1999).

11. P.J. Stabeno et al., *Physical Forcing of Ecosystem Dynamics on the Bering Sea Shelf*, THE SEA: THE GLOBAL COASTAL OCEAN (Allan R. Robinson and Kenneth Brink eds., 2005), *available at* http://www.pmel.noaa.gov/pubs/outstand/stab2529/northern_shelf.shtml.

12. ARCTIC COUNCIL, ARCTIC MARINE SHIPPING ASSESSMENT 2009 REPORT 106 (2009) [hereinafter AMSA 2009].

13. *Id.*

Currents and wind move sea ice at speeds as high as twenty-seven nautical miles per day.[14] These ice floes, driven by wind and currents, may collide with each other and form significant ridges on the ice surface.[15] As sea ice melts, it affects the salinity and density of ocean water, changing ocean circulation patterns across hundreds of square miles.[16]

B. Biological Attributes of the Bering Strait Region

The icy waters of the Bering Strait region provide a habitat for a broad array of species. Dozens of species of birds use the region for breeding, migrating, and/or foraging.[17] These include short-tailed albatross, spectacled eiders, and Steller's eiders—all of which are listed as threatened or endangered species under the Endangered Species Act.[18] The Strait also provides a key breeding, pupping, feeding, and migratory habitat for many species of marine mammals.[19] Beluga whales, bowhead whales, gray whales, Pacific walruses, polar bears, and four species of ice-dependent seals—bearded, ribbon, ringed, and spotted—all depend on the region for migrating, feeding, breeding, and/or resting.[20] Many of these species are also listed, or proposed for listing, under the Endangered Species Act.[21] The Bering Strait region also includes

14. *Id.*

15. *Sea Ice Features: Introduction*, NATIONAL SNOW AND ICE DATA CENTER, (Sept. 9, 2012), http://nsidc.org/cryosphere/seaice/characteristics-features-intro.html.

16. Dagmar Budikova, *Role of Arctic Sea Ice in Global Atmospheric Circulation: A Review*, 68 GLOBAL & PLANETARY CHANGE 149, 153 (2009).

17. Smith, *supra* note 1, at 17.

18. *Id.*; *see also* Endangered and Threatened Wildlife, 50 C.F.R. § 17.11 (2011).

19. *See, e.g.*, Lloyd F. Lowry et al., *Feeding of Bearded Seals in the Bering and Chukchi Seas and Trophic Interaction with Pacific Walruses*, 33 ARCTIC 330, 340 (1980); Jacqueline M. Grebmeier & Nancy M. Harrison, *Seabird Feeding on Benthic Amphipods Facilitated by Gray Whale Activity on the Northern Bering Sea*, 80 MARINE ECOLOGY PROGRESS SERIES 125, 131 (1992); Donald M. Schell, *Declining Carrying Capacity in the Bering Sea: Isotopic Evidence from Whale Baleen*, 45 LIMNOLOGY & OCEANOGRAPHY 459, 459 (2000); Gay Sheffield & Jacqueline M. Grebmeier, *Pacific Walrus (Odobenus Rosmarus Divergens): Differential Prey Digestion and Diet,* 25 MARINE MAMMAL SCIENCE 761, 761-63 (2009).

20. *See, e.g.*, Smith, *supra* note 1, at 7-12, 15-18, 23-24.

21. *See, e.g.*, 50 C.F.R. § 17.11 (listing bowhead whales as endangered, polar bears as threatened, and Steller sea lions as threatened (east of 144º west longitude) and endangered (west of 144º west longitude)); Endangered and Threatened Wildlife and Plants; Review of Native Species That Are Candidates for Listing As Endangered or Threatened, 76 Fed. Reg. 66,370, 66,431 (Oct. 26, 2011) (naming the Pacific walrus as a candidate for listing pursuant to the Endangered Species Act); Endangered and

designated essential fish habitat for Arctic cod, saffron cod, snow crab, and five species of Pacific salmon.[22]

As the only marine corridor connecting the Pacific and Arctic oceans, all wildlife that migrates to the Chukchi and Beaufort seas during the summer months must pass through the bottleneck of the Bering Strait twice per year during their spring and fall migrations.[23] Similarly, many migratory birds and mammals gather in the Chirikov Basin in the spring and follow the retreating ice edge north through the Bering Strait.[24] As a result, the Bering Strait is a pathway for millions of seabirds and hundreds of thousands of marine mammals every year.[25]

These yearly migrations are essential to people living in Bering Strait communities and beyond. One species of particular subsistence importance is the bowhead whale. The Bering-Chukchi-Beaufort stock of bowhead whales numbers around 10,500 individuals.[26] These whales winter in the Bering Sea and migrate north in the spring, following leads in the sea ice in the eastern Chukchi Sea until they pass Point Barrow,

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Threatened Species; Proposed Threatened Status for Subspecies of the Ringed Seal, 75 Fed. Reg. 77,476, 77,476 (Dec. 10, 2010) (proposing subspecies of ringed seal for listing pursuant to the Endangered Species Act); Endangered and Threatened Species; Proposed Threatened and Not Warranted Status for Subspecies and Distinct Population Segments of the Bearded Seal, 75 Fed. Reg. 77,496, 77,496 (Dec. 10, 2010) (issuing a proposed rule to list the Beringia and Okhotsk distinct population segments of the bearded seal as threatened species pursuant to the Endangered Species Act).

22. *See* FISHERY MANAGEMENT PLAN FOR FISH RESOURCES OF THE ARCTIC MANAGEMENT AREA, NORTH PAC. FISHERY MGMT. COUNCIL (2009) http://www.alaskafisheries.noaa.gov/npfmc/PDFdocuments/fmp/Arctic/ArcticFMP.pdf (showing essential fish habitat for Arctic cod, saffron cod, and snow crab); APPENDIX D EFH TEXT AND MAP DESCRIPTIONS FOR FEDERALLY MANAGED SPECIES OF THE ALASKA REGION, NAT'L MARINE FISHERY SERV. D-158-60 (2005) http://www.fakr.noaa.gov/habitat/seis/final/Volume_II/Appendix_D.pdf (describing essential fish habitat for five Pacific salmon species).

23. *See, e.g.*, Lloyd F. Lowry et. al., *Movements and Behavior of Satellite-tagged Spotted Seals (Phoca Largha) in the Bering and Chukchi Seas*, 19 POLAR BIOLOGY 221, 228-29 (1998); Howard W. Braham et al., *Spring Migration of the Western Arctic Population of Bowhead Whales*, 42 MARINE FISHERIES REV. 36, 39 (1980); Thomas Alerstam et al., *A Polar System of Intercontinental Bird Migration*, 274 PROCEEDINGS OF THE ROYAL SOCIETY BIOLOGICAL SCIENCES 2523, 2525 (2007).

24. Smith, *supra* note 1, at 11.

25. *Id.* at 15.

26. Judith E. Zeh & Andreá E. Punt, *Updated 1978-2001 Abundance Estimates and Their Correlations for the Bering-Chukchi-Beaufort Seas Stock of Bowhead Whales*, 7 J. OF CETACEAN RESEARCH & MGMT. 169, 173 (2005).

where they then travel east toward the southeastern Beaufort Sea.[27] During the summer, they range throughout the Beaufort Sea, where they feed.[28] From early September to mid-October, some of these whales migrate toward the Chukotka Peninsula[29] while others head toward Wrangel Island.[30] Once they reach these locations, the whales move southeast toward the Bering Strait and back into the Bering Sea for winter.[31] In other words, nearly the entire Bering-Chukchi-Beaufort stock of bowhead whales—some 10,500 individuals—move through the narrow passage of the Bering Strait twice each year.

Interestingly, the sea ice that covers the ocean for much of the year is a significant driver of ecological processes in the Bering Strait region. The ice provides a habitat for photosynthetic algae, which are released into the water as the ice melts in the spring and summer.[32] This fosters phytoplankton blooms that are crucial to biological productivity.[33] On average, ice algae are responsible for more than half of the total marine primary production in the central Arctic.[34] The ice also provides a habitat for invertebrates, fish, birds, and marine mammals. Zooplankton consume ice algae[35] and use the ice as a place of refuge from predators.[36] Arctic cod use the sea ice as a nursery ground.[37] Arctic cod, in turn, are an important food source for many marine mammals and birds.[38] Walrus,

27. Howard W. Braham et al., *Bowhead and White Whale Migration, Distribution and Abundance in the Bering, Chukchi, and Beaufort Seas, 1975-78*, NOAA TECH. REP. SSRF-778, 17-19 (1984).

28. Sue E. Moore & Janet T. Clarke, *Estimates of Bowhead Whale (*Balaena Mysticetus*) Numbers in the Beaufort Sea During Late Summer*, 44 ARCTIC 43, 43-44 (1991).

29. Sue E. Moore et al., *Bowhead Whales Along the Chukotka Coast in Autumn*, 48 ARCTIC 155, 157-158 (1995).

30. David Rugh et al., *A Review of Bowhead Whale (Balaenga Mysticetus) Stock Identity*, 5 J. OF CETACEAN RESEARCH & MGMT. 267, 271 (2003).

31. *Id.*

32. Christopher Krembs & Jody Deming, *Sea Ice: A Refuge for Life in Polar Seas?* NOAA ARCTIC THEME PAGE, http://www.arctic.noaa.gov/essay_krembsdeming.html (last visited Sept. 8, 2012).

33. *Id.*

34. Michel Gosselin et al., *New Measurements of Phytoplankton and Ice Algal Production in the Arctic Ocean*, 44 DEEP-SEA RESEARCH 1623, 1639 (1997).

35. Michael S.W. Bradstreet, *Trophic Relationships at High Arctic Ice Edges*, 35 ARCTIC 1, 10 (1982).

36. Krembs & Deming, *supra* note 32.

37. *Id.*

38. *Id.*

seals, whales, and polar bears use the ice for migrating, resting, and as protection while rearing their young.[39]

High primary production coupled with relatively low zooplankton grazing means that much organic matter sinks to the seafloor, where it enhances benthic production.[40] As a result, the Bering Sea region contains some of the highest levels of soft-bottom benthic faunal biomass in the world.[41] Chirikov and Hope basins in particular are hotspots for both primary productivity and benthic foraging.[42] The region's abundant benthic communities support a variety of benthic-feeding predators, including demersal fish, diving ducks, walruses, gray whales, and bearded seals.[43] In short, the physical and biological features of the Bering Strait region combine in a way that supports vast numbers of marine invertebrates, fish, birds, and mammals.

C. Human Communities in the Bering Strait Region

In addition to supporting an abundance of wildlife, the Bering Strait region is home to a number of indigenous communities belonging to the Inupiaq, Central Yupik, and Siberian Yupik cultural groups.[44] "Marine resources are of vital importance to peoples of this region"[45] for their nutritional, cultural, and economic needs.[46] Residents of the region use marine resources as a source of clothing and equipment, as material for handicrafts, and to support their limited commercial fishing, hunting, and ecotourism activities.[47]

Residents of Bering Strait communities have hunted marine mammals for over 1000 years and continue to depend on marine resources for their nutritional value.[48] As one Alaska Native put it, "[w]e Inupiat are meat eaters, not vegetarians. We live off the sea mammals . . .

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39. *Id*.

40. Jacqueline M. Grebmeier et al., *Ecosystem Dynamics of the Pacific-influenced Northern Bering and Chukchi Seas in the Amerasian Arctic*, 71 PROGRESS IN OCEANOGRAPHY 331, 332 (2006).

41. *Id.* at 331.

42. Smith, *supra* note 1, at 11, 23.

43. *Id.*

44. AMSA 2009, *supra* note 12, at 106. Total human population in the Bering Strait region is roughly 10,000, and there are 15 permanent villages along the U.S. coast. *Id.*

45. *Id.* at 107.

46. *Id.* at 108. For example, the St. Lawrence Island villages of Gambell and Savoonga generate more than 95% of their subsistence harvest from marine-based resources. Similarly, in the coastal village of Shishmaref, the figure is roughly 75%. *Id.*

47. *Id.* at 107.

48. *Id.* at 106.

. The Bering Sea and the Chukchi Sea are our gardens."[49] Residents of villages like Gambell, Savoonga, Wales, Little Diomede, and Point Hope hunt a variety of marine mammals, including bowhead whales, beluga whales, walrus, polar bears, and seals.[50] For those coastal villages that hunt bowhead whales, the hunts are central to their culture and are critically important to the community residents.[51] One Alaska Native whaler explained that

> [t]he whale is more than food to us. It is the center of our life and culture. We are the People of the Whale. The taking and sharing of the whale is our Eucharist and Passover. The whaling festival is our Easter and Christmas, the Arctic celebrations of the mysteries of life.[52]

Because of their reliance on marine resources, residents of Bering Strait communities depend immensely on an intact ocean ecosystem to support their subsistence, economic needs, and cultural traditions.

D. Impacts of a Changing Climate and Ocean

The Bering Strait region is part of a large, fragile Arctic ecosystem that is already being stressed and altered by climate change.[53] For example, the northern Bering Sea, is experiencing a change from Arctic to subarctic conditions producing an ecosystem that no longer favors benthic communities and bottom-feeding organisms such as sea ducks, gray whales, and walruses.[54] Consequently, the region is becoming more dominated by pelagic fish.[55]

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49. THOMAS R. BERGER, VILLAGE JOURNEY: THE REPORT OF THE ALASKA NATIVE REVIEW COMMISSION 48 (1985).

50. *See* ALASKA ESKIMO WHALING COMM., ILITQUSIA AGVIGUM, SPIRIT OF THE WHALE: A WAY OF LIFE FOR THE INUPIAT AND YUPIK PEOPLE ii, 7, 14, 17, 18 (2012), *available at* http://aewc-alaska.com/uploads/IWC_Brochure_web.pdf (describing the Savoonga, Gambell, Wales, Little Diomede, and Point Hope villages and their dependence on whaling).

51. *See, e.g.*, *id.* at 1 (explaining the importance of the bowhead whale hunt to North Slope communities).

52. Rupa Gupta, *Indigenous Peoples and the International Environmental Community: Accommodating Claims Through a Cooperative Legal Process*, 74 N.Y.U. L. REV. 1741, 1747 (1999) (quoting Alaska native leader of the North Slope, Eben Hopson).

53. *See, e.g.*, AMSA 2009, *supra* note 12, at 136.

