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Changes in the Arctic: Background and Issues for Congress

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Summary

The diminishment of Arctic sea ice has led to increased human activities in the Arctic, and has heightened interest in, and concerns about, the region's future. The United States, by virtue of Alaska, is an Arctic country and has substantial interests in the region. On January 21, 2015, President Obama issued an executive order for enhancing coordination of national efforts in the Arctic. The United States assumed the chairmanship of the Arctic Council on April 24, 2015, and will serve in that capacity for two years.

Record low extents of Arctic sea ice over the past decade have focused scientific and policy attention on links to global climate change and projected ice-free seasons in the Arctic within decades. These changes have potential consequences for weather in the United States, access to mineral and biological resources in the Arctic, the economies and cultures of peoples in the region, and national security.

The five Arctic coastal states—the United States, Canada, Russia, Norway, and Denmark (of which Greenland is a territory)—have made or are in the process of preparing submissions to the Commission on the Limits of the Continental Shelf regarding the outer limits of their extended continental shelves. The Russian submission includes the underwater Lomonosov Ridge, a feature that spans a considerable distance across the Arctic Ocean.

The diminishment of Arctic ice could lead in coming years to increased commercial shipping on two trans-Arctic sea routes—the Northern Sea Route and the Northwest Passage. Current international guidelines for ships operating in Arctic waters are being updated.

Changes to the Arctic brought about by warming temperatures will likely allow more exploration for oil, gas, and minerals. Warming that causes permafrost to melt could pose challenges to onshore exploration activities. Increased oil and gas exploration and tourism (cruise ships) in the Arctic increase the risk of pollution in the region. Cleaning up oil spills in ice-covered waters will be more difficult than in other areas, primarily because effective strategies have yet to be developed.

Large commercial fisheries exist in the Arctic. The United States is currently meeting with other countries regarding the management of Arctic fish stocks. Changes in the Arctic could affect threatened and endangered species. Under the Endangered Species Act, the polar bear was listed as threatened on May 15, 2008. Arctic climate change is also expected to affect the economies, health, and cultures of Arctic indigenous peoples.

Two of the Coast Guard's three polar icebreakers—*Polar Star* and *Polar Sea*—have exceeded their intended 30-year service lives, and *Polar Sea* is not operational. On May 12, 2011, representatives from the member states of the Arctic Council signed an agreement on cooperation on search and rescue in the Arctic.

Although there is significant international cooperation on Arctic issues, the Arctic is increasingly being viewed by some observers as a potential emerging security issue. Some of the Arctic coastal states, particularly Russia, have announced an intention or taken actions to enhance their military presences in the high north. U.S. military forces, particularly the Navy and Coast Guard, have begun to pay more attention to the region in their planning and operations.

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Introduction

The diminishment of Arctic sea ice has led to increased human activities in the Arctic, and has heightened interest in, and concerns about, the region's future. Issues such as Arctic territorial disputes; commercial shipping through the Arctic; Arctic oil, gas, and mineral exploration; endangered Arctic species; and increased military operations in the Arctic could cause the region in coming years to become an arena of international cooperation or competition.

The United States, by virtue of Alaska, is an Arctic country and has substantial political, economic, energy, environmental, and other interests in the region. Decisions that Congress, the executive branch, foreign governments, international organizations, and commercial firms make on Arctic-related issues could significantly affect these interests.

This report provides an overview of Arctic-related issues for Congress, and refers readers to more in-depth CRS reports on specific Arctic-related issues. Congressional readers with questions about an issue discussed in this report should contact the author or authors of the section discussing that issue. The authors are identified by footnote at the start of each section.

This report does not track legislation on specific Arctic-related issues. For tracking of legislative activity, see the CRS reports relating to specific Arctic-related issues that are listed at the end of this report, just prior to **Appendix A**.

Background[1]

Definitions of the Arctic

There are multiple definitions of the Arctic that result in differing descriptions of the land and sea areas encompassed by the term. Policy discussions of the Arctic can employ varying definitions of the region, and readers should bear in mind that the definition used in one discussion may differ from that used in another. This CRS report does not rely on any one definition.

Arctic Circle Definition and Resulting Arctic Countries

The most common and basic definition of the Arctic defines the region as the land and sea area north of the Arctic Circle (a circle of latitude at about 66.34° North). For surface locations within this zone, the sun is generally above the horizon for 24 continuous hours at least once per year (at the summer solstice) and below the horizon for 24 continuous hours at least once per year (at the winter solstice).

The Arctic Circle definition includes the northernmost third or so of Alaska, as well as the Chukchi Sea, which separates that part of Alaska from Russia, and U.S. territorial and Exclusive Economic Zone (EEZ) waters north of Alaska. It does not include the lower two-thirds or so of Alaska or the Bering Sea, which separates that lower part of the state from Russia.

Eight countries have territory north of the Arctic Circle: the United States (Alaska), Canada, Russia, Norway, Denmark (by virtue of Greenland, a member country of the Kingdom of Denmark), Finland, Sweden, and Iceland.[2] These eight countries are often referred to as the Arctic

[1] Except for the subsection on the Arctic and the U.N. Convention on the Law of the Sea, this section was prepared by Ronald O'Rourke, Specialist in Naval Affairs, Foreign Affairs, Defense, and Trade Division.

[2] On November 25, 2008, voters in Greenland approved a referendum for greater autonomy that some observers view (continued...)

countries, and they are the member states of the Arctic Council (see "U.S. Chairmanship of Arctic Council in 2015-2017" below, and "The Arctic Council" in "Geopolitical Environment"). A subset of the eight Arctic countries are the five countries that are considered Arctic coastal states: the United States, Canada, Russia, Norway, and Denmark (by virtue of Greenland).

Definition in Arctic Research and Policy Act (ARPA) of 1984

Section 112 of the Arctic Research and Policy Act (ARPA) of 1984 (Title I of P.L. 98-373 of July 31, 1984)[3] defines the Arctic as follows:

> As used in this title, the term "Arctic" means all United States and foreign territory north of the Arctic Circle and all United States territory north and west of the boundary formed by the Porcupine, Yukon, and Kuskokwim Rivers [in Alaska]; all contiguous seas, including the Arctic Ocean and the Beaufort, Bering, and Chukchi Seas; and the Aleutian chain.

This definition, which is codified at 15 U.S.C. 4111,[4] includes certain parts of Alaska below the Arctic Circle, including the Aleutian Islands and portions of central and western mainland Alaska, such as the Seward Peninsula and the Yukon Delta.

Figure 1 below shows the Arctic area of Alaska as defined by ARPA; **Figure 2** shows the entire Arctic area as defined by ARPA.

Other Definitions

Other definitions of the Arctic are based on factors such as average temperature, the northern tree line, the extent of permafrost on land, the extent of sea ice on the ocean, or jurisdictional or administrative boundaries.[5] A definition based on a climate-related factor could circumscribe differing areas over time as a result of climate change.

The 10° C isotherm definition of the Arctic defines the region as the land and sea area in the northern hemisphere where the average temperature for the warmest month (July) is below 10° Celsius, or 50° Fahrenheit. This definition results in an irregularly shaped Arctic region that excludes some land and sea areas north of the Arctic Circle but includes some land and sea areas south of the Arctic Circle. This definition currently excludes all of Finland and Sweden, as well as some of Alaska above the Arctic Circle, while including virtually all of the Bering Sea and Alaska's Aleutian Islands.[6]

(...continued)

as a step toward eventual independence from Denmark. (Alan Cowell, "Greenland Vote Favors Independence," *New York Times*, November 26, 2008.)