54. Jacqueline M. Grebmeier et al., *A Major Ecosystem Shift in the Northern Bering Sea*, 311 SCIENCE 1461, 1461 (2006).

55. *Id.*

However, perhaps the most visible evidence of the changing climate in the Arctic is a reduction in seasonal sea ice coverage. In 2007, the seasonal minimum sea ice extent in the Arctic reached a record low—resulting in 23% lower ice coverage than had ever been recorded since satellite measurements began.[56] In 2008, the minimum sea ice extent was lower than any year other than 2007.[57] Additionally, the ice coverage was thinner and more diffused, suggesting that 2008 established a record low ice volume.[58] In 2011, the seasonal sea ice in the Arctic was nearly as low as it was in 2007, even though conditions were not as conducive to melting.[59] Then, in 2012, seasonal sea ice established a new record low, approximately 760,000 square kilometers below the 2007 ice extent.[60] The seasonal sea ice minimums established in each of the six years between 2007 and 2011 were the six lowest measurements since satellite measurements began.[61] The rate at which sea ice cover is declining exceeds even the most dramatic predictions from just a few years ago.[62] Consequently, scientists now predict the Arctic could be seasonally ice-free by 2030.[63]

Although scientists do not fully understand the connections between sea ice reduction and ecosystem changes, they expect primary productivity to change.[64] Reductions in sea ice have the potential to restructure the ecosystem by reducing benthic production and increasing pelagic consumption, possibly resulting in fewer benthic prey for marine mammals.[65] While the biological consequences of reduced sea ice are

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56. Press Release: *Arctic Sea Ice Shatters All Previous Record Lows*, NAT'L SNOW & ICE DATA CTR., (Oct. 1, 2007), www.nsidc.org/news/press/2007_seaiceminimum/20071001_pressrelease.html.

57. *Id.*

58. Press Release: *Arctic Sea Ice Down to Second-Lowest Extent; Likely Record-Low Volume*, NAT'L SNOW & ICE DATA CTR., (Oct. 2, 2008), www.nsidc.org/news/press/2008/1002_seaice_pressrelease.html.

59. Press Release: Summer 2011: Arctic Sea Ice Near Record Lows, NSDIC ARCTIC NEWS & ANALYSIS, (Oct. 4, 2011), www.nsidc.org/arcticseaicenews/2011/10/.

60. Press Release: *Arctic Sea Ice Extent Settles at Record Seasonal Minimum*, NAT'L SNOW & ICE DATA CTR., (Sept. 19, 2012), http://nsidc.org/arcticseaicenews/2012/09/arctic-sea-ice-extent-settles-at-record-seasonal-minimum/.

61. *Id.*

62. Jon Vidal, *Arctic May Be Ice-Free Within 30 Years*, THE GUARDIAN (July 11, 2011), *available at* www.guardian.co.uk/environment/2011/jul/11/arctic-ice-free.

63. *Id.* (quoting the director of the U.S. National Snow and Ice Data Center as saying that "we are on track to see an ice-free summer [in the Arctic] by 2030").

64. Jacqueline M. Grebmeier, et al., *Biological Response to Recent Pacific Arctic Sea Ice Retreats*, 91 EOS, TRANS., AM. GEOPHYSICAL UNION 161, 161 (2010).

65. Grebmeier et al., *supra* note 54, at 1462; Chadwick V. Jay et al., *Projected Status of the Pacific Walrus (Odobenus Rosmarus Divergens) in the Twenty-first Century*, 34

difficult to predict and depend on regional conditions influencing productivity,[66] even small changes in the primary production pathways can have large cascading effects on higher trophic organisms.[67]

Coupled with the change in sea ice coverage, another change affecting the Bering Strait region is the process of ocean acidification. Ocean acidification is the decrease of pH in the ocean due to the uptake of atmospheric carbon dioxide.[68] Scientists project that ocean acidification will create corrosive surface waters in the Arctic Ocean.[69] In fact, acidification in the Bering Sea has already caused seasonal calcium carbonate mineral suppression in some areas, and it is causing the Chukchi Sea to become more corrosive to calcium carbonate.[70] This change is likely to continue to modify the ecology, physics, and biogeochemistry of the Arctic Ocean in ways that are not yet fully understood.[71] Furthermore, scientists expect that ocean acidification will likely reduce the ability of many species to produce shells, which will have profound implications on the future of the Arctic marine ecosystem.[72]

The effects of climate change and ocean acidification are ongoing and will continue into the future. In other words, impacts from the expansion of industrial activity in the Bering Strait region—such as pollution, ship strikes, noise, or oil spills related to increased vessel traffic—will not occur in a vacuum. They will be added to and act in synergistic ways with the ongoing and continuing effects of climate change and ocean acidification on the ecosystem.

POLAR BIOLOGY 1065, 1067 (2011); Sue E. Moore et al., *Gray Whale Distribution Relative to Forage Habitat in the Northern Bering Sea: Current Conditions and Retrospective Summary,* 81 CAN. J. OF ZOOLOGY 734, 737-740 (2003).

66. Bodil A. Bluhm & Rolf Gradinger, *Regional Variability in Food Availability for Arctic Marine Mammals*, 18 ECOLOGICAL APPLICATIONS S77, S88 (2008).

67. Grebmeier et al., *supra* note 64, at 161.

68. *See, e.g.*, NAT'L OCEANIC & ATMOSPHERIC ADMIN., OCEAN ACIDIFICATION STEERING COMM., NOAA OCEAN AND GREAT LAKES ACIDIFICATION RESEARCH PLAN, NOAA SPECIAL REPORT 1-2 (2010) (describing ocean acidification).

69. Marco Steinacher et al., *Imminent Ocean Acidification in the Arctic Projected with the NCAR Global Coupled Carbon Cycle-Climate Model*, 6 BIOGEOSCIENCES 515, 515 (2009).

70. Andrey Proshutinsky, *Sea Ice and Ocean Summary*, *Arctic Report Card: Update for 2011*, NOAA (Nov. 9, 2011), www.arctic.noaa.gov/reportcard/sea_ice_ocean.html.

71. N. R. Bates & J. T. Mathis, *The Arctic Ocean Marine Carbon Cycle: Evaluation of Air-sea CO2 Exchanges, Ocean Acidification Impacts and Potential Feedbacks*, 6 BIOGEOSCIENCES 2433, 2433 (2009).

72. *Id.*

III. PRESENT AND ANTICIPATED VESSEL TRAFFIC AND MARITIME INFRASTRUCTURE IN THE BERING STRAIT REGION

Historically, the Bering Strait region has experienced low levels of maritime traffic. Despite the hazards presented by sea ice and stormy conditions, little infrastructure is in place to ensure ship safety and protect the environment. Forecasters anticipate that shipping in the Bering Strait region will increase substantially in the coming years. Higher levels of maritime traffic could lead to more accidents, ship strikes, pollution, noise, injuries, and deaths. Given the combination of increased shipping traffic, inadequate maritime infrastructure, and the threat of significant impacts to a vulnerable ecosystem, there is an urgent need to implement additional safety and environmental protection measures in the Bering Strait region.

A. Current Levels of Maritime Traffic in the Bering Strait Region

Presently, the Bering Strait region experiences a low volume of commercial vessel traffic.[73] Nevertheless, many types of ships still operate in the area. For example, each year during the open water period from July to October, roughly 150 large commercial vessels transit the Bering Strait.[74] Of these, approximately twenty-five are bulk carriers making trips to the DeLong Mountain Terminal associated with the Red Dog mine located near the village of Kivalina, north of Cape Krusenstern National Monument.[75] In addition to the vessels servicing the Red Dog Mine, Russian bulk carriers pass through the Bering Strait to support communities in the far northeast of the Russian Federation.[76] These large vessels are joined by smaller fishing vessels and fuel barges serving coastal communities and area mines.[77] A limited number of passenger vessels, likely associated with marine tourism, also travel through the Bering Strait region.[78] Likewise, government and industry research and

73. *See, e.g.*, AMSA 2009, *supra* note 12, at 85 (maps showing relatively low maritime traffic in the Bering Strait region); *id.* at 89 (noting that in 2004, the total number of vessels operating in the entire circumpolar Arctic amounted to "less than 2 percent of the world's registered fleet of oceangoing vessels over 100 gross tonnage").

74. *Id.* at 109.

75. *Id.* Some of these bulk carriers are quite large. For example, the Panamax- or Handymax-sized carriers can weigh up to 65,000 tons. *Id.* at 76.

76. *Id.* at 90.

77. *Id.* at 109.

78. *Id.* at 78.

survey vessels pass through the Bering Strait to pursue their scientific missions throughout the Arctic waters.[79]

B. Existing Infrastructure and Incident Response Capacity

Maritime infrastructure supporting the Bering Strait region is limited. The United States side of the Bering Strait has three main ports: Nome, Kotzebue, and the DeLong Mountain Terminal.[80] On the Russian side, the three largest ports are Provideniya, Anadyr, and Egvekinot.[81] None of the Alaskan ports are deep-water ports.[82] This means that loading and unloading operations must be done through lightering.[83] For example, freight shipments to Kotzebue must be lightered roughly ten miles using smaller vessels with shallower drafts.[84] Similarly, the DeLong Mountain Terminal requires lightering operations.[85] For the most part, existing ports in the Bering Strait region are unable to accommodate deep-draft vessels in need of repair or refuge.[86]

Navigational infrastructure in the Bering Strait region is similarly sparse. No formally established vessel routing measures exist in the area

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79. *See, e.g.*, STATOIL USA E&P INC., REQUEST BY STATOIL FOR AN INCIDENTAL HARASSMENT AUTHORIZATION TO ALLOW THE INCIDENTAL TAKE OF MARINE MAMMALS DURING A SHALLOW HAZARDS SURVEY IN THE CHUKCHI SEA, ALASKA, 2011 5 (2011), *available at* www.nmfs.noaa.gov/pr/pdfs/permits/statoil_iha_application2011.pdf (describing plan to mobilize seismic exploration vessels from Dutch Harbor to the Chukchi Sea); U.S. GEOLOGICAL SURVEY, REQUEST BY THE U.S. GEOLOGICAL SURVEY FOR AN INCIDENTAL HARASSMENT AUTHORIZATION TO ALLOW THE INCIDENTAL TAKE OF MARINE MAMMALS DURING A MARINE SEISMIC SURVEY OF THE ARCTIC OCEAN, AUGUST – SEPTEMBER 2010 4 (May 2010), *available at* www.nmfs.noaa.gov/pr/pdfs/permits/usgs_arctic_iha_application2010.pdf (describing plans for the icebreaker *Healy* to approach seismic survey area from the Bering Strait).

80. AMSA 2009, *supra* note 12, at 108.

81. *Id.*

82. *Id.* Water depth in most ports in the Bering Strait region measures ten meters or less. *Id.*

83. "Lightering" (or "lightening") refers to the process of transferring cargo from a larger, deep-draft vessel to smaller, shallower-draft vessels capable of entering shallow-draft ports. MARITIME ADMIN., U.S. DEP'T OF TRANSP., GLOSSARY OF SHIPPING TERMS 63 (2008), *available at* www.marad.dot.gov/documents/Glossary_final.pdf.

84. N. ECONOMICS, ALASKA REGIONAL PORTS: PLANNING FOR ALASKA'S REGIONAL PORTS AND HARBORS FINAL REPORT 24 (2011), *available at* http://www.dot.state.ak.us/stwddes/desports/assets/pdf/regionalports_finalreport0111.pdf.

85. *Id*. at 35.

86. *See, e.g.*, *id.* at ES-7 ("Most remote coastal Alaska communities lack the infrastructure and capabilities to respond to vessel disasters. The threat to life and property is most profound when vessels are unable to locate refuge from severe weather along the Alaska coastline.").

and there are few visual aids to navigation.[87] For example, the U.S. Coast Guard maintains only three navigational aids in the Bering Strait along the north side of the Seward Peninsula, and there are no navigational aids north of Kotzebue Sound.[88] No vessel traffic service or other traffic management system is in place and only limited shipboard automated identification system capabilities exist.[89] The Bering Strait region lacks a shore-based VHF-FM communication service, and HF coverage in the region is poor.[90] While the region has Global Positioning System-Standard Positioning Service, its accuracy may be impaired because the system is not optimized for high latitudes.[91] Currently, there is no Differential GPS coverage of the area.[92]

Finally, incident response capabilities in the region are inadequate.[93] There is no permanent U.S. Coast Guard presence in the Bering Sea region. The nearest permanent Coast Guard facility is located on Kodiak Island in the North Pacific, a distance of over 1000 miles by sea.[94] In the open water season of 2012, the U.S. Coast Guard plans to send a team to the Arctic to provide support for anticipated oil and gas exploration activities.[95] However, as one report observed, "[e]ven if a U.S. Coast

87. AMSA 2009, *supra* note 12, at 109.

88. *Id.*

89. *Id.*

90. *Id.*

91. *Id.*

92. *Id.*

93. *See, e.g.*, ALASKA STATE LEGISLATURE, FINDINGS & RECOMMENDATIONS OF THE ALASKA NORTHERN WATERS TASK FORCE 15 (2012), *available at* http://housemajority.org/coms/anw/pdfs/27/NWTF_Full_Report_Color.pdf ("This remote, narrow, and hazardous international strait is located in an environmentally sensitive area with little to no search and rescue or maritime disaster-response capability within 800 miles.") [hereinafter TASK FORCE].

94. *See, e.g.*, NUKA RESEARCH AND PLANNING GROUP, OIL SPILL PREVENTION AND RESPONSE IN THE U.S. ARCTIC OCEAN: UNEXAMINED RISKS, UNACCEPTABLE CONSEQUENCES 23 (Nov. 2008), *available at* http://www.pewenvironment.org/uploadedFiles/PEG/Publications/Report/Oil%20Spill%20Prevention.pdf (noting nearest Coast Guard air station to the Arctic is in Kodiak); *see also* NAT'L OCEAN SERV., NAT'L OCEANIC & ATMOSPHERIC ADMIN., DISTANCES BETWEEN UNITED STATES PORTS, 34, 43 (12th ed. 2012), *available at* http://www.nauticalcharts.noaa.gov/nsd/distances-ports/distances.pdf (showing distance from Kodiak to Unimak Pass is 505 nautical miles and distance from Unimak Pass to Cape Prince of Wales is 702 nautical miles).

95. *See, e.g.*, U.S. DEP'T OF HOMELAND SECURITY, U.S. COAST GUARD, ENVIRONMENTAL ASSESSMENT ARCTIC SHIELD 2012 ALASKA 2-1-2-2 (July 2012), *available at* www.uscg.mil/d17/docs/Final_EA_Version_rev_9_JUL_12.for_posting.pdf (describing plan to establish U.S. Coast Guard Forward Operating Location in Barrow, Alaska and conduct related operations).