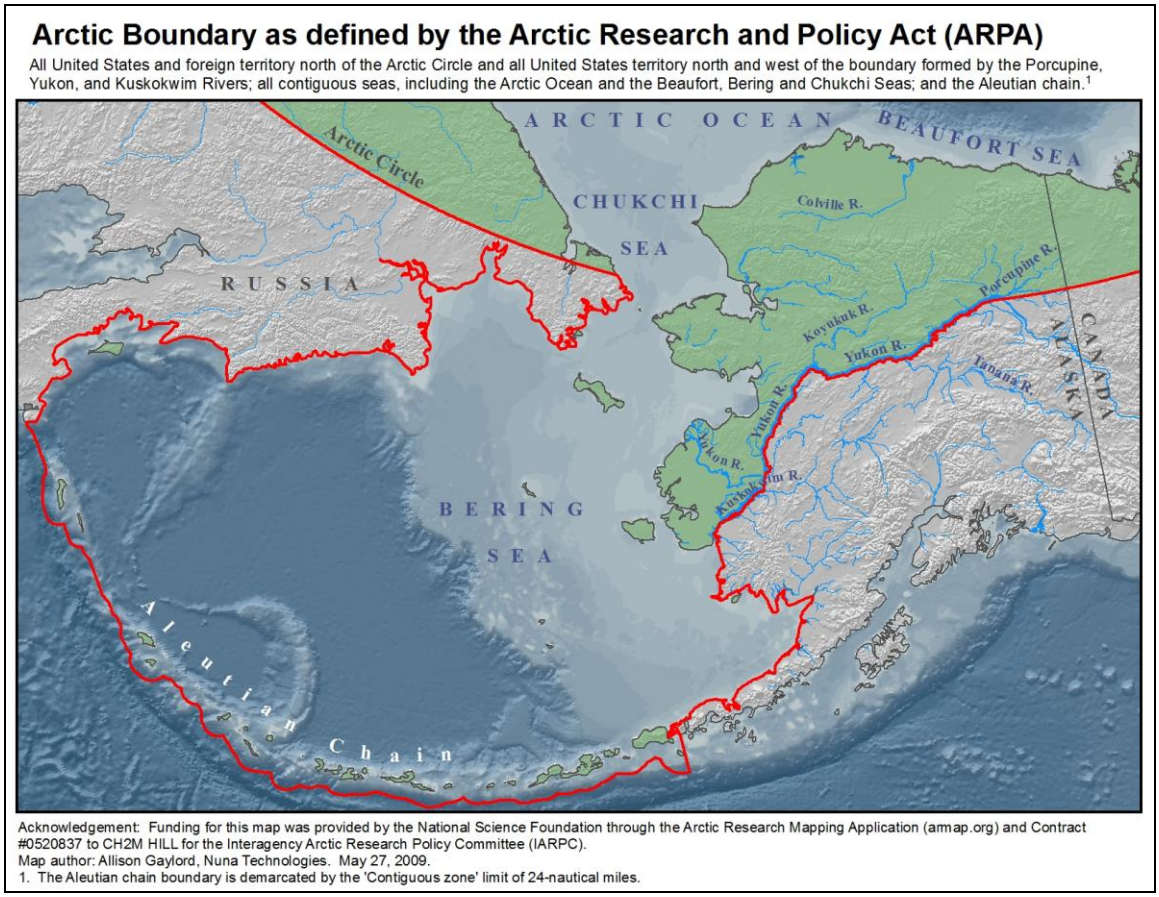
[3] Title II of P.L. 98-373 is the National Critical Materials Act of 1984.

[4] As codified, the definition reads, "As used in this chapter.... "

[5] For discussions and (in some cases) maps, see Susan Joy Hassol, *Impacts of a Warming Arctic* [Executive Summary]. Cambridge, Cambridge University Press, 2004, p. 4, available at http://amap.no/acia/; Oran R. Yong and Niels Einarsson, *Arctic Human Development Report*, Stefansson Arctic Institute, Akureyri, Iceland, 2004, pp. 17-18, available at http://www.svs.is/AHDR/AHDR%20chapters/English%20version/Chapters%20PDF.htm; and Hugo Ahlenius, editor in chief et al., *Vital Arctic Graphics, People and Global Heritage on Our Last Wild Shores*, UNEP/GRID-Arendal, Arendal, Norway, p. 6, available at http://www.grida.no/publications/vg/arctic/.

[6] A map showing the line that results from 10° isotherm definition is available at https://www.cia.gov/library/publications/the-world-factbook/reference_maps/pdf/arctic.pdf.

Figure 1. Arctic Area of Alaska as Defined by ARPA



Source: U.S. Arctic Research Commission (http://www.arctic.gov/maps/ARPA_Alaska_only_150dpi.jpg, accessed on December 23, 2011).

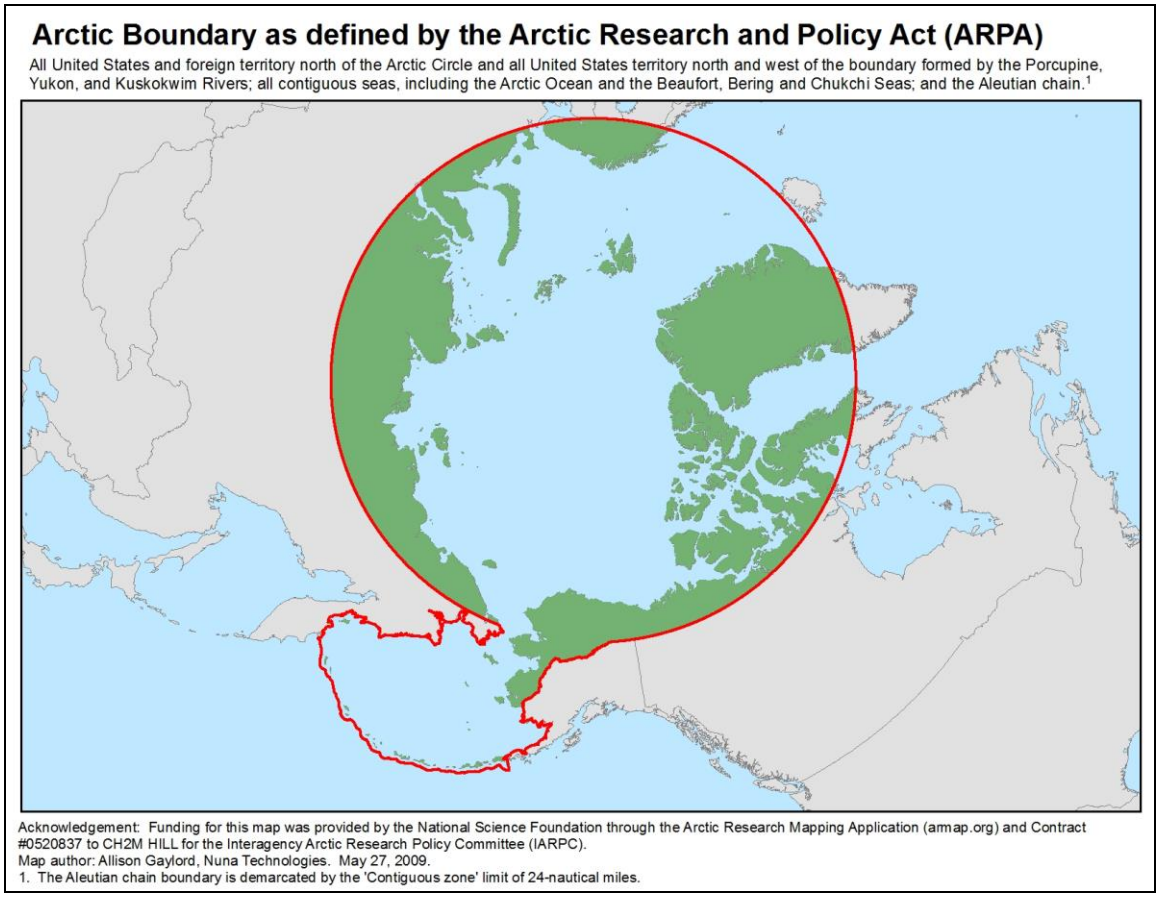
The definition of the Arctic adopted by the Arctic Monitoring and Assessment Programme (AMAP)—a working group of the Arctic Council—"essentially includes the terrestrial and marine areas north of the Arctic Circle (66°32' N), and north of 62° N in Asia and 60° N in North America, modified to include the marine areas north of the Aleutian chain, Hudson Bay, and parts of the North Atlantic, including the Labrador Sea."[7] The AMAP website includes a map showing the Arctic Circle, 10° C isotherm, tree line, and AMAP definitions of the Arctic.[8]

Some observers use the term "high north" as a way of referring to the Arctic. Some observers make a distinction between the "high Arctic"—meaning, in general, the colder portions of the Arctic that are closer to the North Pole—and other areas of the Arctic that are generally less cold and further away from the North Pole, which are sometimes described as the low Arctic or the subarctic.

[7] Discussion entitled "Geographical Coverage," available at http://www.amap.no/ (click on "About AMAP" and then the tab "Geographical coverage").

[8] Discussion entitled "Geographical Coverage," available at http://www.amap.no/ (click on "About AMAP" and then the tab "Geographical coverage)."

Figure 2. Entire Arctic Area as Defined by ARPA



Source: U.S. Arctic Research Commission (http://www.arctic.gov/maps/ARPA_Polar_150dpi.jpg, accessed on December 23, 2011).

U.S. Arctic Research

Arctic Research and Policy Act (ARPA) of 1984, As Amended

The Arctic Research and Policy Act (ARPA) of 1984 (Title I of P.L. 98-373 of July 31, 1984)[9] "provide[s] for a comprehensive national policy dealing with national research needs and objectives in the Arctic."[10] The act, among other things

- made a series of findings concerning the importance of the Arctic and Arctic research;
- established the U.S. Arctic Research Commission (USARC) to promote Arctic research and recommend Arctic research policy;

[9] Title II of P.L. 98-373 is the National Critical Materials Act of 1984.

[10] These words are taken from the official title of P.L. 98-373. (Arctic Research and Policy Act of 1984 is the short title of Title I of P.L. 98-373.) The remainder of P.L. 98-373's official title relates to Title II of the act, the short title of which is the National Critical Materials Act of 1984.)

- designated the National Science Foundation (NSF) as the lead federal agency for implementing Arctic research policy;
- established the Interagency Arctic Research Policy Committee (IARPC) to develop a national Arctic research policy and a five-year plan to implement that policy, and designated the NSF representative on the IARPC as its chairperson;[11] and
- defined the term "Arctic" for purposes of the act.

The Arctic Research and Policy Act of 1984 was amended by P.L. 101-609 of November 16, 1990. For the texts of the Arctic Research and Policy Act of 1984 and P.L. 101-609, see **Appendix A** and **Appendix B**, respectively.

FY2017 NSF Budget Request for Arctic Research

NSF—the lead federal agency for implementing Arctic research policy (see "Arctic Research and Policy Act (ARPA) of 1984, As Amended")—carries out Arctic research activities through its Division of Polar Programs (PLR), which is part of its Directorate for Geosciences (GEO). NSF is requesting a total of $464.86 million for PLR for FY2017 (an increase of 5.2% over the estimated FY2016 level), including $139.82 million for research in both the Arctic and Antarctic (an increase of 9.2% over the estimated FY2015 level) and $42.41 million for Arctic research support and logistics (an increase of 7.6% over the estimated FY2015 level).[12]

NSF states in its FY2017 overview of GEO that

> As the primary U.S. supporter of fundamental research in the polar regions, NSF, through GEO, provides interagency leadership for U.S. polar activities. In the Arctic, NSF helps coordinate research planning as directed by the Arctic Research Policy Act of 1984. The NSF Director chairs the Interagency Arctic Research Policy Committee created for this purpose, which is now a component of the President's National Science and Technology Council (NSTC).[13]

NSF states in its FY2017 overview of PLR that

> The Division of Polar Programs (PLR) provides interagency leadership and is the primary U.S. supporter of research in the polar regions. Arctic Sciences supports research in social, earth systems, and a broad range of natural sciences; its' Research Support and Logistics program responds to research by assisting researchers with access to the Arctic and the planning and sharing of results with local Arctic communities....
>
> PLR's FY 2017 Request reflects three key priorities: (1) maintaining strong disciplinary programs that provide a basis for investments in cross-disciplinary science programs; (2) focusing basic research on cross-foundation (e.g., INFEWS,[14] PREEVENTS[15]) and interagency priorities; and (3) supporting and improving the efficiency of critical facilities that enable research in both polar regions.... For the Arctic, shared cross-

[11] The IARPC currently includes more than a dozen federal agencies, departments, and offices. Additional information on the IARPC is available at http://www.nsf.gov/od/opp/arctic/iarpc/start.jsp.

[12] National Science Foundation, *FY 2017 Budget Request to Congress*, February 9, 2016, p. GEO-17 (pdf page 145 of 560). Accessed March 25, 2016, at http://www.nsf.gov/about/budget/fy2017/pdf/fy2017budget.pdf.

[13] National Science Foundation, *FY 2017 Budget Request to Congress*, February 9, 2016, p. GEO-11 (pdf page 129 of 560). Accessed March 25, 2016, at http://www.nsf.gov/about/budget/fy2017/pdf/fy2017budget.pdf.

[14] INFEWS is an acronym for Innovations at the Nexus of Food, Energy, and Water Systems.

[15] PREEVENTS is an acronym for Prediction of and Resilience against Extreme Events.

> directorate basic research objectives, the Interagency Arctic Research Policy Committee's (IARPC) *Arctic Research Plan: FY 2013-2017*, and the *National Ocean Policy Implementation Strategy* inform science investment priorities.
>
> PLR funds both research and the necessary research support in the form of logistics and infrastructure. About 13 percent of PLR's funds are available for new research grants each year. The supporting logistics and infrastructure budget is 70 percent of overall funds, with the remainder supporting research awards made in prior years.[16]

Regarding its FY2017 request for $42.41 million for Arctic research support and logistics within PLR, NSF states:

> This program provides support for Arctic researchers, including access to airplanes, helicopters, research vessels including icebreakers, and field camps for approximately 150 projects in remote sites in Alaska, Greenland, Canada, Arctic Scandinavia, Russia, and the Arctic Ocean. Summit Station on the Greenland ice cap operates as a year-round international site for a variety of atmospheric and geophysical measurements. An increase (+$3.0 million) to a total of $42.41 million, enables increased use of marine platforms, such as the newly available Sikuliaq, for oceanographic research.[17]

Major U.S. Policy Documents Relating to the Arctic

January 2009 Arctic Policy Directive (NSPD 66/HSPD 25)

On January 12, 2009, the George W. Bush Administration released a presidential directive establishing a new U.S. policy for the Arctic region. The directive, dated January 9, 2009, was issued as National Security Presidential Directive 66/Homeland Security Presidential Directive 25 (NSPD 66/HSPD 25). The directive was the result of an interagency review, and it superseded for the Arctic (but not the Antarctic) a 1994 presidential directive on Arctic and Antarctic policy. The directive, among other things,

- states that the United States is an Arctic nation, with varied and compelling interests in the region;
- sets forth a six-element overall U.S. policy for the region;
- describes U.S. national security and homeland security interests in the Arctic; and
- discusses a number of issues as they relate to the Arctic, including international governance; the extended continental shelf and boundary issues; promotion of international scientific cooperation; maritime transportation; economic issues, including energy; and environmental protection and conservation of natural resources.

The Obama Administration has not issued a new directive superseding NSPD 66/HSPD 25; it is currently operating under the Bush Administration's policy directive.[18] For the text of NSPD 66/HSPD 25, see **Appendix C**.

[16] National Science Foundation, *FY 2017 Budget Request to Congress*, February 9, 2016, pp. GEO-17 and GEO-18 (pdf pages 145 and 146 of 560). Accessed March 25, 2016, at http://www.nsf.gov/about/budget/fy2017/pdf/fy2017budget.pdf.

[17] National Science Foundation, *FY 2017 Budget Request to Congress*, February 9, 2016, p. GEO-18 (pdf page 146 of 560). Accessed March 25, 2016, at http://www.nsf.gov/about/budget/fy2017/pdf/fy2017budget.pdf.

[18] CRS communication with State Department official, October 8, 2010.

May 2010 National Security Strategy

In May 2010, the Obama Administration released a national security strategy document that states:

> The United States is an Arctic Nation with broad and fundamental interests in the Arctic region, where we seek to meet our national security needs, protect the environment, responsibly manage resources, account for indigenous communities, support scientific research, and strengthen international cooperation on a wide range of issues.[19]

May 2013 National Strategy for Arctic Region

On May 10, 2013, the Obama Administration released a document entitled *National Strategy for the Arctic Region*.[20] The document appears to supplement rather than supersede the January 2009 Arctic policy directive (NSPD 66/HSPD 25) discussed above.[21] The executive summary of *National Strategy for the Arctic Region* begins by quoting the above statement from the May 2010 national security strategy document, and then states:

> The *National Strategy for the Arctic Region* sets forth the United States Government's strategic priorities for the Arctic region. This strategy is intended to position the United States to respond effectively to challenges and emerging opportunities arising from significant increases in Arctic activity due to the diminishment of sea ice and the emergence of a new Arctic environment. It defines U.S. national security interests in the Arctic region and identifies prioritized lines of effort, building upon existing initiatives by Federal, state, local, and tribal authorities, the private sector, and international partners, and aims to focus efforts where opportunities exist and action is needed. It is designed to meet the reality of a changing Arctic environment, while we simultaneously pursue our global objective of combating the climatic changes that are driving these environmental conditions. Our strategy is built on three lines of effort:
>
> 1. **Advance United States Security Interests** – We will enable our vessels and aircraft to operate, consistent with international law, through, under, and over the airspace and waters of the Arctic, support lawful commerce, achieve a greater awareness of activity in the region, and intelligently evolve our Arctic infrastructure and capabilities, including ice-capable platforms as needed. U.S. security in the Arctic encompasses a broad spectrum of activities, ranging from those supporting safe commercial and scientific operations to national defense.
>
> 2. **Pursue Responsible Arctic Region Stewardship** – We will continue to protect the Arctic environment and conserve its resources; establish and institutionalize an integrated Arctic management framework; chart the Arctic region; and employ scientific research and traditional knowledge to increase understanding of the Arctic.

[19] *National Security Strategy*, Washington, May 2010, p. 50. The quoted sentence constitutes the entirety of the document's comments specifically on the Arctic. It is the final sentence of a section on "sustain[ing] broad cooperation on key global challenges" that includes longer discussions on climate change, peacekeeping and armed conflict, pandemics and infectious disease, transnational criminal threats and threats to governance, and safeguarding the global commons.

[20] *National Strategy for the Arctic Region*, May 2013, 11 pp.; accessed May 14, 2013, at http://www.whitehouse.gov/sites/default/files/docs/nat_arctic_strategy.pdf. The document includes a cover letter from President Obama dated May 10, 2013.

[21] *National Strategy for the Arctic Region* states on page 6 that the "lines of effort" it describes are to be undertaken "[t]o meet the challenges and opportunities in the Arctic region, and in furtherance of established Arctic Region Policy," at which point there is a footnote referencing the January 2009 Arctic policy directive.