Guard operating team were seasonally deployed to an Arctic coastal community, weather and distance to an incident site would remain huge challenges."[96] In addition to the lack of a year-round Coast Guard presence, the region has few salvage vessels capable of supporting search and rescue operations.[97] To complicate matters, there is little data on weather and oceanographic conditions to support incident response operations.[98] Presently, vessels in distress in the Bering Strait region must either rely on nearby vessels or local communities to render assistance or wait for help to arrive from outside the region.[99] Poor weather and the distance to ports or other places of refuge present significant challenges to ships passing through the region.[100]

C. Increasing Maritime Traffic

While vessel traffic in the Arctic is currently light, it is growing steadily. A 2012 report by the Alaska State Legislature noted that Arctic maritime traffic has increased from 6000 to 7000 vessels since 2006.[101] In the coming years, observers anticipate that maritime traffic in the Bering Strait region will grow even more. Increased vessel traffic in the Bering Strait region could result from growth in the use of trans-Arctic shipping routes, such as the Northwest Passage north of Canada or the Northern Sea Route north of Asia.[102] Of the two routes, the Northern Sea Route is likely the more viable route, at least in the short term.[103] The Russian Federation has developed and used portions of the route for

96. AMSA 2009, *supra* note 12, at 109.
97. *Id.*
98. *Id.*
99. *Id*.
100. *Id.*
101. TASK FORCE, *supra* note 93, at 16 (noting growth in Arctic vessel traffic from 2006 to present). Prior to that study, a 2009 Arctic Marine Shipping Assessment noted that that marine transport in the Arctic to support exploration and extraction of natural resources is "increasing." AMSA 2009, *supra* note 12, at 90.
102. *Cf.* AMSA 2009, *supra* note 12, at 17 (showing Northern Sea Route and Northwest Passage).
103. TASK FORCE, *supra* note 93, at 14 (comparing the two routes and noting that the Northern Sea Route "holds particular promise," and is anticipated to "be the preferred Arctic sea lane in the near future"); AMSA 2009, *supra* note 12, at 5 (concluding that "the Northwest Passage is not expected to become a viable trans-Arctic route through 2020"); Northern Economics, Inc., *Planning for Alaska's Regional Ports and Harbors,* 17 (Jan. 2011) [hereinafter NORTHERN ECONOMICS, INC.], http://www.dot.state.ak.us/stwddes/desports/assets/pdf/regionalports_finalreport0111.pdf ("Future shipping levels in the Northwest Passage are expected to be less than in the Northern Sea Route . . . ").

many years.[104] In the summer of 2009, with approval and assistance from the Russian Federation, two German-owned ships transited the Northern Sea Route from South Korea to Vladivostok and then on to the Netherlands.[105] One Arctic shipping expert recognized the passage as the "first true commercial transit" of the Northern Sea Route from Asia to Europe.[106]

Use of the Northern Sea Route could reduce significantly the distance, sailing time, and cost of Europe-to-Asia shipping when compared to the existing alternatives that run through the Panama or Suez canals.[107] The Arctic Marine Shipping Assessment observed that transportation of oil and gas via the Northern Sea Route is "technically and economically feasible," and anticipated that by 2020, the volume of oil and gas transported via the Northern Sea Route could grow to as much as forty million tons per year.[108] A recent economic analysis noted that the Northern Sea Route could be used to transport "oil and gas project modules" from their sites of fabrication to sites of operation on Alaska's North Slope.[109] Over the longer term, the analysis determined that trans-Arctic sea routes could be used to ship oil and gas from Alaska's North Slope.[110] A 2012 Alaska Legislature study noted the possibility of increasing trans-Arctic vessel traffic and observed that "transient traffic in the future, regardless of the route taken, must transit the Bering Strait."[111]

In addition to increased vessel traffic from trans-Arctic shipping, exploration and development of oil and gas leases in the Chukchi Sea and Beaufort Sea to the north and east could generate higher volumes of traffic through the Bering Strait.[112] The 2009 Arctic Marine Shipping Assessment noted that "[w]ith diminishing summer sea ice in the Arctic Ocean, the Bering Strait region may experience increased destinational

104. *See* AMSA 2009, *supra* note 12, at 44.

105. *See, e.g.*, Andrew Kramer & Andrew Revkin, *Arctic Shortcut Beckons Shippers as Ice Thaws*, N.Y. TIMES (Sept. 10, 2009), http://www.nytimes.com/2009/09/11/science/earth/11passage.html; *German Ships Successfully Make "Arctic Passage,"* REUTERS (Sept. 12, 2009), http://www.reuters.com/article/2009/09/12/us-climate-shipping-arctic-idUSTRE58B01K20090912.

106. *Id.*

107. *See, e.g.,* NORTHERN ECONOMICS, INC., *supra* note 104, at 17; AMSA 2009, *supra* note 12, at 44; TASK FORCE, *supra* note 93, at 14.

108. AMSA 2009, *supra* note 12, at 5.

109. NORTHERN ECONOMICS, INC., *supra* note 103, at 33.

110. *Id.*

111. TASK FORCE, *supra* note 93, at 15; *see also* AMSA 2009, *supra* note 12, at 17 (showing Northern Sea Route and Northwest Passage).

112. AMSA 2009, *supra* note 12, at 109.

traffic to the oil and gas exploration areas in the Beaufort and Chukchi seas."[113] A 2011 economic analysis concluded that "ice-free conditions in the Arctic would facilitate marine traffic, thereby providing increased and more convenient support for North Slope oil and gas producers."[114] The analysis explained that different phases of oil and gas operations would require different types of vessels:

> [d]uring the exploration phase of oil and gas development, a small fleet of seismic survey vessels and drill ships is typically involved. During the construction phase, a wide variety of vessel activity is involved, including project cargo and heavy lift ships delivering construction materials and components, ocean barges, other construction vessels, and supply vessels.[115]

In fact, oil and gas operations in the Beaufort and Chukchi seas are already resulting in increased vessel traffic in the Bering Strait region.[116] Energy companies send seismic exploration vessels to Arctic waters to map subsurface geological features.[117] In 2012, Shell plans to take a fleet of vessels through the Bering Strait to conduct exploratory drilling operations on leases in the Beaufort and Chukchi seas.[118] The U.S. Coast

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113. *Id.* at 106; *see also id.* at 90 ("Increasing Arctic marine operations off Alaska in the Chukchi and Beaufort seas to support oil and gas exploration are envisioned for the next decade.").

114. NORTHERN ECONOMICS, INC., *supra* note 103, at 33.

115. *Id.*

116. *See generally* LGL ALASKA RESEARCH ASSOC., INC., *Request by Statoil for and Incidental Harassment Authorization to Allow the Incidental Take of Marine Mammals during Shallow Hazards Survey in the Chukchi Sea, Alaska, 2011,* 5 (Apr. 2011), www.nmfs.noaa.gov/pr/pdfs/permits/statoil_iha_applicaiton2011.pdf (describing plan to mobilize seismic exploration vessels from Dutch Harbor to the Chukchi Sea); SHELL EXPLORATION & PRODUCTION, INC., *Application for Incidental Harassment Authorization for the Non-Lethal Taking of Whales and Seals in Conjunction with a Proposed Open Water Marine Survey Program in the Beaufort and Chukchi Seas, Alaska, During 2010,* 1-2 (Apr. 2010), www.nmfs.noaa.gov/pr/pdfs/permits/shell_marine_survey_iha_application.pdf (describing proposed seismic activities in the Chukchi and Beaufort seas).

117. *See id.*; *see also* SHELL EXPLORATION & PRODUCTION, INC., *supra* note 116, at 1-2.

118. *See, e.g.*, U.S. Dep't of the Interior, Bureau of Ocean Energy Mgmt., Chukchi Sea Planning Area, *Shell Revised Chukchi Sea Exploration Plan Environmental Assessment,* 1-2 (Dec. 2011), www.boem.gov/uploadedFiles/2011_1214_FINAL_2012ChukchiSeaEA.PDF (summarizing Shell's 2012 exploration plans for the Chukchi Sea); U.S. Dep't of the Interior, Bureau of Ocean Energy Mgmt., Beaufort Sea Planning Area, *2012 Shell Camden Bay Exploration Plan Environmental Assessment,* 1-2 (Aug. 2011), www.boem.gov/uploadedFiles/BOEM/Oil_and_Gas_Energy_Program/Plans/Regional_Plans/Alaska_Exploration_Plans/2012_Shell_Beaufort_EP/EA_Shell2012CamdenBay.pdf (summarizing Shell's 2012 exploration plans for the Beaufort Sea).

Guard also plans to send vessels to the Arctic to respond to potential search and rescue and security needs related to the planned exploratory drilling, to conduct outreach, and to test oil spill response systems.[119]

The Bering Strait region could also experience increased vessel traffic from sources other than trans-Arctic shipping and oil and gas operations.[120] Supply ships could increase the number of trips they make—or expand the season of service—to communities in western Alaska. For example, early in 2012, the city of Nome arranged for wintertime fuel delivery by a Russian tanker, accompanied by a U.S. Coast Guard icebreaker.[121] The operation was the first of its kind in western Alaska,[122] but it may not be the last. There could also be an expansion of maritime tourism in Arctic communities.[123] Additionally, the Bering Strait region could experience increased traffic associated with the Red Dog Mine in northwest Alaska.[124]

D. Risks of Increased Vessel Traffic

Increases in vessel traffic through the Bering Strait will also increase the potential for additional noise, air emissions, ship strikes, and discharges of hydrocarbons or other hazardous materials. All of these impacts could pose a threat to the region's fish, birds, marine mammals, and to the people who depend on these biological resources to support their way of life.

The Alaska State Legislature observed that:

> With increased shipping and marine traffic comes increased risk of vessel groundings, spills, collisions, pollutants, noise disturbances, and invasive species. This risk is particularly high

119. U.S. DEP'T OF HOMELAND SECURITY, U.S. COAST GUARD, ENVIRONMENTAL ASSESSMENT ARCTIC SHIELD 2012 ALASKA, 2.2-2.4 (July 2012), *available at* www.uscg.mil/d17/docs/Final_EA_Version_rev_9_JUL_12.for_posting.pdf.

120. *See, e.g., Alaska Winter: Russian Tanker Reaches Ice-bound Nome*, BBC NEWS, Jan. 13, 2012, http://www.bbc.co.uk/news/world-us-canada-16555840; Alice Rogof, *Melting Arctic: Think of the Bering Strait as the next Panama Canal*, ALASKA DISPATCH, Feb. 28, 2010, http://www.alaskadispatch.com/article/melting-arctic-think-bering-strait-next-panama-canal?page=0,0.

121. *Id*.

122. *See, e.g.*, *id.*

123. Rogof, *supra* note 120 ("European cruise ships ply the famed Northwest Passage in summer and discharge passengers directly on our beaches—lightered by dinghies—in villages from Barrow to Nome. Even without docks, the tourists are arriving—sometimes virtually unannounced.").

124. AMSA 2009, *supra* note 12, at 106.

> due to the lack of detailed navigational charts, reliable weather forecasting, vessel traffic separation protocols, search and rescue infrastructure, and overall maritime domain awareness throughout the Arctic.[125]

The threat of oil spills is of particular concern in icy waters like those of the Bering Strait region because sea ice can reduce significantly the effectiveness of mechanical recovery technologies.[126]

The Bering Strait region is particularly vulnerable to the threats posed by increased vessel traffic because the region is home to high concentrations of wildlife.[127] As noted above, wildlife congregates in the region to take advantage of the region's high biological productivity, and is channeled through the Strait along the migration pathway between the Chukchi and Bering seas.[128] As the ice-free season lengthens and vessel traffic grows, there is a greater potential for ships to strike bowhead whales as the whales migrate north and south through the Bering Strait.[129] One assessment observed that "[p]otential conflicts between increased ship traffic and large marine pinnipeds and cetaceans in the [Bering Strait] region are associated with increases in ambient and underwater ship noise, ship strikes, entanglement in marine debris and pollution (including oil spills)."[130] The area also hosts large seabird colonies that would be vulnerable to such impacts.[131] If a marine disaster took place in the Bering Strait during a critical migration period, it could have serious adverse consequences on a large number of individual animals, in addition to affecting a number of species important to the region's ecology.[132] These negative impacts would spill over to adversely affect the people who live in Bering Strait communities, and who depend on the region's biological resources to support their way of life.[133]

Finally, it bears repeating that the impacts associated with increased maritime traffic in the Bering Strait region may pose an especially significant risk because the region is already experiencing stress from profound and rapid climate change, ocean acidification, and retreating

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125. TASK FORCE, *supra* note 93, at 14.

126. NUKA RESEARCH & PLANNING GROUP, *supra* note 94, at 73-75.

127. *See id.* at Part II.B.

128. *See id.*

129. *See, e.g.*, Randall Reeves et al., *Implications of Arctic Industrial Growth and Strategies to Mitigate Future Vessel and Fishing Gear Impacts on Bowhead Whales*, 36 MARINE POLICY 454, 458-459 (2012).

130. AMSA 2009, *supra* note 12, at 106.

131. *Id.* at 109.

132. *Id.*

133. *Id.* at 106-07.

seasonal sea ice.[134] The impacts from increased vessel traffic—whether in the form of an acute, catastrophic disaster or the chronic, cumulative effects associated with increased shipping traffic over time—could add to, and act synergistically with, the effects of ongoing climate change and ocean acidification to negatively affect the marine ecosystem of the region.

Given this context, there is an urgent need to put in place a more robust maritime safety infrastructure and to adopt and implement additional environmental protection measures in the Bering Strait region. The questions are: how can this best be accomplished, what organizations are best positioned to effect change, and what tools and instruments can they use? The remainder of this Article will address these questions. To provide context for that discussion, Part IV of this Article will briefly summarize the legal framework that governs maritime traffic, with a particular focus on the aspects of the law that may apply to the Bering Strait region.

IV. LEGAL FRAMEWORK GOVERNING MARITIME TRAFFIC

Maritime traffic is governed by an overarching legal framework established by customary international law and the 1982 United Nations Convention on the Law of the Sea (UNCLOS).[135] Among other things, this legal framework includes a series of maritime jurisdictional zones that balance the ability of coastal states to regulate vessel traffic and the ability of maritime powers to maintain navigational freedom.[136] However, the standard jurisdictional zones do not apply to all geographies; UNCLOS establishes a unique rule that applies to international straits, such as the Bering Strait.[137] In addition, UNCLOS includes special provisions relating to ice-covered waters and ecologically important areas.[138]

134. *See* NUKA RESEARCH & PLANNING GROUP, *supra* note 94, at Part II.D.

135. United Nations Convention on the Law of the Sea, Dec. 10, 1982, 1833 U.N.T.S. 397 [hereinafter UNCLOS].

136. *See generally id.* at Part III.

137. *See generally id.* at Part III, arts. 34–45.

138. *Id.* at art. 192 (obligation to preserve and protect), art. 211 (special areas) & art. 234 (ice-covered areas).