> 3. **Strengthen International Cooperation** – Working through bilateral relationships and multilateral bodies, including the Arctic Council, we will pursue arrangements that advance collective interests, promote shared Arctic state prosperity, protect the Arctic environment, and enhance regional security, and we will work toward U.S. accession to the United Nations Convention on the Law of the Sea (Law of the Sea Convention).
>
> Our approach will be informed by the following guiding principles:
>
> • **Safeguard Peace and Stability** – Seek to maintain and preserve the Arctic region as an area free of conflict, acting in concert with allies, partners, and other interested parties. Support and preserve: international legal principles of freedom of navigation and overflight and other uses of the sea and airspace related to these freedoms, unimpeded lawful commerce, and the peaceful resolution of disputes for all nations.
>
> • **Make Decisions Using the Best Available Information** – Across all lines of effort, decisions need to be based on the most current science and traditional knowledge.[22]
>
> • **Pursue Innovative Arrangements** – Foster partnerships with the state of Alaska, Arctic states, other international partners, and the private sector to more efficiently develop, resource, and manage capabilities, where appropriate and feasible, to better advance our strategic priorities in this austere fiscal environment.
>
> • **Consult and Coordinate with Alaska Natives** – Engage in a consultation process with Alaska Natives, recognizing tribal governments' unique legal relationship with the United States and providing for meaningful and timely opportunity to inform Federal policy affecting Alaskan Native communities.[23]

For the main text of the document, see **Appendix D**.

January 2014 Implementation Plan for National Strategy for Arctic Region

On January 30, 2014, the Obama Administration released an implementation plan for the May 2013 national strategy for the Arctic region.[24] The plan states that it

> complements and builds upon existing initiatives by Federal, State, local, and tribal authorities, the private sector, and international partners, and focuses efforts where opportunities exist and action is most needed. The Implementation Plan reflects the reality of a changing Arctic environment and upholds national interests in safety, security, and environmental protection, and works with international partners to pursue global objectives of addressing climatic changes.
>
> This Implementation Plan follows the structure and objectives of the Strategy's three lines of effort and is consistent with the guiding principles. The lines of effort of the Strategy and the Implementation Plan are as follows:
>
> • Advance United States Security Interests
>
> • Pursue Responsible Arctic Region Stewardship
>
> • Strengthen International Cooperation

[22] A footnote in the document at this point states: "Traditional knowledge refers to a body of evolving practical knowledge based on observations and personal experience of indigenous communities over an extensive, multigenerational time period. (BOEM Ocean Science, Vol. 9, Issue 2, May/April/June 2012, page 4)."

[23] *National Strategy for the Arctic Region*, May 2013, pp. 2-3.

[24] *Implementation Plan for The National Strategy for the Arctic Region*, January 2014, 32 pp. The news release announcing the implementation plan is posted at http://www.whitehouse.gov/blog/2014/01/30/white-house-releases-implementation-plan-national-strategy-arctic-region. The document itself is posted at http://www.whitehouse.gov/sites/default/files/docs/implementation_plan_for_the_national_strategy_for_the_arctic_region_-_fi.... pdf.

> These lines of effort and guiding principles are meant to be implemented as a coherent whole.[25]

The plan also states:

> Climate change is already affecting the entire global population, and Alaska residents are experiencing the impacts in the Arctic. To ensure a cohesive Federal approach, implementation activities must be aligned with the Executive Order on Preparing the United States for the Impacts of Climate Change[26] while executing the Strategy. In addition to the guiding principles, the following approaches are important in implementing the activities across all of the lines of effort:
>
> • Foster Partnerships with Arctic Stakeholders. As outlined in the Strategy, all lines of effort must involve Arctic partners, particularly the State of Alaska and Alaska Natives in the Arctic region. Federal agencies, the State of Alaska, tribal communities, local governments, and academia will work with other nations, industry stakeholders, non-governmental organizations, and research partners to address emerging challenges and opportunities in the Arctic environment. The Federal Government should strive to maintain the free flow of communication and cooperation with the State of Alaska to support national priorities.
>
> • Coordinate and Integrate Activities across the Federal Government. Multiple Federal bodies currently have authority for Arctic policy (e.g., the National Ocean Council (NOC), Arctic Policy Group, and Interagency Arctic Research Policy Committee (IARPC)). The National Security Council Staff will develop an Executive Order through the interagency process to maximize efficiency, align interagency initiatives, and create unity of effort among all Federal entities conducting activities in the Arctic.[27]

The plan outlines about 36 specific initiatives. For each, it presents a brief statement of the objective, a list of next steps to be taken, a brief statement about measuring progress in achieving the objective, and the names of the lead and supporting federal agencies to be involved.

On March 9, 2016, the Administration released three documents discussing the implementation of the national strategy for the Arctic:[28] (1) a report entitled *2015 Year in Review—Progress Report on the Implementation of the National Strategy for the Arctic Region*;[29] (2) an appendix to that report entitled *Appendix A, Implementation Framework for the National Strategy for the Arctic Region*:[30] and (3) another appendix to that report entitled *Appendix B, Interagency Arctic*

[25] *Implementation Plan for The National Strategy for the Arctic Region*, January 2014, p. 1.

[26] The passage contains a footnote at this point stating that this executive order was signed by the President on November 1, 2013. It is Executive Order 13653. The text of the order is posted at http://www.gpo.gov/fdsys/pkg/FR-2013-11-06/pdf/2013-26785.pdf and http://www.whitehouse.gov/the-press-office/2013/11/01/executive-order-preparing-united-states-impacts-climate-change. A fact sheet about it is posted at http://www.whitehouse.gov/the-press-office/2013/11/01/fact-sheet-executive-order-climate-preparedness.

[27] *Implementation Plan for The National Strategy for the Arctic Region*, January 2014, p. 4.

[28] For the text of the administration's announcement releasing these documents, see "Advancing Implementation of the National Strategy for the Arctic Region," March 9, 2016, accessed March 25, 2016, at https://www.whitehouse.gov/blog/2016/03/09/advancing-implementation-national-strategy-arctic-region.

[29] *2015 Year in Review—Progress Report on the Implementation of the National Strategy for the Arctic Region*, Prepared by the Arctic Executive Steering Committee, March 2016, 35 pp., accessed March 25, 2016, at https://www.whitehouse.gov/sites/whitehouse.gov/files/documents/Progress%20Report%20on%20the%20Implementation%20of%20the%20National%20Strategy%20for%20the%20Arctic%20Region.pdf.

[30] *Appendix A, Implementation Framework for the National Strategy for the Arctic Region*, March 2016, 33 pp., accessed March 25, 2016, at https://www.whitehouse.gov/sites/whitehouse.gov/files/documents/National%20Strategy%20for%20the%20Arctic%20Region%20Implementation%20Framework%20%28Appendix%20A%29%20Final.pdf.

Research Policy Committee 5-Year Plan Collaboration Teams: 2015 Summary of Accomplishments and 2016 Priorities.[31]

January 2015 Executive Order for Enhancing Coordination of Arctic Efforts

On January 21, 2015, President Obama issued Executive Order 13689, entitled "Enhancing Coordination of National Efforts in the Arctic." The order states in part:

> As the United States assumes the Chairmanship of the Arctic Council, it is more important than ever that we have a coordinated national effort that takes advantage of our combined expertise and efforts in the Arctic region to promote our shared values and priorities.
>
> As the Arctic has changed, the number of Federal working groups created to address the growing strategic importance and accessibility of this critical region has increased. Although these groups have made significant progress and achieved important milestones, managing the broad range of interagency activity in the Arctic requires coordinated planning by the Federal Government, with input by partners and stakeholders, to facilitate Federal, State, local, and Alaska Native tribal government and similar Alaska Native organization, as well as private and nonprofit sector, efforts in the Arctic....
>
> There is established an Arctic Executive Steering Committee (Steering Committee), which shall provide guidance to executive departments and agencies (agencies) and enhance coordination of Federal Arctic policies across agencies and offices, and, where applicable, with State, local, and Alaska Native tribal governments and similar Alaska Native organizations, academic and research institutions, and the private and nonprofit sectors....
>
> ... the Steering Committee will meet quarterly, or as appropriate, to shape priorities, establish strategic direction, oversee implementation, and ensure coordination of Federal activities in the Arctic....
>
> The Steering Committee, in coordination with the heads of relevant agencies and under the direction of the Chair, shall:
>
> (a) provide guidance and coordinate efforts to implement the priorities, objectives, activities, and responsibilities identified in National Security Presidential Directive 66/Homeland Security Presidential Directive 25, Arctic Region Policy, the National Strategy for the Arctic Region and its Implementation Plan, and related agency plans;
>
> (b) provide guidance on prioritizing Federal activities, consistent with agency authorities, while the United States is Chair of the Arctic Council, including, where appropriate, recommendations for resources to use in carrying out those activities; and
>
> (c) establish a working group to provide a report to the Steering Committee by May 1, 2015, that:
>
> (i) identifies potential areas of overlap between and within agencies with respect to implementation of Arctic policy and strategic priorities and provides recommendations to increase coordination and reduce any duplication of effort, which may include ways to increase the effectiveness of existing groups; and
>
> (ii) provides recommendations to address any potential gaps in implementation....

[31] *Appendix B, Interagency Arctic Research Policy Committee 5-Year Plan Collaboration Teams: 2015 Summary of Accomplishments and 2016 Priorities*, undated, 13 pp., accessed March 25, 2016, at: https://www.whitehouse.gov/sites/whitehouse.gov/files/documents/Appendix%20B%20IARPC%202015%20Annual%20Report.pdf.

> It is in the best interest of the Nation for the Federal Government to maximize transparency and promote collaboration where possible with the State of Alaska, Alaska Native tribal governments and similar Alaska Native organizations, and local, private-sector, and nonprofit-sector stakeholders. To facilitate consultation and partnerships with the State of Alaska and Alaska Native tribal governments and similar Alaska Native organizations, the Steering Committee shall:
>
> (a) develop a process to improve coordination and the sharing of information and knowledge among Federal, State, local, and Alaska Native tribal governments and similar Alaska Native organizations, and private-sector and nonprofit-sector groups on Arctic issues;
>
> (b) establish a process to ensure tribal consultation and collaboration, consistent with my memorandum of November 5, 2009 (Tribal Consultation). This process shall ensure meaningful consultation and collaboration with Alaska Native tribal governments and similar Alaska Native organizations in the development of Federal policies that have Alaska Native implications, as applicable, and provide feedback and recommendations to the Steering Committee;
>
> (c) identify an appropriate Federal entity to be the point of contact for Arctic matters with the State of Alaska and with Alaska Native tribal governments and similar Alaska Native organizations to support collaboration and communication; and
>
> (d) invite members of State, local, and Alaska Native tribal governments and similar Alaska Native organizations, and academic and research institutions to consult on issues or participate in discussions, as appropriate and consistent with applicable law.[32]

U.S. Special Representative for the Arctic

On July 16, 2014, Secretary of State John Kerry announced the appointment of retired Coast Guard Admiral Robert J. Papp, Jr., who served as Commandant of the Coast Guard from May 2010 to May 2014, as the first U.S. Special Representative for the Arctic.[33] The duties of this position involve, among other things, interacting with ambassadors to the Arctic region from other countries.

U.S. Chairmanship of Arctic Council in 2015-2017

As discussed later in greater detail (see "The Arctic Council" in "Geopolitical Environment"), the primary intergovernmental high-level forum for cooperation in the Arctic region is the eight-nation Arctic Council, of which the United States is an active member.[34] The Council has a two-year chairmanship that rotates among the eight member states. The United States assumed the chairmanship on April 24, 2015, and will serve in that capacity for two years—a period that will end in 2017, during the first year of the administration of the President elected in November 2016. The United States previously held the chairmanship from 1998 to 2000 and, following the 2015-2017 term, is to next hold it in 2031-2033.

[32] Executive order, "Enhancing Coordination of National Efforts in the Arctic," January 21, 2015, accessed January 21, 2015, at http://www.whitehouse.gov/the-press-office/2015/01/21/executive-order-enhancing-coordination-national-efforts-arctic.

[33] See "Retired Admiral Robert Papp to Serve as U.S. Special Representative for the Arctic," Press Statement, John Kerry, Secretary of State, Washington, DC, July 16, 2014, accessed July 17, 2014, at http://www.state.gov/secretary/remarks/2014/07/229317.htm.

[34] See also http://www.arctic-council.org/.

The U.S. chairmanship team is led by Secretary of State John Kerry. The State Department lists nine additional members of the team, including retired Coast Guard Admiral Robert J. Papp, Jr., U.S. Special Representative for the Arctic (see previous section).[35]

The Administration states the following regarding the U.S. chairmanship:

> Given the increased strategic importance of the region, the next two years offers the United States an unprecedented opportunity to make significant progress on our Arctic policy objectives, which were first laid out in the National Strategy for the Arctic Region released by the White House in May 2013 and followed by an Implementation Plan in January 2014.
>
> The U.S. will be chairing the Arctic Council at a crucial moment when the effects of climate change are bringing a myriad of new environmental, human and economic opportunities and challenges to the Arctic. During the U.S. Chairmanship, the State Department will focus the Arctic work it carries out through the Arctic Council, various international scientific cooperation mechanisms and, in some cases, domestic initiatives led by U.S. states or other U.S. government agencies. The three thematic areas of the U.S. Chairmanship are: improving economic and living conditions in Arctic communities; Arctic Ocean safety, security and stewardship; and addressing the impacts of climate change. The theme of the U.S. Chairmanship of the Arctic Council is "One Arctic: Shared Opportunities, Challenges and Responsibilities," which recognizes the peaceful and stable nature of the Arctic. The U.S. chairmanship will conclude in spring 2017 with a Ministerial meeting in Alaska, at which point the United States will hand the chairmanship to Finland.
>
> To guide U.S. engagement on the Arctic during this crucial period, U.S. Secretary of State John Kerry appointed the former Commandant of the U.S. Coast Guard, Admiral Robert J. Papp, Jr., as the first-ever U.S. Special Representative for the Arctic in July 2014.
>
> The U.S. has developed an ambitious and balanced program for its Arctic Council Chairmanship that focuses on three crucial areas: improving economic and living conditions; Arctic Ocean safety, security and stewardship; and addressing the impacts of climate change.
>
> **1. Improving Economic and Living Conditions in Arctic Communities**
>
> Remote Arctic communities face a number of threats to the health and well-being of their citizens, including food and water security, safe water, sewer and sanitation, affordable and renewable energy, adequate mental health services, and the need to ensure the continued economic viability of their communities.
>
> Our work in this area will aim to:
>
> —Promote the development of **renewable energy** technology, such as modular micro-grid systems, to spur public-private partnerships and improve energy affordability;
>
> —Provide a better understanding of **freshwater security** in the Arctic, including through the creation of a Water Resources Vulnerability Index;

[35] "Meet the U.S. Chairmanship Team," accessed September 29, 2015, at http://www.arctic-council.org/index.php/en/about-us/arctic-council/u-s-chairmanship. The other eight members of the team are the Honorable Fran Ulmer, Special Advisor to the U.S. Secretary of State on Arctic Science and Policy; Ambassador David Balton, Chair of the Senior Arctic Officials; Julia Gourley, U.S. Senior Arctic Official (SAO); Dr. Nikoosh Carlo, Senior Advisor to the SAO Chair; Dr. Adrianna Muir, Deputy Senior Arctic Official; Nomi Seltzer, Arctic Affairs Advisor; Erin Robertson, Arctic Press and Public Affairs Officer; and Matthew Kastrinsky, Administrative Officer.

—Coordinate an Arctic-wide **telecommunications infrastructure assessment** to promote the build-out of commercial infrastructure in the region;

—Support **mental wellness**, including suicide prevention and resilience;

—Harness the expertise and resources of the **Arctic Economic Council** to inform the Arctic Council's work on economic and living conditions;

—Mitigate public health risks and reduce **black carbon output** in Arctic communities;

—Promote better **community sanitation and public health** by facilitation collaboration between industry, researchers and public policy experts to increase access to and reduce the operating costs of in-home running water and sewer in remote communities.

2. Arctic Ocean Safety, Security and Stewardship

The acceleration of maritime activity in the Arctic increases risk in an already harsh and challenging environment. U.S. Chairmanship priorities include building upon existing preparedness and response programs; enhancing the ability of Arctic states to execute their search and rescue responsibilities; and emphasizing safe, secure, and environmentally sound shipping as a matter of high priority. To ensure that future maritime development avoids negative impacts, particularly in areas of ecological and cultural significance, the Arctic Council is also continuing its work towards a network of marine protected areas and enhanced international cooperation in the Arctic Ocean. Ocean acidification is one of the most urgent issues facing the world's ocean today and the Arctic Council is responding by supporting research to improve the capability to monitor and track acidification in the Arctic Ocean.

Our work in this area will aim to:

—Better prepare those responsible to better address **search and rescue** challenges in the Arctic;

—Ensure marine environmental protection, including working toward the establishment of a network of **marine protected areas**;

—Explore the creation of a **Regional Seas Program** of the Arctic Ocean;

—Create a better understanding of **Arctic Ocean acidification** and its effects on Arctic organisms and the economies that rely on them;

—Encourage all parties take the steps necessary to allow for the proper implementation of the **Agreement on Cooperation on Marine Oil Pollution, Preparedness and response in the Arctic**.

3. Addressing the Impacts of Climate Change

The impacts of climate change affect the Arctic and the many people, wildlife, and plants that depend on the region for survival. The United States recognizes that we need to reduce black carbon (soot) and methane emissions, which disproportionally impact the Arctic. The Arctic Council is addressing the impacts of climate change by facilitating cooperation on action to reduce black carbon and methane emissions. Arctic Council activities to enhance access to adaptation and resilience tools, and promote the development of climate change indicators and high-resolution mapping are also priorities of the U.S. chairmanship that will increase scientists', communities', policymakers' and the public's understanding of the impacts of climate change.