A. The Basic Maritime Jurisdictional Framework: Territorial Sea, Exclusive Economic Zone, and High Seas

Customary international law, as reflected in UNCLOS,[139] recognizes a number of maritime jurisdictional zones, ranging from internal waters to the high seas. Within each of these zones, coastal states may exercise varying degrees of authority over foreign-flagged vessels, and foreign-flagged vessels have varying degrees of freedom of navigation.[140] For purposes of this Article, the most important of these zones are the territorial sea, the exclusive economic zone, and the high seas.

The territorial sea is the first maritime jurisdictional zone seaward of the coastline.[141] A coastal state has the right to establish a territorial sea that extends from its coastline outward to a distance of twelve nautical miles.[142] In general, a coastal state may exercise full sovereignty over its territorial sea and may adopt and enforce domestic legislation against both foreign citizens and its own citizens.[143] That said, vessels from any country have the right to transit in "innocent passage" through a coastal state's territorial sea.[144] In broad terms, "innocent passage" refers to continuous and expeditious travel through the territorial sea that is not prejudicial to the peace, good order, or security of the coastal state, and that does not enter a coastal state's internal waters.[145]

Beyond the territorial sea lies the exclusive economic zone.[146] A coastal state's exclusive economic zone extends from the outer edge of its territorial sea seaward for a distance of no more than 200 nautical

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139. As of this writing, the United States has not acceded to UNCLOS. However, "the United States adheres to almost all provisions of the Convention and considers most of its provisions to be a reflection of binding customary international law." Jon M. Van Dyke, *The 1982 United Nations Convention on the Law of the Sea*, OCEAN AND COASTAL L. & POL'Y 375, 381 (2008). *See also* 33 C.F.R. § 2.30 (2011) (defining "exclusive economic zone" with reference to "customary international law as reflected in Article 56 of the 1982 United Nations Convention on the Law of the Sea.").

140. *See generally* UNCLOS, *supra* note 135, at arts. 3-5.

141. More precisely, the "coastline" refers to the baseline of the coastal state, which is generally the low-water line along the coast. *Id.* at art. 5.

142. *Id.* at art. 3.

143. *Id.* at art. 2 ("The sovereignty of a coastal State extends, beyond its land territory and internal waters and, in the case of an archipelagic State, its archipelagic waters, to an adjacent belt of sea, described as the territorial sea."). *See also* Michael W. Reed, *National and International Jurisdictions and Boundaries*, OCEAN AND COASTAL L. & POL'Y 1, 8 (2008).

144. UNCLOS, *supra* note 135, at art. 17 ("[S]hips of all States, whether coastal or land-locked, enjoy the right of innocent passage through the territorial sea.").

145. *Id.* at arts. 18-19.

146. *See id.* at arts. 56-57.

miles from the coast.[147] Within its exclusive economic zone, a coastal state has the sovereign right to explore, manage, conserve living and nonliving natural resources, and to exploit other economic activities including energy production.[148] A coastal state also has jurisdiction with respect to the construction and use of artificial islands, marine research, and the protection and preservation of the marine environment within its exclusive economic zone.[149] UNCLOS also imposes certain responsibilities on coastal states.[150] For example, a coastal state must "ensure through proper conservation and management measures that the management of the living resources in the exclusive economic zone is not endangered by over-exploitation."[151]

The high seas are those parts of the ocean that are not included in the exclusive economic zone, the territorial sea, or internal waters.[152] Pursuant to UNCLOS, "[n]o State may validly purport to subject any part of the high seas to its sovereignty."[153] Because of this, the high seas are open to all states, and include unrestricted freedom of navigation, freedom of overflight, freedom to lay submarine cables and pipelines, freedom of fishing, and freedom of scientific research, among other things.[154]

B. International Straits and Transit Passage

The maritime jurisdictional framework described above does not apply to all geographic situations.[155] In narrow international straits—like the Bering Strait[156]—special rules apply to ensure that non-coastal states have relatively unimpaired access through the passage.[157] Where a strait is "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

147. *Id.*
148. *Id.* at art. 56.
149. *Id.*
150. *Id.* at art. 61.
151. *Id.*
152. *Id.* at art. 86 (high seas also do not include archipelagic waters of an archipelagic state).
153. *Id.* at art. 89.
154. *Id.* at art. 87.
155. *See generally id.* at arts. 34-45.
156. It is generally acknowledged that the Bering Strait meets the UNCLOS definition of an international strait. *See, e.g.*, AMSA 2009, *supra* note 12, at 106 ("The Bering Strait is a narrow international strait . . ."); Van Dyke, *supra* note 145, at 378 (referring to the Bering Strait as one of several "key" international straits).
157. *See generally* UNCLOS, *supra* note 135, at Part III, arts. 34-45.

exclusive economic zone," vessels and aircraft have a right of "transit passage."[158] UNCLOS defines transit passage as "the exercise . . . of the freedom of navigation and overflight solely for the purpose of continuous and expeditious transit of the strait."[159] In general, vessels in transit passage through an international strait must "refrain from any activities other than those incident to their normal modes of continuous and expeditious transit."[160] The concept and principles of transit passage through international straits described in UNCLOS are generally recognized as customary international law.[161]

In general, "[t]he laws and regulations that a coastal state may adopt with respect to transit passage [through an international strait] are more limited than those relating to innocent passage."[162] UNCLOS provides that coastal states "may adopt laws and regulations relating to transit passage through straits," including laws or regulations relating to safety of navigation, vessel traffic, pollution control, fishing, customs, fiscal policy, immigration, and sanitary issues.[163] However, those laws and regulations may "not discriminate in form or in fact among foreign ships" and cannot "have the practical effect of denying, hampering or impairing the right of transit passage."[164] Coastal states may also "designate sea lanes and prescribe traffic separation schemes . . . where necessary to promote the safe passage of ships."[165] But in doing so, they must cooperate with other states that border the strait and refer their proposals to the "competent international organization."[166] For this and other similar purposes, the International Maritime Organization (IMO) is

158. *Id.* at arts. 37-38.

159. *Id.* at art. 38. *See also* RESTATEMENT (THIRD) OF FOREIGN RELATIONS LAW § 513 cmt. j (1987). Transit passage is similar to innocent passage, but is "free from many of the restrictions implied in innocent passage." *Id*. For example, a coastal state may temporarily suspend innocent passage through the territorial sea, but it may not suspend transit passage through an international strait. *Id.* Similarly, submarines must surface in innocent passage, but may remain submerged in transit passage. *Id.*

160. UNCLOS, *supra* note 135, at art. 39.

161. RESTATEMENT (THIRD) OF FOREIGN RELATIONS LAW § 513 cmt. j (1987).

162. *Id.*

163. UNCLOS, *supra* note 135, at art. 42.

164. *Id.*

165. *Id.* at art. 41.

166. *See id.*; *See also* RESTATEMENT (THIRD) OF FOREIGN RELATIONS LAW § 513 cmt. j (1987) ("[I]n international straits the designation of such lanes or schemes requires concurrent action by the strait state (or states) and the competent international organization.").

recognized as the competent international organization.[167] The IMO may adopt only those traffic separation schemes that are agreed upon with other states.[168]

The legal regime that applies to the right of transit passage limits the ability of a coastal state to regulate and control vessel traffic that passes through an international strait bordering its coastline. With respect to the Bering Strait, this means that the United States has a limited ability to act unilaterally to impose additional regulations on vessel traffic. For example, while the United States and the Russian Federation could coordinate in an effort to designate vessel traffic lanes in the Bering Strait, the IMO would have to adopt any such lanes before they can be prescribed by the coastal states.[169]

C. Other Aspects of UNCLOS That May Apply to the Bering Strait Region

In addition to describing the rules governing transit passage through international straits, UNCLOS contains a section on the protection and preservation of the marine environment.[170] Among other things, this section of the Convention imposes on states a general obligation to protect and preserve the marine environment[171] and a responsibility to take measures to prevent, reduce, and control pollution of the marine environment.[172] Two other articles in this section may have particular relevance to the Bering Strait region: article 211, which allows states to identify and regulate "special areas," and article 234, which relates to ice-covered areas.

1. UNCLOS Article 211

In instances where a coastal state has reasonable grounds to believe that a particular area of its exclusive economic zone merits "special mandatory measures for the prevention of pollution from vessels," UNCLOS article 211 provides that a coastal state may "adopt laws and regulations for the prevention, reduction and control of pollution from

167. *See, e.g.*, RESTATEMENT (THIRD) OF FOREIGN RELATIONS LAW § 513 cmts. d & j (1987) (noting that the "competent international organization" is "principally the IMO").
168. UNCLOS, *supra* note 135, at art. 41.
169. *Id.* at art. 41.
170. *See e.g.*, *id.* at Part XII, arts. 192-237.
171. *Id.* at art. 192.
172. *Id.* at art. 194.

vessels . . . for special areas."[173] To adopt these laws and regulations, a coastal state must consult with other concerned states and submit its proposal to the IMO.[174] If the IMO determines that the coastal state's proposal satisfies the relevant requirements, the state may adopt its proposed laws and regulations.[175]

Even if a coastal state can show that a particular area merits recognition and protection as a special area, there are limits on the state's ability to impose regulations under article 211. For example, any additional regulations must be designed to address prevention of pollution from vessels.[176] As a result, regulation under article 211 may not be the optimal way to address non-pollution impacts of shipping traffic, such as increased noise or the threat of ships striking large marine mammals. In addition, regulations imposed pursuant to article 211 "shall not require foreign vessels to observe design, construction, manning or equipment standards other than generally accepted international rules and standards."[177] This limitation likely precludes many significant protections. Moreover, article 211 only authorizes states to take regulatory action "in respect of their exclusive economic zones."[178] As a result, article 211 may have limited application in an international strait like the Bering Strait.

2. UNCLOS Article 234

Article 234 provides that coastal states may adopt and enforce non-discriminatory laws and regulations designed to prevent, reduce, "and control marine pollution from vessels in ice-covered areas within the limits of the exclusive economic zone."[179] It applies "where particularly severe climatic conditions and the presence of ice covering such areas for most of the year create obstructions or exceptional hazards to navigation, and pollution of the marine environment could cause major harm to or irreversible disturbance of the ecological balance."[180] Laws or regulations enacted pursuant to article 234 must "have due regard to

173. *Id.* at art. 211(6)(a).
174. *Id.*
175. *Id.*
176. *Id.* (providing explicit authorization only for "laws and regulations for the prevention, reduction and control of pollution from vessels"). Regulations proposed under article 211 "may relate to discharges or navigational practices." *Id.*
177. *Id.*
178. *Id.* at art. 211(5).
179. *Id.* at art. 234.
180. *Id*.

navigation and the protection and preservation of the marine environment based on the best available scientific evidence."[181]

As is the case for article 211, the application of article 234 is limited. Article 234 only applies to areas that are ice-covered for "most of the year."[182] At present, the Bering Strait region may qualify as such an area, but as the climate changes and seasonal sea ice forms later in the season[183] it is not at all certain that it will continue to qualify. In addition, article 234 is available only for areas within the limits of a state's exclusive economic zone,[184] and its application to vessels in transit passage through an international strait is not clear.

V. INSTITUTIONS AND INSTRUMENTS OF CHANGE

Given the Bering Strait's status as an international strait and the limitations on coastal states' ability to restrict transit traffic in an international strait, the adoption of a strong system of safety, prevention, management, and mitigation measures in the region will require action from a variety of stakeholders. The following section examines the governmental agencies and international organizations that are best positioned to affect change in the Bering Strait region and the tools and instruments they can use to do so.

A. Coastal State Regulation: Domestic Action and Bilateral Agreements

Domestic and bilateral processes offer one path toward a strengthened safety and environmental protection regime in the Bering Strait region. Domestically, the U.S. Coast Guard has engaged in a Port Access Route Study designed to explore improvements to the regulation of maritime traffic in the Bering Strait region.[185] Reaching beyond U.S. borders, the United States and the Russian Federation cooperate and have existing agreements on a variety of issues relating to the Bering Strait region.[186] It may be possible to use that model to adopt and implement

181. *Id*.

182. *Id.*

183. *See, e.g.*, AMSA 2009, *supra* note 12, at 106 (noting that the Bering Strait region is projected to experience later freeze-up that will cause "a significant reduction" of sea ice in November and December in the future).

184. *Id.*

185. *See* Port Access Route Study: In the Bering Strait, 75 Fed. Reg. 68,568, 68,568–70 (proposed Nov. 8, 2010) (to be codified at 33 C.F.R. pt. 300).

186. *See e.g.*, Rick Janelle, *Protection of the Marine Environment in the Bering and Chukchi Seas*, THE COAST GUARD JOURNAL OF SAFETY AT SEA, PROCEEDINGS OF THE

additional safety and environmental protections. In general, the United States and the Russian Federation—whether acting unilaterally or jointly—have limited authority to impose binding regulations in an international strait. However, to the extent that the two Bering Strait coastal states recommend non-binding safety and protective measures, foreign-flagged vessels may elect to comply with those recommendations voluntarily.

1. U.S. Coast Guard Port Access Route Study Process in the Bering Strait

The U.S. Coast Guard is currently conducting a Port Access Route Study in the Bering Strait in accordance with the Ports and Waterways Safety Act.[187] Among other things, the study will evaluate "the need for modifications to current vessel routing measures and the need for creation of new vessel routing measures in the Bering Strait."[188] The Coast Guard intends for the study "to help reduce the risk of marine casualties and increase the efficiency of vessel traffic" in the Bering Strait area.[189] The recommendations that result from the study could lead to domestic rulemaking or international agreement.[190]

The Coast Guard intends to use the Bering Strait Port Access Route Study to "assess whether the creation of a vessel routing system is advisable to increase the predictability of vessel movements, which may decrease the potential for collisions, oil spills, and other events that could threaten the marine environment."[191] The Coast Guard anticipates that the study may result in a range of recommendations including: maintaining the status quo, establishing a traffic separation scheme, creating one or more precautionary areas, creating one or more inshore traffic zones, identifying deep-draft routes, establishing areas to be

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MARINE SAFETY COUNCIL 24–27 (2003) [hereinafter COAST GUARD JOURNAL] (discussing history of agreements and cooperation between the U.S. Coast Guard and the Russian Federation); Robert E. Kramek & W. Russell Webster, *Steaming with the Russians*, 123 PROCEEDINGS: U.S. NAVAL INSTITUTE (1997), *available at* http://www.usni.org/magazines/proceedings/1997-12/steaming-russians (describing expansion of relationship between United States and Russian Federation).

187. *See* Ports and Waterways Safety Act of 1972, 33 U.S.C. §§ 1221-1236 (2002).