Our work in this area will aim to:

—Target **short-lived climate pollutants** through reductions in black carbon and methane emissions;

—Support **Arctic climate adaptation and resilience** efforts including the creation of an Early Warning Indicator System;

—Create a **Pan-Arctic Digital Elevation Map** that will increase our understanding of the impacts of climate change on shorelines and surface areas in the Arctic.[36]

The Arctic and the U.N. Convention on Law of the Sea (UNCLOS)[37]

Background to UNCLOS

In November 1994, the United Nations Convention on the Law of the Sea (UNCLOS) entered into force. This convention establishes a treaty regime to govern activities on, over, and under the world's oceans. It builds on the four 1958 law of the sea conventions and sets forth a framework for future activities in parts of the oceans that are beyond national jurisdiction.[38] The 1982 Convention and its 1994 Agreement relating to Implementation of Part XI of the Convention were transmitted to the Senate on October 6, 1994.[39] In the absence of Senate advice and consent to adherence, the United States is not a party to the convention and agreement.

Part VI of UNCLOS and Commission on Limits of Continental Shelf

Part VI of the convention, dealing with the Continental Shelf, and Annex II, which established a Commission on the Limits of the Continental Shelf, are most pertinent to the Arctic as it becomes more accessible ocean space, bordered by five coastal states.[40] The convention gives the coastal state sovereign jurisdiction over the resources, including oil and gas, of its continental shelf.[41]

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[36] "U.S. Chairmanship of the Arctic Council, One Arctic: Shared Opportunities, Challenges, and Responsibilities," accessed September 29, 2015, at http://www.state.gov/e/oes/ocns/opa/arc/uschair/index.htm. Emphasis as in original. See also:

—Arctic Council chairmanship brochure, accessed September 29, 2015, at http://www.state.gov/documents/organization/241186.pdf, and Statement of Admiral Robert J. Papp, Jr., Special Representative for the Arctic, U.S. Department of State, before the Committee on Energy and Natural Resources, U.S. Senate, March 5, 2015, pp. 4-6.

—Department of State, "Chairmanship Projects," October 29, 2015, accessed November 25, 2015, at http://www.state.gov/e/oes/ocns/opa/arc/uschair/248957.htm.

—Statement of Admiral Robert J. Papp, Jr., Special Representative for the Arctic, U.S. Department of State, Before the Committee on Foreign Affairs, Subcommittees on Europe, Eurasia, and Emerging Threats, and Western Hemisphere, U.S. House of Representatives, November 17, 2015, pp. 4-7.

See also Yereth Rosen, "US Pushes Ambitious Goals As Arctic Council Convenes in Anchorage," *Alaska Dispatch News*, October 19, 2015; Jeannette Lee Falsey, "In Anchorage, U.S. Holds First Meeting As chair of Arctic Council," *Alaska Dispatch News*, October 23, 2015; Monica Gokey, "Arctic Council Concludes 1st Meeting Under US Chairmanship," *Alaska Public Media*, October 23, 2015; Eilis Quinn, "Arctic Council Talks Climate, COP21, Suicide in North," *Radio Canada International*, October 23, 2015.

[37] This section prepared by (name redacted), who was a Specialist in International Relations, Foreign Affairs, Defense, and Trade Division until her retirement from CRS on October 10, 2015.

[38] The United States is party to the four conventions adopted in 1958: Convention on the Territorial Sea and the Contiguous Zone, Convention on the High Seas, Convention on the Continental Shelf, and Convention on Fishing and Conservation of the Living Resources of the High Seas.

[39] Treaty Document 103-39.

[40] Other relevant provisions of the Convention, applicable depending on the extent of Arctic melting, relate to navigation, high seas freedoms, fisheries, and exclusive economic zones.

[41] The continental shelf is the under-sea extension of a coastal state's land territory. Article 76 of the Convention defines the continental shelf, *inter alia*, as "the seabed and subsoil of the submarine areas that extend beyond its [coastal state's] territorial sea throughout the natural prolongation of its land territory to the outer edge of the continental margin."

Under Article 76 of the convention, a coastal state with a broad continental margin may establish a shelf limit beyond 200 nautical miles. This jurisdiction is subject to the submission of the particulars of the intended limit and supporting scientific and technical data by the coastal state to the commission for review and recommendation.[42] The commission reviews the documentation and, by a two-thirds majority, approves its recommendations to the submitting state. Coastal states agree to establish the outer limits of their continental shelf, in accordance with this process and with their national laws. In instances of disagreement with the commission's recommendations, the coastal state may make a revised or new submission. The actions of the commission "shall not prejudice matters relating to delimitation of boundaries between States with opposite or adjacent coasts."[43] The "limits established by a coastal State on the basis of these recommendations shall be final and binding."[44]

Extended Continental Shelf and United States as a Non-Party to UNCLOS

The U.S. government's State Department-led interagency Extended Continental Shelf Project makes the following points regarding the extended continental shelf and the United States as a non-party to UNCLOS:

- As a non-party to UNCLOS, U.S. nationals may not serve as members of the Commission on the Limits of the Continental Shelf.
- The question of whether non-parties may make a submission to the commission has not been resolved.[45]
- Becoming a party to UNCLOS would help the United States maximize international recognition and legal certainty regarding the outer limits of the U.S. continental shelf. Even for non-parties to UNCLOS, however, customary international law, as reflected in UNCLOS, confers on coastal states rights and obligations relating to the continental shelf. This view is well supported in international law. The International Court of Justice, for example, has already declared Article 76(1) to have the status of customary international law (Nicaragua v. Colombia, 2012). Article 76(1) provides that the continental shelf

[42] A coastal State party has 10 years from the entry into force of the Convention for submission of information on its proposed limits. In May 2001, the Meeting of States Parties to the Convention decided that for any State for which the Convention entered into force before May 13, 1999, the date of commencement of the 10-year time period for making submissions to the commission is May 13, 1999.

[43] Annex II, Article 9. Article 83 of the Convention provides that questions relating to these boundary delimitation disputes shall be resolved by agreement between the States or by the Dispute Settlement options set forth in Part XV of the Convention.

[44] Article 76, para. 8.

[45] The State Department states:

> Paragraph 8 of Article 76 (as well as the relevant provisions of Annex II) refers to "coastal States" making submissions. This differs from many other provisions of the Convention (e.g., the nomination of members of the Commission, noted above) that refer expressly to "States Parties". In brief, in 1997, the Commission posed to the Meeting of States Parties to the Law of the Sea Convention (SPLOS) the question of whether "the terms 'a coastal State' and 'a State' include a non-State party to the Convention, or do they only refer to a coastal State or a State which is a State Party to the Convention?" The matter was debated and but not resolved. It will likely not be settled until/unless a non-Party makes a submission, at which point the Commission will need to decide the matter (perhaps with input from States or other entities).
>
> (Source: U.S. Department of State, Legal Counsel for U.S. Extended Continental Shelf Project, email to CRS dated January 20, 2016.)

extends to "the outer edge of the continental margin or to a distance of 200 nautical miles," whichever is further. Paragraphs 2 through 7 of Article 76 set forth the detailed rules for determining the precise outer limits of the continental shelf in those areas where the continental margin extends beyond 200 nautical miles from shore. The United States, like other countries, is using these provisions to determine its continental shelf limits. As a matter of customary international law, the United States also respects the continental shelf limits of other countries that abide by Article 76.

- The commission is not a claims process, and continental shelf entitlement does not depend on going through this procedure. The mandate of the commission is instead to make "recommendations" on the "outer limits" of the continental shelf. The word "claim" does not appear in Article 76, Annex II, or the commission's rules. Article 77(3) and the case law of the International Court of Justice indicate that continental shelf rights exist as a matter of fact and do not need to be expressly claimed.
- Delineating the continental shelf is a very complex and technical exercise, and the commission's process is important for obtaining international recognition and legal certainty of the outer limits of the continental shelf.
- The United States has potentially overlapping extended continental shelf areas with two countries in the Arctic—Russia and Canada.
  - The United States and the Soviet Union (now Russia) agreed to a maritime boundary, including in the Arctic, in 1990. The treaty was approved by the U.S. Senate in 1991; it has not been approved by Russia's Duma. Pending the treaty's entry into force, the two countries continue to provisionally apply the terms of the treaty. In determining its extended continental shelf limits, Russia has respected this agreement. Russia has not asserted an extended continental shelf in any areas that might be considered part of the U.S. extended continental shelf. The Russian submission to the commission respects the U.S.-Russia maritime boundary.
  - Canada and the United States have not yet established a maritime boundary in the Arctic. The United States and Canada have cooperated extensively to collect the data necessary to define the continental shelf in the Arctic Ocean. The areas where the continental shelf of the United States and Canada overlap will not be fully known until both countries determine the extent of their extended continental shelf in the Arctic Ocean. Once those areas are identified, the United States and Canada will address the maritime boundary on a bilateral basis at an appropriate time.[46]

Over the years, the United States has submitted observations on submissions to the commission made by other states, requesting that those observations be made available online and to the commission. In addition, since 2001, the United States has gathered and analyzed data to determine the outer limits of its extended continental shelf. Starting in 2007, this effort became the Extended Continental Shelf Project.[47]

[46] Sources: U.S. Department of State, Legal Counsel for U.S. Extended Continental Shelf Project, email to CRS dated January 20, 2016, and the Extended Continental Shelf Project website at: http://www.continentalshelf.gov/, accessed March 25, 2016.

[47] For more information, see http://www.continentalshelf.gov/.

Additional Points

Some observers have suggested that a separate international legal regime be negotiated to address the changing circumstances in the Arctic. They maintain that these changing circumstances were not envisioned at the time UNCLOS was negotiated. Still others suggest that the Arctic region above a certain parallel be designated a wilderness area. As precedent, they cite Article 4 of The Antarctic Treaty, under which any current claims to sovereign territory are frozen and

> No acts or activities taking place while the present Treaty is in force shall constitute a basis for asserting, supporting or denying a claim to territorial sovereignty in Antarctica or create any rights of sovereignty in Antarctica. No new claim, or enlargement of an existing claim, to territorial sovereignty in Antarctica shall be asserted while the present Treaty is in force.

Supporters of the Law of the Sea Convention maintain that changing circumstances in the Arctic strengthen their argument that the United States should become a party to the convention. In this way, they argue, the United States can be best situated to protect and serve its national interests, under both Article 76 and other parts of the convention.

The Administration's January 2014 implementation plan for its national strategy for the Arctic region (see discussion above) includes, as one of its 36 or so initiatives, one entitled "Accede to the Law of the Sea Convention." Under this initiative, the State Department and other federal agencies are to "continue to seek the Senate's advice and consent to accede to the Law of the Sea Convention." The document states that "the Administration is committed, like the last three Administrations, to pursuing accession to the Convention on the Law of the Sea and will continue to place a priority on attaining Senate advice and consent to accession."[48]

Senate Arctic Caucus

On March 4 and 5, 2015, Senator Lisa Murkowski and Senator Angus King announced the formation of a Senate Arctic Caucus "to spotlight this region and open up a wider conversation about the nation's future in the region as America prepares to accede to the Chair of the Arctic Council."[49]

Issues for Congress

Climate Change and Loss of Arctic Sea Ice[50]

Record low extents of Arctic sea ice in 2012 and 2007 have focused scientific and policy attention on climate changes in the high north, and to the implications of projected ice-free[51] seasons in the

[48] *Implementation Plan for The National Strategy for the Arctic Region*, January 2014, p. 29.

[49] Press release from the office of Senator Angus King, "King, Murkowski Announce U.S. Senate Arctic Caucus," March 4, 2015, accessed March 17, 2015, at http://www.king.senate.gov/newsroom/press-releases/king-murkowski-announce-us-senate-arctic-caucus. See also press release from the office of Senator Lisa Murkowski, "Senators Murkowski, King Announce U.S. Senate Arctic Caucus," March 5, 2015, accessed March 17, 2015, at http://www.murkowski.senate.gov/public/index.cfm/pressreleases?ID=1ce5edcb-540d-4c43-b264-56bdbb570755, which includes a similar phrase.

[50] This section prepared by Jane Leggett, Specialist in Energy and Environmental Policy, Resources, Science, and Industry Division.

[51] In scientific analyses, "ice-free" does not necessarily mean "no ice." The definition of "ice-free" or sea ice "extent" or "area" varies across studies. Sea ice "extent" is one common measure, equal to the sum of the area of grid cells that (continued...)

Arctic within decades. The Arctic has been projected by several scientists to be ice-free in most late summers as soon as the 2030s.[52] This opens opportunities for transport through the Northwest Passage and the Northern Sea Route, extraction of potential oil and gas resources, and expanded fishing and tourism (**Figure 3**).

More broadly, physical changes in the Arctic include warming ocean, soil, and air temperatures; melting permafrost; shifting vegetation and animal abundances; and altered characteristics of Arctic cyclones. All these changes are expected to affect traditional livelihoods and cultures in the region and survival of polar bear and other animal populations, and raise risks of pollution, food supply, safety, cultural losses, and national security. Moreover, linkages ("teleconnections") between warming Arctic conditions and extreme events in the mid-latitude continents are increasingly evident, identified in such extreme events as the heat waves and fires in Russia in 2010; severe winters in the eastern United States and Europe in 2009/2010 and in Europe in 2011/2012;[53] and Indian summer monsoons and droughts. Hence, changing climate in the Arctic suggests important implications both locally and across the Hemisphere.

(...continued)

have ice concentration of less than a set percentage—frequently 15%. For more information, see the National Snow and Ice Data Center, http://nsidc.org/seaice/data/terminology.html.

[52] Muyin Wang and James E. Overland, "A Sea Ice Free Summer Arctic within 30 Years?," *Geophysical Research Letters* 36, no. L07502 (April 3, 2009): 10.1029/2009GL037820; Marika Holland, Cecilia M. Bitz, and Bruno Tremblay, "Future abrupt reductions in the summer Arctic sea ice," *Geophysical Research Letters* 33, no. L23503 (2006); But see also Julien Boé, Alex Hall, and Xin Qu, "Sources of spread in simulations of Arctic sea ice loss over the twenty-first century," *Climatic Change* 99, no. 3 (April 1, 2010): 637-645; I. Eisenman and J. S. Wettlaufer, "Nonlinear threshold behavior during the loss of Arctic sea ice," *Proceedings of the National Academy of Sciences* 106, no. 1 (January 6, 2009): 28-32; Dirk Notz, "The Future of Ice Sheets and Sea Ice: Between Reversible Retreat and Unstoppable Loss," *Proceedings of the National Academy of Sciences* 106, no. 49 (December 8, 2009): 20590-20595.

[53] Overland et al., state that "a warm Arctic-cold continent pattern represents a paradox of recent global warming: there is not a uniform pattern of temperature increases" due to a set of newly recognized processes described in Overland, J. E, K. R Wood, and M. Wang. "Warm Arctic-cold Continents: Climate Impacts of the Newly Open Arctic Sea." *Polar Research* 30 (2011). The authors raise a critical, unanswered question, "Is the observed severe mid-latitude weather in two adjacent years simply due to an extreme in chaotic processes alone, or do they included a partial but important Arctic forcing and connection due to recent changing conditions?" In other words, are recent patterns random anomalies, or might we expect more of the same?; among other examples, see also Lim, Young-Kwon, and Siegfried D. Schubert. "The Impact of ENSO and the Arctic Oscillation on Winter Temperature Extremes in the Southeast United States." *Geophysical Research Letters* 38, no. 15 (August 11, 2011): L15706.

Figure 3. Arctic Sea Ice Extent in September 2008, Compared with Prospective Shipping Routes and Oil and Gas Resources

Source: Graphic by Stephen Rountree at *U.S. News and World Report*, http://www.usnews.com/articles/news/world/2008/10/09/global-warming-triggers-an-international-race-for-the-artic/photos/#1.

Like the rest of the globe, temperatures in the Arctic have varied[54] but show a significant warming trend since the 1970s, and particularly since 1995.[55] The annual average temperature for the

[54] There was a regionally warm period in the Arctic from the mid-1920s to around 1940, which scientists have assessed to have been driven by natural climate variability. They have found that period to be distinctly different from the recent multi-decadal warming, in part because the early 20th century warming was concentrated in the northern high latitudes. See, for example, Figure 2, upper left graphic, in Geophysical Fluid Dynamics Laboratory, "Simulatoin of Early 20th Century Warming," at http://www.gfdl.noaa.gov/early-20th-century-global-warming.

Arctic region (from 60° to 90° N) is now about 1.8° F warmer than the "climate normal" (the average from 1961 to 1990). Temperatures in October-November are now about 9° F above the seasonal normal. Scientists have concluded that most of the *global* warming of the last three decades is very likely caused by human-related emissions of greenhouse gases (GHG, mostly carbon dioxide); they expect the GHG-induced warming to continue for decades, even if, and after, GHG concentrations in the atmosphere have been stabilized. The extra heat in the Arctic is amplified by processes there (the "polar amplification") and may result in irreversible changes on human timescales.