188. Port Access Route Study: In the Bering Strait, 75 Fed. Reg. at 68,568.

189. *Id.*

190. *Id.*

191. *Id.* at 68,570.

avoided, establishing or modifying anchorage grounds, establishing a regulated navigation area, or identifying other ships' routing measures.[192]

As explained below, many of these vessel routing measures are defined and recognized in international instruments[193] and would likely require coordination with the Russian Federation and action by the IMO before being adopted and implemented in the Bering Strait.[194] One of the identified measures—establishment of a regulated navigation area—is specific to waters subject to the United States' jurisdiction.[195] Coast Guard regulations define a regulated navigation area as a water area with a specific boundary for which the Coast Guard has issued regulations that specify times of vessel movement in certain areas; establish vessel size, speed, draft, or operating conditions; or restrict vessel operations in hazardous areas or under hazardous conditions.[196] Because international law prevents a coastal state from enacting regulations that "have the practical effect of denying, hampering or impairing the right of transit passage,"[197] a United States regulated navigation area in the Bering Strait may have limited effect on foreign-flagged vessels.

2. Bilateral Agreements

Beyond the U.S. Coast Guard's domestic Port Access Route Study, there is also the opportunity for the two Bering Strait coastal states—the United States and the Russian Federation—to enter into a bilateral agreement aimed at improving maritime safety and environmental protection in the Bering Strait region.

As noted above, the two nations already cooperate on a range of issues in the area. In 1972 the United States and the Union of Soviet Socialist Republics (USSR) signed the Agreement on Cooperation in the

192. *Id.*

193. *See* discussion *infra* Part V.C.1.a (describing ships' routing measures recognized under the International Convention for the Safety of Life at Sea and the IMO's General Provisions on Ships' Routeing).

194. *See, e.g.*, *Coast Guard Operations in the Arctic*: *Hearing before the H. Transp. & Infrastructure Subcomm. on Coast Guard & Maritime Transp.*, 112th Cong. (2011) [hereinafter *Coast Guard Operations in the Arctic*] (testimony of Admiral Robert Papp, Commandant, U.S. Coast Guard) (noting that the Coast Guard will need to coordinate with the Russian Federation and other stakeholders before forwarding its analysis to the IMO for consideration).

195. *See* 33 C.F.R. § 165.9(b) ("[R]egulated navigation areas may be established in waters subject to the jurisdiction of the United States . . . including the territorial sea to a seaward limit of 12 nautical miles from the baseline").

196. *Id.* at §§ 165.10–165.11.

197. UNCLOS, *supra* note 135, at art. 42.

Field of Environmental Protection.[198] In 1978 the two countries ratified a migratory bird treaty,[199] and in 1989 they signed an agreement to cooperate on combating pollution in the Bering and Chukchi seas.[200] In 1995 the United States and the Russian Federal Border Service signed a memorandum of understanding that provided a framework for greater cooperation in areas such as search and rescue and maritime law enforcement.[201] More recently, the U.S. Coast Guard and the Russian State Marine Pollution Control Salvage and Rescue Administration signed a memorandum of understanding and agreed to joint contingency planning relating to oil spill response.[202] The Russian Federation and the United States have also cooperated in response to illegal fishing activities in the waters between the two nations.[203]

The United States and the Russian Federation could use this history of collaboration as the basis for negotiating and implementing a bilateral agreement designed to improve shipping safety and environmental protection in the Bering Strait region. The bilateral approach has the advantage of relative simplicity. As an agreement between the two Bering Strait coastal states, it would not require the agreement of other Arctic countries or the blessing of the IMO.[204] As such, however, it would only be binding on the United States and the Russian Federation and would not be enforceable against vessels of other nations that transit the Bering Strait.[205]

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198. COAST GUARD JOURNAL, *supra* note 186, at 24-27.

199. Convention between the United States of America and the Union of Soviet Socialist Republics Concerning the Conservation of Migratory Birds and their Environment, U.S.-Rus., Nov. 19, 1976, 29 U.S.T. 4647; *see also* Fish and Wildlife Improvement Act of 1978, Pub. L. No. 95-616, 92 Stat. 3110.

200. COAST GUARD JOURNAL, *supra* note 186, at 24-27.

201. Kramek & Webster, *supra* note 186.

202. *Coast Guard Operations in the Arctic, supra* note 194, at 6.

203. U.S. GOV'T ACCOUNTABILITY OFFICE, GAO-10-870, COAST GUARD EFFORTS TO IDENTIFY ARCTIC REQUIREMENTS ARE ONGOING, BUT MORE COMMUNICATION ABOUT AGENCY PLANNING EFFORTS WOULD BE BENEFICIAL, 15 (2010).

204. At the same time, the United States may be disinclined to enter into such an agreement for those very reasons. The United States has resisted attempts of coastal nations to extend their maritime jurisdiction into international waters. *See, e.g.*, Michael Sternheim, *Regulating the Northwest Passage*, 10 LOY. MAR. L.J. 173, 178-82 (2011) (describing United States' opposition to Canadian attempts to assert jurisdiction over the Northwest Passage). This has led one commenter to assert that "it is not likely that the United States would advocate a policy of establishing bilateral control regimes by states bordering waters that are considered international straits." *Id.* at 204-05.

205. *Cf.* Sternheim, *supra* note 204, at 204 (noting, in context of a proposed United States-Canada bilateral agreement governing the Northwest Passage, that "any bilateral agreement would only bind the United States and Canada").

3. Setting the Stage for IMO Action and Voluntary Compliance

As described above, implementation of a bilateral agreement between the United States and the Russian Federation or unilateral action by the United States—such as creation of a "regulated navigation area" pursuant to Coast Guard regulations—would have limited binding effect on the vessels of other nations. However, these types of actions could result in more enforceable regulatory measures in the future, perhaps carried out under the auspices of the IMO.[206]

In addition, unilateral or bilateral adoption of non-binding regulations or recommendations could encourage voluntary compliance by foreign vessels passing through the Bering Strait. For example, a recent news media account of a meeting on Bering Strait shipping reported a shipping expert's assertion that the vast majority of vessels comply with voluntary speed restrictions when others vessels are able to monitor their speeds using automated tracking technology.[207] According to the report, the expert stated that "there are very few infractions because people know they are being watched, and do not want a reputation of non-compliance."[208] Similarly, a National Oceanic and Atmospheric Administration report noted that most vessels voluntarily complied with a non-binding Area To Be Avoided—albeit one adopted by the IMO—off the coast of the Olympic Coast National Marine Sanctuary in Washington state.[209]

B. Arctic Council

Another path toward strengthened safety and environmental protections in the Bering Strait region could run through the Arctic Council. The Arctic Council defines itself as "a high level intergovernmental forum [established] to provide a means for promoting

206. *See, e.g.*, *Coast Guard Operations in the Arctic*, *supra* note 194, at 4 (testimony of Admiral Robert Papp, Commandant, U.S. Coast Guard, anticipating that the U.S. Port Access Route Study will lead to coordination with the Russian Federation and then consideration by the IMO).

207. Amelia Cooper, *Organizations Prepare for Increased Arctic Shipping*, NOME NUGGET, July 5, 2012, at 6, http://www.nomenugget.net/archives/2012/070512nn.pdf (quoting Coast Guard retiree Ed Page).

208. *Id.* (however, in the same article, Brad Hanson, a wildlife biologist, states that voluntary measures "really don't work").

209. GEORGE GALASSO, NAT'L OCEANIC & ATMOSPHERIC ADMIN, MARINE SANCTUARY DIV., OLYMPIC COAST NATIONAL MARINE SANCTUARY AREA TO BE AVOIDED (ATBA) EDUCATION AND MONITORING PROGRAM, 1-4 (2000).

cooperation, coordination and interaction among the Arctic States, with the involvement of the Arctic Indigenous communities and other Arctic inhabitants . . . ."[210] The Council addresses a variety of Arctic issues, including those relating to sustainable development and environmental protection in the Arctic.[211] Arctic Council member states include Canada, Denmark, Finland, Iceland, Norway, the Russian Federation, Sweden, and the United States.[212] A variety of indigenous organizations are permanent participants on the Council, including the Aleut International Association, the Inuit Circumpolar Council, the Russian Arctic Indigenous Peoples of the North, and the Saami Council.[213]

Through a series of working groups,[214] the Arctic Council carries out programs and projects mandated by the Council's Ministers.[215] For example, in May 2011, the Arctic Council tasked its working groups with developing recommendations and best practices for the prevention of marine oil pollution in the Arctic.[216] Past Arctic Council projects have usually resulted in non-binding guidelines and reports addressing science, ecology, and social and cultural issues.[217] Some examples include the Arctic Climate Impact Assessment,[218] the Arctic Marine Shipping Assessment,[219] the Arctic Council Offshore Oil and Gas

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210. *About the Arctic Council*, ARCTIC COUNCIL, http://www.arctic-council.org/index.php/en/about-us (last visited Sept. 23, 2012).

211. *Id.*

212. *Id.*

213. *Permanent Participants,* ARCTIC COUNCIL, http://www.arctic-council.org/index.php/en/about-us/permanentparticipants (last visited Sept. 23, 2012).

214. Arctic Council working groups include Arctic Contaminants Action Program, Arctic Monitoring and Assessment Programme, Conservation of Arctic Flora and Fauna, Emergency Prevention, Preparedness and Response, Protection of the Arctic Marine Environment, and Sustainable Development Working Group. *See Working Groups*, ARCTIC COUNCIL, http://www.arctic-council.org/index.php/en/about-us/working-groups (last visited Sept. 23, 2012).

215. *Id.*

216. *Task Force on Arctic Marine Oil Pollution Preparedness and Response*, ARCTIC COUNCIL, www.arctic-council.org/index.php/en/about-us/task-forces/280-oil-spill-task-force (last visited Sept. 23, 2012).

217. J. Ashley Roach, *International Law and the Arctic: A Guide to Understanding the Issues*, 15 SW. J. INT'L L. 301, 316-18 (2009). *See also id.* at 315-16 (describing Arctic Council projects as part of a "soft-law" regime applicable to the Arctic Ocean); Bonnie Malloy, *On Thin Ice: How a Binding Treaty Regime Can Save the Arctic*, 16 HASTINGS W.-NW. J. ENVTL. L. & POL'Y 471, 486-87 (2010) (noting that the Arctic Council and its working groups "only create soft law").

218. Susan Joy Hassal, IMPACTS OF A WARMING ARCTIC: ARCTIC CLIMATE IMPACT ASSESSMENT (Cambridge Univ. Press 2004).

219. AMSA 2009, *supra* note 12.

Guidelines,[220] and Arctic Biodiversity Trends 2010: Selected Indicators of Change.[221] More recently, however, the Arctic Council facilitated the adoption of an internationally binding search and rescue agreement for the Arctic.[222] The 2011 Arctic search and rescue agreement "is the first legally binding instrument negotiated under the auspices of the Arctic Council, and it also represents the first legally binding agreement on any topic ever negotiated among all the eight Arctic states."[223]

Among other things, the 2011 Arctic search and rescue agreement calls for coordination and communication among the parties, including the exchange of weather and ocean forecasts and warnings, joint exercises and training, shared support services, and use of ship reporting systems for search and rescue purposes.[224] However, the agreement is not primarily designed to prevent shipping accidents, and it does not address critical gaps that exist in the Bering Strait region, such as lack of maritime infrastructure, vessel regulation, and environmental protection measures. Nonetheless, the Arctic search and rescue agreement should facilitate improved preparedness and response capacity in the event of an accident in the Bering region.

Given the role the Arctic Council played in the development and adoption of the 2011 Arctic search and rescue agreement, the Council could play a similar role facilitating a multilateral agreement aimed at improving vessel safety, preventing maritime accidents, reducing the environmental impacts of vessel traffic, and bolstering environmental safeguards in the Arctic, particularly in the Bering Strait region.[225] The

220. PROTECTION OF THE ARCTIC MARINE ENVIRONMENT WORKING GROUP, ARCTIC COUNCIL, FINAL DRAFT: ARCTIC OFFSHORE OIL AND GAS GUIDELINES (2009), *available at* www.artctic-council.org/index.php/en/about/documents/category/233-3-energy.

221. CONSERVATION OF ARCTIC FLORA AND FAUNA, ARCTIC COUNCIL, ARCTIC BIODIVERSITY TRENDS 2010: SELECTED INDICATORS OF CHANGE (2010).

222. AGREEMENT ON COOPERATION ON AERONAUTICAL AND MARITIME SEARCH AND RESCUE IN THE ARCTIC (April 21, 2011) [hereinafter AGREEMENT ON COOPERATION], *available at* http://library.arcticportal.org/1709/1/Arctic_SAR_Agreement_EN_FINAL_for_signature_21-Apr-2011.pdf.

223. *Search and Rescue in the Arctic*, ARCTIC COUNCIL, http://www.arctic-council.org/index.php/en/oceans/search-and-rescue/157-sar-agreement (last visited Sept. 23, 2012).

224. AGREEMENT ON COOPERATION, *supra* note 222, at art. 9.

225. Some observers have advocated an Arctic treaty that is broader in scope. For example, one author called for a binding treaty that would "comprehensively address the full range of issues in the Arctic," perhaps based on the Antarctic Treaty System. Malloy, *supra* note 217, at 475; *see also* Stephanie Holmes, Student Author, *Breaking the Ice: Emerging Legal Issues in Arctic Sovereignty*, 9 CHI. J. INT'L L. 323, 327 (2008) (referencing Hugo Grotius, who argued that "the world's oceans constitute a common resource belonging to everyone"). However, the governments of the United States, the

Arctic Council's 2009 Arctic Marine Shipping Assessment[226] could be viewed as a first step in this direction. The Arctic Marine Shipping Assessment includes a series of recommendations "to provide a guide for future action by the Arctic Council" and others.[227] In fact, these recommendations—which concern ensuring safety, protecting Arctic people and the environment, and building the Arctic marine infrastructure[228]—have already served as a catalyst for action. In a status update released two years after publication of the Arctic Marine Shipping Assessment, the Arctic Council concluded "that significant progress is being made on implementing many of the Assessment's recommendations."[229] In particular, the update focused on IMO's *Guidelines for Ships Operating in Polar Waters* and the ongoing work to develop a legally binding Polar Code, in addition to the adoption of an Arctic search and rescue agreement.[230] However, the status update also recognized that more work remained, including "further cooperation and increased efforts to improve Arctic maritime safety and protection of the Arctic marine environment."[231]

To the extent that the Arctic Council and others in the international community seek to improve maritime safety and protection of the marine environment in the Bering Strait region, the IMO will likely play a critical role. The following section explores some of the ways that the IMO and its instruments might be used to expand maritime safety and protection measures in the Bering Strait region.

Russian Federation, Norway, Denmark, and Canada rejected this approach. In the 2008 Ilulissat Declaration, these nations agreed that the existing legal framework "provides a solid foundation for responsible management by the five coastal States and other users" of the Arctic Ocean and that there is "no need to develop a new comprehensive international legal regime to govern the Arctic Ocean." THE ILULISSAT DECLARATION: ARTIC OCEAN CONVENTION 1-2 (2008), www.oceanlaw.oeg/downloads/arctic/Ilulissat_Declaration.pdf.

226. AMSA 2009, *supra* note 12.

227. *Id.* at 6.

228. *Id.* at 6-7.

229. ARCTIC COUNCIL, STATUS ON IMPLEMENTATION OF THE AMSA 2009 REPORT RECOMMENDATIONS 3 (2011), *available at* http://library.arcticportal.org/1401/1/AMSA_Status_on_Implementation_of_the_AMSA_2009_Report_Recomendations%2DMay_2011.pdf.

230. *Id.*

231. *Id.* (noting that "more work needs to be done to identify areas of heightened cultural or ecological significance within the Arctic and then craft appropriate measures as necessary to safeguard such areas").

C. International Maritime Organization and its Instruments and Processes

The IMO is a specialized agency within the United Nations responsible for the safety and security of shipping as well as the prevention of marine pollution by ships.[232] The IMO facilitates most international maritime conventions and, through various codes and guidelines, helps implement international rules and standards governing vessel traffic.[233] In this capacity, the IMO is well positioned to affect change in the Bering Strait region.

A variety of IMO instruments, processes, and tools could be used to bolster safety and environmental protection measures in the Bering Strait region. First, the International Convention for the Safety of Life at Sea[234] (SOLAS) allows the adoption and implementation of ships' routing systems, ships' reporting systems, vessel traffic services, and automatic identification systems. Second, the International Convention for the Prevention of Pollution from Ships (MARPOL) provides for the designation of emission control areas and special areas.[235] Third, the IMO is developing a mandatory Polar Code to address all aspects of polar shipping.[236] Fourth, IMO Assembly Resolution 720(17) provides for the designation of Particularly Sensitive Sea Areas that are subject to special regulation. The following sections explore these instruments and processes in more detail.

1. Ships' Routing Measures, Ships' Reporting Systems, Vessel Traffic Services, Long-Range Information and Tracking Systems, and Automatic Identification Systems

SOLAS provides for four tools that may be particularly useful in improving vessel traffic safety and environmental protection in the Bering Strait region. First, SOLAS regulations give the IMO the

232. *Introduction to IMO*, IMO, http://www.imo.org/About/Pages/Default.aspx (last visited Sept. 23, 2012).

233. AMSA 2009, *supra* note 12, at 50.

234. International Convention for the Safety of Life at Sea, Nov. 1, 1974, 32 U.S.T. 47, 1226 (as amended) [hereinafter SOLAS].

235. International Convention for the Prevention of Pollution from Ships, as amended by Protocol of 1978 Relating to the International Convention of the Prevention of Pollution by Ships, 1973, Feb. 16, 1978, 17 I.L.M. 546 [hereinafter MARPOL].

236. *Protecting the Polar Regions from Shipping*, *Protecting Ships in Polar Waters*, IMO, www.imo.org/mediacentre/hottopics/polar/Pages/default.aspx (last visited Sept. 23, 2012).

authority to adopt and implement ships' routing systems that direct vessel traffic in certain areas.[237] Second, SOLAS regulations give the IMO the authority to adopt ships' reporting systems that facilitate communication between vessels and ships and shore-based facilities.[238] Third, SOLAS regulations call for member governments to implement vessel traffic services where appropriate.[239] Vessel traffic systems are shore-based communications systems that range from providing simple information exchange with ships to providing more comprehensive management of vessel traffic in a particular area.[240] Finally, SOLAS regulations now call for most large ships engaged in international voyages to be equipped with automatic identification systems and long-range identification and tracking systems that can automatically transmit information about the ship to other ships and to coastal authorities.[241]

a. Ships' Routing Measures

Ships' routing measures are used to reduce the risk of pollution or other damage to the marine environment caused by ships traveling, colliding, or grounding in or near environmentally sensitive areas.[242] IMO ships' routing measures may be either recommended or mandatory for vessels[243] and may apply to "all ships, certain categories of ships, or ships carrying certain cargoes."[244] Ships' routing systems may "be established to improve safety of life at sea, safety and efficiency of navigation, and/or increase the protection of the marine environment."[245] Member governments may submit proposals for ships' routing systems

237. SOLAS, *supra* note 234, reg. V/10.1.

238. *Id.* at reg. V/11.1.

239. *Id.* at reg. V/12.2.

240. *See Vessel Traffic Services*, IMO, http://www.imo.org/OurWork/Safety/Navigation/Pages/VesselTrafficServices.aspx (last visited Sept. 23, 2012).

241. SOLAS, *supra* note 234, at regs. V/19.2.4 & V/19-1.

242. *See* Raul A. F. Pedrozo, *Transport of Nuclear Cargoes By Sea*, 28 J. MAR. L. & COM. 207, 229 (1997) (noting that ships' routing measures are used to reduce the risk of casualties and prevent or reduce the risk of pollution or damage to the marine environment).

243. IMO, GUIDANCE NOTE ON THE PREPARATION OF PROPOSALS ON SHIPS' ROUTEING SYSTEMS AND SHIP REPORTING SYSTEMS FOR SUBMISSION TO THE SUB-COMMITTEE ON SAFETY OF NAVIGATION, § 2.1 (2003) [hereinafter IMO GUIDANCE NOTE], *available at* http://www.imo.org/OurWork/Safety/Navigation/Documents/1060.pdf.

244. SOLAS, *supra* note 234, at ch. V. *See also* IMO GUIDANCE NOTE, *supra* note 243, at § 2.1.

245. IMO GUIDANCE NOTE, *supra* note 243, at § 1.2.

and ship reporting systems to the IMO for consideration.[246] IMO guidance and regulations provide that when "two or more Governments have a common interest in a particular area, they should formulate a joint proposal for the routing system with integrated measures and procedures for co-operation between the jurisdictions of the proposing Governments."[247]

Among other variations, ships' routing measures may take the form of traffic separation schemes, areas to be avoided, and precautionary areas.[248] A traffic separation scheme is "a routeing measure aimed at the separation of opposing streams of traffic by appropriate means and by the establishment of traffic lanes."[249] While the original purpose of traffic separation schemes was to prevent collisions and improve the safety of international shipping, they can also be used to direct "traffic flow around or at a safe distance from environmentally sensitive areas."[250] An area to be avoided is "an area within defined limits in which either navigation is particularly hazardous or it is exceptionally important to avoid casualties and which should be avoided by all ships, or by certain classes of ships."[251] In general, an area to be avoided cannot be adopted if it "would impede the passage of ships through an international strait."[252] A precautionary area is "an area within defined limits where ships must navigate with particular caution and within which the

246. *Id.* at § 1.1.

247. SOLAS, *supra* note 234, at ch. V & reg. V/10.5. *See also* IMO GUIDANCE NOTE, *supra* note 243, at § 3.3.

248. IMO, General Provisions on Ships' Routeing, at § 2.1.1, (Nov. 20, 1985) [hereinafter IMO Provision on Shipping], as amended, http://www.imo.org/blast/blastDataHelper.asp?data_id=22369&filename=A572(14).pdf.

249. Ships Routeing, IMO http://www.imo.org/OurWork/Safety/Navigation/Pages/ShipsRouteing.aspx (last visited Sept. 23, 2012). *See also* 33 C.F.R. § 167.5(b) (defining traffic separation scheme as "a designated routing measure which is aimed at the separation of opposing streams of traffic by appropriate means and by the establishment of traffic lanes").

250. IMO, *Ships' Routeing,* IMO Assemb. Res. A. 827(19), Annex 3 § 1.1.6 (Nov. 23, 1995) [hereinafter IMO Res. 827(19)], *available at* http://www.imo.org/blast/blastDataHelper.asp?data_id=23907&filename=827-REV1%2819%29.pdf; *see also* IMO GUIDANCE NOTE, *supra* note 243, at § 1.2 (providing that ships' routing systems may be used to "increase the protection of the marine environment").

251. Ships' Routeing, *supra* note 249. *See also* 33 C.F.R. § 167.5(a) (2011) (defining area to be avoided as "a routing measure comprising an area within defined limits in which either navigation is particularly hazardous or it is exceptionally important to avoid casualties and which should be avoided by all ships or certain classes of ships").

252. *See* IMO Res. 827(19), *supra* note 250, at § 3.3.7.

direction of flow of traffic may be recommended."[253] A precautionary area can serve to control traffic flow around an area that may pose hazards to shipping or may complement a designated area to be avoided.[254]

b. Ships' Reporting Systems

Ships' reporting systems enable the communication and exchange of information between shore-based authorities and participating ships.[255] These systems should be considered when addressing "the improvement of the safety of life at sea, the safety and efficiency of navigation and/or to increase the protection of the marine environment."[256] When implemented, ships' reporting systems should enable the exchange of basic information between ship and shore, including the ship's name, call sign, and position.[257] If necessary, the system may also call for the transmission of "the intended movement of the ship through the area, any operational defects or difficulties affecting the ship, and general categories of any hazardous cargoes on board."[258] In the event of an emergency or threat to the marine environment, the system may request that the ship provide the precise details of any hazardous cargoes as soon as possible.[259]

Ships' reporting systems may "be mandatory for use by all ships, or certain categories of ships, or ships carrying certain cargoes."[260] IMO may also review and recommend voluntary ship reporting systems; such systems will be recommended by IMO for voluntary use in international waters if the systems adhere as closely as possible to IMO regulations, guidance, and criteria.[261] As is the case with ships' routing measures, member governments may submit proposals for ships' reporting systems

253. Ships' Routeing, *supra* note 249. *See also* 33 C.F.R. § 167.5(e) (defining precautionary area as "a routing measure comprising an area within defined limits where ships must navigate with particular caution and within which the direction of traffic flow may be recommended").

254. *See* IMO Res. A. 827(19), *supra* note 250, at § 4.5.3 (containing diagrams illustrating the various uses of a Precautionary Area designation).

255. IMO, Maritime Safety Comm., *Guidelines and Criteria for Ship Reporting Systems*, IMO Assemb. Res. MSC.43(64) as amended § 2.2.1.2 (Dec. 9, 1994), *available at* http://www.imo.org/blast/blastDataHelper.asp?data_id=15404&filename=43(64).pdf.

256. *Id.* at § 2.1.

257. IMO, GUIDANCE NOTE, *supra* note 243, at § 6.2.2.

258. *Id.*

259. *Id.*

260. *Id.* at § 5.1.

261. *Id.* at § 5.2.

to the IMO for consideration,[262] and when "two or more governments have a common interest in a particular area, they should formulate a joint proposal for the ship reporting system with integrated measures and procedures for co-operation between the jurisdictions of the proposing Governments."[263] It is the responsibility of the proposing governments to plan and implement any proposed ships' reporting systems.[264]

c. Vessel Traffic Services

As noted above, vessel traffic services are shore-based communication systems that can provide simple information exchange with ships, or provide more comprehensive vessel management for a particular area.[265] Broadly speaking, there are two types of vessel traffic services: port or harbor vessel traffic and coastal vessel traffic.[266] The former "is mainly concerned with vessel traffic to and from a port or harbor," and usually provides an assistance service or a traffic organization service.[267] The latter "is mainly concerned with vessel traffic passing through the area" and is usually limited to providing an information service.[268] SOLAS recognizes that vessel traffic services "contribute to safety of life at sea, safety and efficiency of navigation and protection of the marine environment, [and] adjacent shore areas . . . from possible adverse effects of maritime traffic."[269]

SOLAS calls on governments to "arrange for the establishment of [vessel traffic services] where, in their opinion, the volume of traffic or the degree of risk justifies such services."[270] However, vessel traffic services may only be made mandatory within the territorial seas of a coastal state, and they do not alter the legal regimes governing international straits.[271] When planning and implementing vessel traffic services, governments should strive to follow relevant IMO guidelines.[272]

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262. *See, e.g.*, *id.* at § 1.1.
263. *Id.* at § 6.3.
264. *Id.* at § 6.1.
265. *See* IMO, *Vessel Traffic Services*, http://www.imo.org/OurWork/Safety/Navigation/Pages/VesselTrafficServices.aspx (last visited July 22, 2012).
266. IMO, *Guidelines For Vessel Traffic Services*, IMO Assemb. Res. A. 857(20) § 2.1.2 (Nov. 27, 1997) [hereinafter *Guidelines for Vessel Traffic Services*], *available at* http://www.imo.org/blast/blastDataHelper.asp?data_id=22637&filename=A857(20).pdf.
267. *Id.*
268. *Id.*
269. SOLAS, *supra* note 234, at reg. V/12.1.
270. *Id.* at reg. V/12.2.
271. *Id.* at reg. V/12.3 & 12.5.
272. *Id*.

IMO guidelines call for cooperation and agreement when two or more nations have a common interest in establishing a vessel traffic service for a given area.[273] When two or more countries establish a vessel traffic service, "it should have uniform procedures and operations."[274]

d. Automatic Identification Systems and Long-Range Identification and Tracking Systems

SOLAS regulations now require certain large vessels engaged in international travel to be equipped with an automated identification system, and/or a long-range identification and tracking system.[275] Both systems require participating vessels to transmit information about the vessel, but the systems operate in different ways.

Automatic identification systems are VHF-based systems that are limited to line-of-sight transmission, but are able to transmit more data than long-range identification and tracking systems.[276] Automatic identification system equipment "transmits information such as the name of the vessel, its position, speed, course, and destination to receivers within range of its broadcast, allowing these vessels to be tracked when they are operating in coastal areas, inland waterways, and ports."[277] Receivers for the automatic identification system may be located on vessels, land-based stations, or in other locations.[278]

In contrast, long-range identification and tracking systems are satellite-based; unlike automatic identification systems, these systems

273. *Guidelines For Vessel Traffic Services*, *supra* note 266, at § 2.2.1.

274. *Id.*

275. *See* SOLAS, *supra* note 234, at regs. V/19.2.4 & 19.1. United States law and regulations also require certain vessels to be equipped with automatic identification systems and long-range identification and tracking systems. *See, e.g.*, 46 U.S.C. § 70114 (2002) (requiring certain vessels to carry automatic identification system equipment); 33 C.F.R. § 164.46 (same); 33 C.F.R. § 169.210(a)-(c) (2008).

276. Long Range Identification and Tracking of Ships, 73 Fed. Reg. 23,310, 23,312 (Apr. 29, 2008) (to be codified at 33 C.F.R. pt. 166). In the future, commercially provided long-range automatic identification systems may be implemented; these systems would provide more information than the long-range identification and tracking system. U.S. GOV'T ACCOUNTABILITY OFFICE, GAO-09-337, MARITIME SECURITY: VESSEL TRACKING SYSTEMS PROVIDE KEY INFORMATION, BUT THE NEED FOR DUPLICATE DATA SHOULD BE REVIEWED, 8 (Mar. 2009) [hereinafter GAO VESSEL TRACKING SYSTEMS]. Commercially provided long-range automatic identification systems may be able to track vessels up to 2,000 nautical miles at sea, but the Coast Guard does not expect commercially provided long-range AIS to be fully operational until 2014. *Id.*

277. GAO VESSEL TRACKING SYSTEMS, *supra* note 276, at 2.

278. *Id.*

enable observers to identify and track vessels over a broader geographic area.[279] Long-range identification and tracking systems provide for transmission of vessel identification and position to a national data center, which can then share that information with an international data exchange.[280] For example, in general, U.S. flag ships must transmit periodic long-range identification and tracking position reports to the United States data center when they are engaged in an international voyage, while foreign flag ships on international voyages must transmit long-range identification and tracking position reports to a U.S. data center after they announce their intention to enter a United States port, or when the ship is within 1,000 nautical miles of the baseline of the United States.[281]

By allowing vessels and on-shore observers to track and communicate with ships, long-range identification and tracking systems and automatic identification systems help avoid collisions, maintain safe distance from maritime hazards, locate vessels in distress, and assist in search and rescue efforts. Moreover, because vessels equipped with these systems know they are visible to others, the systems may encourage safer maritime practices and compliance with both mandatory and voluntary regulatory measures. As noted above, one expert has asserted that vessels using tracking systems are likely to adhere to even voluntary restrictions because their operators "do not want a reputation of non-compliance."[282]

2. Special Areas and Emission Control Areas

In addition to the vessel routing, tracking, and monitoring of systems and procedures contemplated in the SOLAS convention, MARPOL offers other types of tools designed to protect the maritime environment and reduce pollution.[283] MARPOL "addresses pollution from ships by oil; by noxious liquid substances carried in bulk; harmful substances carried by sea in packaged form; sewage, garbage; and the prevention of

279. Long Range Identification and Tracking of Ships, *supra* note 276, at 23,312.

280. GAO VESSEL TRACKING SYSTEMS, *supra* note 276, at 17.

281. 33 C.F.R. § 169.210(a)-(c), *supra* note 275. *See also* GAO VESSEL TRACKING SYSTEMS, *supra* note 276, at 5-6.

282. Cooper, *supra* note 207, at 1 & 6.

283. *See generally* MARPOL, *supra* note 235. *See also* IMO, *Int'l Convention for the Prevention of Pollution from Ships (MARPOL)*, http://www.imo.org/about/conventions/listofconventions/pages/international-convention-for-the-prevention-of-pollution-from-ships-%28marpol%29.aspx [hereinafter IMO, *MARPOL*].

air pollution from ships."[284] Two MARPOL tools that may be particularly relevant are the designation of special areas and emission control areas.

a. Special Areas Under MARPOL Annexes I, II, IV, and V

MARPOL provides for the designation of specific areas of the ocean as "special areas."[285] Special areas are areas where, "for technical reasons relating to their oceanographical and ecological condition and to their sea traffic, the adoption of special mandatory methods for the prevention of sea pollution is required."[286] A special area "may encompass the maritime zones of several States, or even an entire enclosed or semi-enclosed area."[287] Under MARPOL, special areas are provided with a higher level of protection than other areas of the sea."[288]

Special area designation is available under MARPOL Annex I for oil, Annex II for noxious liquid substances in bulk, Annex IV for sewage, and Annex V for garbage.[289] Special area designation is based on three separate categories: oceanographic conditions, ecological conditions, and vessel traffic characteristics.[290] To qualify for a special area designation based on oceanographic conditions, a location must experience concentration or retention of harmful substances or sediments due to its circulation patterns, temperature, salinity stratification, low

284. IMO, *Pollution Prevention*, http://www.imo.org/OurWork/Environment/PollutionPrevention/Pages/Default.aspx (last visited July 22, 2012).

285. *See* MARPOL, *supra* note 235, at Annexes I, II, IV & V. *See also* IMO, *MARPOL, supra* note 283.

286. IMO, *Special Areas Under MARPOL*, http://www.imo.org/OurWork/Environment/PollutionPrevention/SpecialAreasUnderMARPOL/Pages/Default.aspx [hereinafter *Special Areas Under MARPOL*] (last visited July 22, 2012). *See also* IMO, *Guidelines for the Designation of Special Areas Under MARPOL 73/78 and Guidelines for the Identification and Designation of Particularly Sensitive Sea Areas*, IMO Assemb. Res. A. 927(22) § 2.1 (Nov. 29, 2001) [hereinafter IMO Res. A. 927(22)], *available at* http://www.imo.org/blast/blastDataHelper.asp?data_id=10469&filename=927.pdf.

287. IMO Res. A. 927(22), *supra* note 286, at § 2.2.

288. *Special Areas Under MARPOL*, *supra* note 286. *See also* IMO Res. A. 927(22), *supra* note 286, at § 2.1.

289. IMO Res. A. 927(22), *supra* note 286, at § 2.1; *see also Special Areas Under MARPOL, supra* note 286 (noting the existence of a Baltic Sea special area under Annex IV).

290. IMO Res. A. 927(22), *supra* note 286, at § 2.3. IMO guidance suggests that special area proposals for special area designation contain information on each category of criteria—oceanographic conditions, ecological conditions, and vessel traffic characteristics. *Id.*

flushing rates, extreme ice state, or adverse winds.[291] Qualifying ecological conditions include: depleted, threatened, or endangered marine species; areas of high natural productivity; spawning, breeding, and nursery areas; areas representing migratory routes for seabirds and marine mammals; rare or fragile ecosystems; or critical habitats and/or areas of critical importance for the support of large marine ecosystems.[292] To qualify as a special area based on vessel traffic characteristics, the area must experience traffic such that conformance with the usual requirements of MARPOL would be insufficient to protect the area from pollution.[293] Other factors may influence the consideration of a particular location as a special area as well.[294]

To obtain a special area designation, a nation must submit a proposal to the IMO's Marine Environment Protection Committee.[295] The proposal must define the exact location of the area being proposed, describe the area's characteristics, set forth the reasons for its designation, and explain how the area fulfills the criteria for the designation of special areas.[296] If IMO designates the proposal as a special area, the designation will become effective only when there are adequate reception facilities in the area to receive the harmful substance from affected ships.[297]

b. Emissions Control Areas Under MARPOL Annex VI

The IMO recognizes that nitrogen oxides, sulphur oxides, and particulate matter from vessels "contribute to ambient concentrations of air pollution in cities and coastal areas around the world," and that "[a]dverse public health and environmental effects associated with air pollution include premature mortality, cardiopulmonary disease, lung cancer, chronic respiratory ailments, acidification and eutrophication."[298] To that end, regulations in MARPOL Annex VI provide for the

291. *Id.* at § 2.4.
292. *Id.* at § 2.5.
293. *Id.* at § 2.6.
294. *Id.* at §§ 2.3, 2.8-2.10.
295. *Id.* at § 3.1.
296. *Id.* at §§ 3.2-3.3.
297. IMO Res. A. 927(22), *supra* note 286, at § 2.7.
298. IMO, Marine Env't Prot. Comm. [MEPC], *Revised MARPOL Annex VI, International Convention for the Prevention of Air Pollution from Ships* [hereinafter Revised MARPOL Annex VI], MEPC Res. 176(58), at 39, MEpC 58/23/Add.1 (Oct. 10, 2008) *available at* http://www.imo.org/blast/blastDataHelper.asp?data_id=23760&filename=176(58).pdf.

establishment of emission control areas, which are defined as "area[s] where the adoption of special mandatory measures for emissions from ships is required to prevent, reduce and control air pollution from [nitrogen oxides] or [sulphur oxides] and particulate matter or all three types of emissions and their attendant adverse impacts on human health and the environment."[299] Emission control areas are governed by stricter emissions limits than other areas of the sea.[300]

Parties to MARPOL may submit to the IMO a proposal for the designation of an emission control area for nitrogen oxides, sulphur oxides, or particulate matter (or all three).[301] IMO guidance requires that when two or more nations have a common interest in an area, the nations should work together to submit a coordinated proposal.[302] Proposals must include a description of the proposed area, the type of emission(s) proposed for control, an explanation of the human populations and environmental areas under threat from the emissions, an assessment that vessels in the area are contributing to ambient levels of emissions or adverse environmental impacts, information on meteorological conditions, the nature of vessel traffic, a description of land-based emission control measures, and other information.[303]

In 2010, the IMO adopted the North American emission control area for nitrogen oxides, sulphur oxides, and particulate matter.[304] The emission control area forms a band stretching outward from the North American shoreline from the northern portion of Labrador to the southern portion of Texas on the east and Gulf of Mexico coasts, and throughout the west coast of North America from southern California to the northern portion of southeast Alaska.[305] The emission control area also includes an area encircling the Hawaiian Islands.[306] In 2011, the

299. *Id.* at 4.

300. *See, e.g.*, *id.* at 39 (establishing emissions limitations for nitrogen oxides in emission control areas); *id.* at 19-20 (establishing emissions limitations for sulphur oxides and particulate matter in emissions control areas).

301. *Id.* at 39.

302. *Id.*

303. *Id.* at 39-40.

304. *Special Areas under MARPOL*, *supra* note 286. The North American emission control area came into effect on August 1, 2012. *See* IMO, North American Emission Control Area Comes Into Effect on 1 August 2012, *available at* http://www.imo.org/MediaCentre/PressBriefings/Pages/28-eca.aspx.

305. *See, e.g.*, IMO, *Information on North American Emission Control Area Under MARPOL Annex VI* [hereinafter MARPOL Annex VI], MEPC 1/Circ.723 (May 13, 2010) *available at* http://www.imo.org/blast/blastDataHelper.asp?data_id=29099&filename=723.pdf.

306. *See, e.g.*, *id.* at 3.

IMO also adopted the United States Caribbean Sea emission control area for nitrogen oxides, sulphur oxides, and particulate matter.[307] Arctic waters, including the Bering Strait region, are not included in the existing North American emission control area.

3. Mandatory Polar Code

Although SOLAS and MARPOL provide mechanisms to address the safety and environmental issues in Arctic waters, they are not specifically tailored to the Arctic. However, the IMO is currently facilitating the development of a mandatory Polar Code that targets shipping in polar waters.[308]

As noted above, the IMO has already adopted non-mandatory 2010 *Guidelines for Ships Operating in Polar Waters*.[309] These guidelines cover topics such as ship construction, equipment, and operation, as well as environmental protection and damage control.[310] The Polar Code will follow the adoption of the 2010 *Guidelines*, and is intended to "cover the full range of design, construction, equipment, operational, training, search and rescue and environmental protection matters relevant to ships operating in the inhospitable waters surrounding the two poles."[311] The Polar Code will "address the risks that are specific to operations in polar waters, taking into account the extreme environmental conditions and the remoteness of operation."[312] The working group developing the Polar Code—working under the auspices of the IMO's ship design and equipment subcommittee—agreed that it should "apply in polar waters only," that "ships not trading in polar regions would not need to comply with its requirements," and that "the Code should be made mandatory under SOLAS and/or MARPOL."[313]

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307. *Special Areas under MARPOL*, *supra* note 286. The United States Caribbean Sea emission control area is expected to take effect on January 1, 2014. *Id.*

308. IMO, *Subcomm. on Ship Design and Equip.*, 53rd session, Feb. 2010, http://www.imo.org/MediaCentre/MeetingSummaries/DE/Pages/DE-53rd-Session.aspx (last visited July 22, 2012) (noting that a correspondence group is in the process of drafting a mandatory Polar Code).

309. IMO, *Guidelines for Ships Operating in Polar Waters*, IMO Assemb. Res. A.1024(26), at 4 (Jan. 18, 2010), *available at* http://www.imo.org/blast/blastDataHelper.asp?data_id=29985&filename=A1024(26).pdf.

310. *Id.* at 12-33.

311. *Subcomm. on Ship Design and Equip.*, 53rd session, *supra* note 308, at 2.

312. IMO, *Subcomm. on Ship Design and Equip.*, 54th Session, Oct. 2010, *available at* http://www.imo.org/MediaCentre/MeetingSummaries/DE/Pages/DE-54th-Session.aspx (last visited July 22, 2012).

313. *Subcomm. on Ship Design and Equip.*, 53rd session, *supra* note 308.

As of the end of February 2012, the Polar Code working group had made progress developing the "technical parts" of the Code.[314] The ship design and equipment subcommittee agreed to forward relevant sections of the draft code to the other appropriate IMO subcommittees, including the subcommittees on radio communications, search and rescue, fire protection, safety of navigation, stability, load lines, fishing vessel safety, and training and watch-keeping.[315] However, the working group was divided on how to proceed with respect to the "environmental aspects" of the Code.[316] Some in the working group felt that the environmental protection provisions should be incorporated as part of the Polar Code, while others felt that they should be adopted as amendments to MARPOL and other IMO instruments.[317] As of this writing, the ship design and equipment subcommittee had forwarded the issue for consideration by the IMO's Marine Environment Protection Committee.[318] Regardless of how it decides to handle the environmental aspects, it is likely that the IMO will adopt a mandatory Polar Code, and that portions of the Code or related provisions will have the effect of improving safety and environmental protection measures in the Bering Strait region.

4. Particularly Sensitive Sea Areas

One more IMO mechanism may have particular relevance to efforts to improve vessel safety, prevent maritime accidents, protect the environment, and mitigate the impacts associated with increased ship traffic: designation of Particularly Sensitive Sea Areas (PSSAs). Since 1991, IMO guidelines have allowed the designation of PSSAs.[319] The IMO defines a PSSA as "an area that needs special protection through action by IMO because of its significance for recognized ecological,

314. IMO, *Subcomm. on Ship Design and Equip.*, 56th session, Feb. 2012, *available at* http://www.imo.org/MediaCentre/MeetingSummaries/DE/Pages/DE-56th-session.aspx (last visited July 22, 2012).

315. *Id.*

316. *Id.*

317. *Id*.

318. *Id.*

319. *See* Helene Lefebvre-Chalain, *Fifteen Years of Particularly Sensitive Sea Areas: A Concept in Development*, 13 OCEAN & COASTAL L.J. 47, 47 (2007) (noting that IMO first passed the Assembly Resolution that provided for PSSAs in 1991).

socio-economic, or scientific attributes where such attributes may be vulnerable to damage by international shipping activities."[320]

At or before the time it is designated, a PSSA must be accompanied by an "associated protective measure."[321] An associated protective measure is a protective action that is, or will be, approved or adopted by IMO. This could include the designation or adoption of a special area or an emissions control area, special discharge restrictions, ships' routing and reporting systems, or any other protective measure designed to protect sea areas against environmental damage from ships (that also have an identified legal basis).[322] The IMO also suggests that PSSAs could be listed on the World Heritage List, declared a Biological Reserve, or included on other lists of ecologically important areas.[323]

Only the IMO can designate PSSAs.[324] To create a PSSA, a nation must submit an application to the IMO to propose an area for PSSA designation and adopt associated protective measures.[325] If multiple countries have a common interest in an area, they should submit a coordinated proposal to IMO for consideration.[326] IMO's Marine Environment Protection Committee will analyze the application, hear presentations from the nominating government(s), and receive reports from IMO technical groups; after doing so, it may designate the area "in principle"[327] and inform the appropriate IMO committees and subcommittees.[328] The Marine Environment Protection Committee makes the final PSSA designation only after the appropriate committees and subcommittees—or the IMO Assembly—approve the associated protective measures.[329]

To qualify for designation as a PSSA, IMO guidelines require an area to be vulnerable to damage from international shipping activities, and to have attributes that fall within at least one of three broad, inclusive categories: ecological criteria; social, cultural, and economic criteria; and

320. IMO, Revised Guidelines for the Identification and Designation of Particularly Sensitive Sea Areas, IMO Assemb. Res. A.982(24), at 3 (Dec. 1, 2005), *available at* http://www.imo.org/blast/blastDataHelper.asp?data_id=14373&filename=982.pdf.

321. *Id.* at 9-11.

322. *Id.* at 8.

323. *Id.*

324. *Id.* at 4.

325. *Id.*

326. *Id.*

327. *Id.* at 12.

328. *Id.*

329. *Id.* at 11-12.

scientific and educational criteria.[330] Ecological criteria include factors such as the uniqueness or rarity of the area, the presence of critical habitat in the area, the degree to which the area is representative of a certain habitat type, the area's diversity and productivity, the presence of spawning or breeding grounds or migratory routes in the area, the naturalness, integrity, or fragility of the area, and other factors.[331] Social, cultural, and economic criteria include the extent to which people depend on the ecological health of the area for social or economic purposes, the extent to which the area is important for the support of traditional subsistence or food production activities, or the presence of historical or archaeological sites.[332] Finally, scientific and educational criteria include factors such as whether an area is of particular scientific interest, whether it can provide a baseline for monitoring studies, or whether the area provides an outstanding opportunity for education.[333]

In addition, an application for designation of a PSSA must describe the area's vulnerability to damage from international shipping activities.[334] IMO guidelines require consideration of vessel traffic characteristics, such as the type of maritime activities in the area, the types of vessels that use the area, the characteristics of the vessel traffic, and the extent to which vessels carry harmful substances.[335] An application must also consider the area's natural characteristics, such as water conditions, weather conditions, and the presence of potential hazards like sea ice, tidal streams, or ocean currents.[336] Proposals for PSSA designation can also consider other factors, including any history of accidents or stresses from other environmental sources.[337]

D. Application of Tools to the Bering Strait Region

The foregoing section described a variety of tools—ranging from domestic regulation to bilateral agreements to international instruments and processes—which might be employed to improve safety, safeguard against accidents, and mitigate and protect against the potential impacts of vessel traffic. Many of these tools could have meaningful application

330. *Id.* at 5.
331. *Id.* at 5-6.
332. *Id.* at 6.
333. *Id.* at 6-7.
334. *Id.* at 7.
335. *Id.*
336. *Id.*
337. *Id.* at 8.

in the Bering Strait region and should be pursued by the relevant authorities.

The U.S. Coast Guard's Port Access Route Study in the Bering Strait is an important first step. It could lead to the implementation of domestic safety and environmental protection actions, and it could set the stage for cooperation with the Russian Federation and eventual action at the IMO.

The Port Access Route Study should recommend implementation of a comprehensive vessel routing system to regulate maritime traffic in the Bering Strait region. The system should include a traffic separation scheme to prevent collisions and guide ships along safe fairways that avoid environmentally sensitive areas and minimize the area where bowhead whales and other marine mammals are exposed to the danger of ship strikes. Such a system would not be unique. For instance, Panama has proposed vessel traffic lanes to guide ships in and out of the Panama Canal in a way that will reduce the area of the ocean where whales will be exposed to ship strikes.[338] Similarly, in the San Francisco Bay region, United States government agencies, shipping industry representatives, and whale researchers have cooperated to recommend measures that would confine vessel traffic to shipping lanes that extend further out to sea in an effort to better protect whale feeding grounds at the edge of the continental shelf.[339] In the Bering Strait region, a vessel routing system would have to be designed so as to allow vessels the flexibility to navigate safely in response to changing sea and ice conditions. Such a system would also require IMO approval.

The Port Access Route Study should recommend that areas in the Bering Strait region that are important for local subsistence hunting, or that have particular ecological importance, be designated as areas to be avoided or precautionary areas to minimize the potential for interference and impacts from vessel traffic. In many places in the Bering Strait region, designation of these areas would require IMO authorization. However, in areas of the Bering Strait region where the United States has jurisdiction and that are not subject to transit passage, the Coast Guard should consider creating regulated navigation areas to protect important coastal habitats. The Coast Guard has already designated a regulated navigation area in Alaska's Prince William Sound.[340] Where appropriate,

338. Richard Black, *Whales to Gain Panama Canal Traffic Protection*, BBC NEWS, July 6, 2012, *available at* http://www.bbc.co.uk/news/science-environment-18720380?print=true.

339. *Feds to Reroute SF Bay Ships Traffic After Spike in Whale-ship Collisions*, THE WASHINGTON POST (July 15, 2012) [hereinafter *Feds to Reroute*].

340. 33 C.F.R. § 165.1704 (2012).

it could implement a similar system for important ecological areas in the Bering Strait region.

Further, the Coast Guard's Port Access Route Study should also recommend an integrated vessel traffic service to improve vessel monitoring, communication, and emergency response capabilities in the region. Such a service would not be the first in Alaska: there is already a vessel traffic service in effect for portions of Alaska's Prince William Sound, including Valdez Arm, Valdez Narrows, and Port Valdez.[341] However, a new vessel traffic service in the Bering Strait region should be operated on a cooperative basis with the Russian Federation. The cooperative vessel traffic service for the Juan de Fuca region, which is operated jointly by the United States and Canada, could be a model for the Bering Strait region.[342]

The Alaska Marine Exchange now lists at least seven automatic identification system receivers in the Bering Strait region as of April 2012.[343] As this system grows, it will fill in gaps in maritime infrastructure and become the foundation for a comprehensive vessel traffic service that will help foster improved tracking, search and rescue, and communication in the area. This kind of system could also be used to implement real-time monitoring of marine mammals, enabling vessels to report sightings of marine mammals—such as bowhead whales—so that other vessels in the area can avoid the animals or reduce speed to lower the risk of a collision.[344]

Because ice and vessel traffic conditions in the Bering Strait region are anticipated to change, which in turn creates a higher risk of collision between marine mammals and vessels, the Coast Guard should consider recommending implementation of a reporting system in the region. Under this type of reporting system, ships will be required to identify themselves, and to communicate to others their direction, speed, and

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341. 33 C.F.R. § 161.60 (2012).

342. 33 C.F.R. § 161.55 (2012). *See also* U.S. Coast Guard, *USCG: Purpose and Objective—Cooperative Vessel Traffic Service—13th Coast Guard District—Guardians of the Pacific Northwest*, July 31, 2008, *available at* www.uscg.mil/d13/cvts/purposeandobjective.asp (describing purpose and objective of cooperative vessel traffic system for the Strait of Juan de Fuca region); Exchange of Notes Constituting an Agreement on Vessel Traffic Management of the Juan de Fuca Region, U.S.-Can., Dec. 19, 1979, 1221 U.N.T.S. 67.

343. Alaska Marine Exchange, *Map of Automatic Identification System Receivers on the Alaska Coast*, http://www.mxak.org/vtrack/vtrack_images/AIS_Locations_042412-lg.jpg (showing at least seven automatic identification system receivers in the Bering Strait region as of April 2012).

344. *See Feds to Reroute*, *supra* note 339 (where this type of real-time monitoring system has been proposed for implementation in the San Francisco Bay area).

intended route of travel as they enter the reporting area,[345] thereby providing shore-based authorities the opportunity to warn them and others of known marine mammals or other hazards in their vicinity.[346]

Given the Bering Strait's status as an international strait, it is unlikely that the Coast Guard will be able to impose unilaterally all the recommendations that stem from its Port Access Route Study. However, recommendations that flow from the study can set the stage for coordination and cooperation with the Russian Federation and implementation of safety and environmental protection measures through future IMO action. Because the IMO encourages submission of joint proposals from interested nations, the United States should cooperate with the Russian Federation in developing recommendations regarding ships' routing systems, reporting systems, and vessel traffic services. To the extent that the United States or the Russian Federation require or recommend that their vessels conform to certain safety or environmental protection measures in the Bering Strait region, other countries' vessels may be encouraged to voluntarily follow suit.

At the multinational level, the Arctic Council should continue to press for implementation of the recommendations contained in the 2009 Arctic Marine Shipping Assessment. More broadly, it can play an important role in fostering cooperation and consensus among Arctic nations in support of actions designed to improve vessel safety, prevent maritime accidents, reduce the environmental impacts of increased vessel traffic, and bolster environmental safeguards in the Arctic, specifically in the Bering Strait region.

The IMO is uniquely positioned to implement many safety, prevention, mitigation, and environmental protection measures, whether binding or recommended, in the Bering Strait region. The IMO should continue its development of a comprehensive and mandatory Polar Code. In so doing, it should ensure that environmental regulations are built into the Code so that they are on equal footing with the more technical aspects of the Code. Pursuant to SOLAS, the international community should use the IMO processes to adopt comprehensive ships' routing systems, ships' reporting systems, and vessel traffic services for the Bering Strait region. Implementation of these systems will help fill

345. *See, e.g.*, 33 C.F.R. §§ 169.100–169.140 (describing the operation of mandatory vessel reporting systems on the east coast of the United States).

346. Similarly, two mandatory reporting systems designed to help protect the endangered northern right whale are already in place for certain areas of the east coast of the United States. *Id.* at § 169.100. Likewise, a mandatory vessel monitoring system is also required in the Northwestern Hawaiian Islands Marine National Monument. 50 C.F.R. § 404.5 (2006).

significant gaps in the maritime infrastructure of the Bering Strait region. Likewise, to reduce the potential threat of pollution from increasing vessel traffic in the Bering Strait region, the United States should coordinate with the Russian Federation to promote the region as a "special area" in order to obtain protection under various MARPOL Annexes. The United States should also consider working with the Russian Federation to propose an expansion of the existing North American emission control area so that it covers Arctic waters including the Bering Strait region.

Finally, the United States should consider coordinating with the Russian Federation and others in the international community to propose the Bering Strait region as a PSSA, incorporating many of the above-mentioned safety and environmental protection measures as associated protective measures. Although there currently are no PSSAs in Arctic waters,[347] the Bering Strait region is a prime candidate for such designation. Given the characteristics and attributes of the Bering Strait region—including its productivity, habitat, vulnerability in the face of rapid environmental change, and importance as a migratory pathway and to subsistence communities—the region should easily satisfy the required ecological, social, cultural, economic, scientific, and educational criteria. The threat of increased vessel traffic in an ecologically important area, coupled with the objective hazards of the Bering Strait's geography, powerful storms, and seasonal sea ice coverage, demonstrate that the area is vulnerable to damage arising from increased international shipping activities.

VI. CONCLUSION

The Bering Strait region is a highly productive marine environment with large concentrations of wildlife, including a wide variety of marine mammals, birds, and fish. It is also home to human residents who rely on an intact ocean ecosystem to support a way of life that is thousands of years old. The marine ecosystem of the Bering Strait is experiencing significant change as the climate warms, seasonal sea ice is reduced in temporal and geographic extent, and acidification begins to affect the surface waters of the ocean.

As a remote area without well-developed maritime infrastructure, the Bering Strait lacks strong environmental protections. While extensive

347. *See* IMO, *Particularly Sensitive Sea Areas*, www.imo.org/OurWork/Environment/PollutionPrevention/PSSAs/Pages/Default.aspx (last visited Sept. 22, 2012) (listing currently designated PSSAs).

seasonal sea ice protected the area from high levels of commercial and industrial use in the past, the Bering Strait region is experiencing increased vessel traffic as sea ice retreats. Observers anticipate additional growth as commercial and industrial use expands. This combination—a vulnerable marine environment and increasing commercial and industrial use—calls for the adoption and implementation of increased safety and environmental protection and regulation in the region.

The Bering Strait's status as an international strait restricts the United States' ability to act on its own to impose binding regulations on foreign-flagged vessels in some parts of the Bering Strait region. However, the United States is able to impose restrictions in areas of its territorial sea that are not subject to transit passage. The United States can also coordinate with the Russian Federation and other nations to initiate proposals in the international community that can set the stage for future safety, prevention, mitigation, and environmental protection actions by the IMO. In the meantime, to the extent that the United States implements measures designed to regulate vessel traffic or protect the marine environment in the Bering Strait region—either on its own or in concert with the Russian Federation—it may encourage voluntary compliance with those measures by foreign-flagged vessels even in the absence of IMO action.

The United States Coast Guard's Port Access Route Study will be an important first step toward implementing more meaningful safety and protective measures for the Bering Strait region. The study should recommend measures such as the adoption and implementation of vessel routing systems, vessel reporting systems, and vessel traffic services. Pursuant to the provisions of SOLAS, the United States should work with the Russian Federation and other nations to propose these measures to the IMO for adoption. The United States should also work with international partners to recommend the designation of special areas and the expansion of the North American emissions control area pursuant to MARPOL. The United States can also play a meaningful role in the formulation of the mandatory Polar Code by having its representatives advocate for stronger safety and environmental standards in the Code. Finally, the United States should consider coordinating with the Russian Federation and others in the international community to propose designating the Bering Strait region as a PSSA. A Bering Strait regional PSSA could incorporate many of the foregoing safety and environmental protection mechanisms as associated protective measures, providing the area with a suite of meaningful protections. Recognizing the Bering Strait region as a PSSA would serve to underscore the region's

ecological importance—and vulnerability—to the world's maritime community.