The observed warmer temperatures along with rising cyclone size and strength in the Arctic have reduced sea ice extent, thickness, and ice that persists year-round ("perennial ice"); natural climate variability has likely contributed to the record low ice extents of 2007 and 2012. The 2007 minimum sea ice extent was influenced by warm Arctic temperatures and warm, moist winds blowing from the North Pacific into the central Arctic, contributing to melting and pushing ice toward and into the Atlantic past Greenland. Warm winds did not account for the near-record sea ice minimum in 2008.[56] In early August 2012, an unusually large storm with low pressure developed over the Arctic, helping to disperse the already weak ice into warmer waters and accelerating its melt rate. By August 24, 2012, sea ice extent had shrunk below the previous observed minimum of late September 2007.[57]

Modeling of GHG-induced climate change is particularly challenging for the Arctic, but it consistently projects warming through the 21st century, with annual average Arctic temperature increases ranging from +1° to +9.0° C (+2° to +19.0° F), depending on the GHG scenario and model used. While such warming is projected by most models throughout the Arctic, some models project slight cooling localized in the North Atlantic Ocean just south of Greenland and Iceland. Most warming would occur in autumn and winter, "with very little temperature change projected over the Arctic Ocean" in summer months.[58]

Due to observed and projected climate change, scientists have concluded that the Arctic will have changed from an ice-covered environment to a recurrent ice-free[59] ocean (in summers) as soon as the late 2030s. The character of ice cover is expected to change as well, with the ice being thinner, more fragile, and more regionally variable. The variability in recent years of both ice quantity and location could be expected to continue.

(...continued)

[55] Steele, Michael, Wendy Ermold, and Jinlun Zhang. "Arctic Ocean Surface Warming Trends over the Past 100 Years." *Geophysical Research Letters* 35, no. 2 (January 29, 2008): L02614.

[56] J. Overland, J. Walsh, and M. Wang, *Arctic Report Card - Atmosphere* (NOAA Arctic Research Program, October 6, 2008), http://www.arctic.noaa.gov/reportcard/atmosphere.html.

[57] National Snow and Ice Data Center, "Arctic sea ice extent breaks 2007 record low" (August 27, 2012); Japanese Aerospace Exploration Agency, "A new record minimum of the Arctic sea ice extent was set on 24 August 2012"; Arctic ROOS (Norway), "Daily Updated Time series of Arctic sea ice area and extent derived from SSMI data provided by NERSC," at http://arctic-roos.org/observations/satellite-data/sea-ice/ice-area-and-extent-in-arctic.

[58] William L. Chapman and John E. Walsh, "Simulations of Arctic Temperature and Pressure by Global Coupled Models," *Journal of Climate* 20, no. 4 (February 1, 2007): 609-632.

[59] See footnote 51. Also, although one Canadian scientist has predicted that recurrent ice-free summers may begin sometime between 2013 and 2020, this is not consistent with other climate models' projections.

Extended Continental Shelf Submissions, Territorial Disputes, and Sovereignty Issues[60]

Extended Continental Shelf Submissions

Motivated in part by a desire to exercise sovereign control over the Arctic region's increasingly accessible oil and gas reserves (see "Oil, Gas, and Mineral Exploration"), the four Arctic coastal states other than the United States—Canada, Russia, Norway, and Denmark (of which Greenland is a territory)—have made or are in the process of preparing submissions to the Commission on the Limits of the Continental Shelf regarding the outer limits of their extended continental shelves. (For further discussion of the commission, see "Extended Continental Shelf and United States as a Non-Party to UNCLOS.")

Russia has been attempting to chart the Arctic Ocean's enormous underwater Lomonosov Ridge in an attempt to show that it is an extension of Russia's continental margin. The ridge spans a considerable distance across the Arctic Ocean. A 2001 submission by Russia was rejected as insufficiently documented. Canada views a portion of the ridge as part of its own continental shelf.[61]

In August 2007, a Russian submersible on a research expedition deposited an encased Russian Federation flag on the seabed of the presumed site of the North Pole. The action captured worldwide attention, but analysts note that it did not constitute an official claim to the Arctic seabed or the waters above it, that it has no legal effect, and that it therefore was a purely symbolic act.

At a May 2008 meeting in Ilulissat, Greenland, the five Arctic coastal states reaffirmed their commitment to the UNCLOS legal framework for the establishment of extended continental shelf limits in the Arctic.[62] (For further discussion, see "Extent of the Continental Margin" in "Oil, Gas, and Mineral Exploration.")

Territorial Disputes and Sovereignty Issues

In addition to this process, there are four unresolved Arctic territorial disputes:

- Scientists have forecast that in coming decades, global warming will reduce the ice pack in Canada's northern archipelago sufficiently to permit ships to use the trans-Arctic shipping route known as the Northwest Passage during the summer months (see "Commercial Sea Transportation"). The prospect of such traffic raises a major jurisdictional question. Ottawa maintains that such a passage would be an inland waterway, and would therefore be sovereign Canadian territory subject to Ottawa's surveillance, regulation, and control. The United States, the European Union, and others assert that the passage would constitute an international strait between two high seas.

[60] This section was prepared by (name redacted), who was a Specialist in International Relations, Foreign Affairs, Defense, and Trade Division, until his retirement on April 30, 2014. For questions relating to this section, contact (n ame redacted), Analyst in European Affairs, Foreign Affairs, Defense, and Trade Division.

[61] "Russia, Canada Make Competing Claims To Arctic Resources," *The Canadian Press*, September 16, 2010.

[62] "5 Countries Agree To Talk, Not Compete, Over the Arctic," *New York Times*, May 29, 2008.

- The United States and Canada are negotiating over a binational boundary in the Beaufort Sea.
- The United States and Russia in 1990 signed an agreement regarding a disputed area of the Bering Sea; the U.S. Senate ratified the pact the following year, but the Russian *Duma* has yet to approve the accord.
- Denmark and Canada disagree over which country has the territorial right to Hans Island, a tiny, barren piece of rock between Greenland and Canada's Ellesmere Island. Some analysts believe the two countries are vying for control over a future sea lane that might be created if the Arctic ice were to melt sufficiently to create a Northwest Passage. Others claim that the governments are staking out territorial claims in the event that future natural resource discoveries make the region economically valuable.[63]

In addition to these disputes, Norway and Russia had been at odds for decades over the boundary between the two in the so-called "Grey Zone" in the Barents Sea, an area believed to hold rich undersea deposits of petroleum. On September 15, 2010, Norwegian Prime Minister Jens Stoltenberg and Russian President Dmitry Medvedev signed an agreement in Murmansk, a Russian city near the Norwegian border. The accord awards roughly half of the 175,000-square-kilometer area to each country; it spells out fishing rights, and provides for the joint development of future oil and gas finds that straddle the boundary line. Some observers believe it is noteworthy that Russia would concede sovereignty over such a large, resource-rich area to a small, neighboring country. But others have noted that Moscow may be hoping for Norwegian cooperation in developing offshore resources, and eventually in winning approval when Russia makes its Article 76 UNCLOS submission.[64]

In August 2010, Canadian Foreign Minister Lawrence Cannon announced a new "Statement of Canada's Arctic Policy," which reaffirmed the government's commitment to Canada's sovereignty in the region, to economic and social development, to environmental protection, and to empowerment of the peoples in the north. The statement also emphasized the government's intention to negotiate settlements to its disputes with the United States over the Beaufort Sea boundary, and with Denmark over Hans Island. Minister Cannon declared that "making progress on outstanding boundary issues will be a top priority."[65] Also, despite their dispute over Hans Island, Canada and Denmark have been working together on Arctic issues. In May 2010, the two countries' military chiefs of staffs signed a memorandum of understanding on Arctic Defense, Security, and Operational Cooperation, committing the two countries to "enhanced consultation, information exchange, visits, and exercises."[66]

[63] For additional information, see Natalie Mychajlyszyn, *The Arctic: Geopolitical Issues*, Canadian Library of Parliament, October 24, 2008.

[64] "Russia, Norway Sign Deal On Barents Sea Border, Seek More Development in Mineral-rich Arctic," *Associated Press*, September 15, 2010.

[65] Cannon quoted in "Canada Seeks To Settle Arctic Borders," *Agence France Presse*, August 20, 2010. For additional information concerning Canada's August statement on Arctic policy, see "Statement on Canada's Arctic foreign policy: Exercising sovereignty and promoting Canada's Northern Strategy abroad," Foreign Affairs and International Trade Canada website, http://www.international.gc.ca/polar-polaire/canada_arctic_foreign_policy-la_politique_etrangere_du_canada_pour_arctique.aspx?lang=eng.

[66] "Canada and Denmark Sign Arctic Cooperation Arrangement," *Targeted News Service*, May 17, 2010.

Commercial Sea Transportation[67]

Background

The search for a shorter route from the Atlantic to Asia has been the quest of maritime powers since the Middle Ages. The melting of Arctic ice raises the possibility of saving several thousands of miles and several days of sailing between major trading blocs.[68] If the Arctic were to become a viable shipping route, the ramifications could extend far beyond the Arctic. For example, lower shipping costs could be advantageous for China (at least its northeast region), Japan, and South Korea because their manufactured products exported to Europe or North America could become less expensive relative to other emerging manufacturing centers in Southeast Asia, such as India.[69] Melting ice could potentially open up two trans-Arctic routes (see **Figure 3**):[70]

- **The Northern Sea Route** (NSR, a.k.a. the "Northeast Passage"), along Russia's northern border from Murmansk to Provideniya, is about 2,600 nautical miles in length. It was opened by the Soviet Union to domestic shipping in 1931 and to transit by foreign vessels in 1991. This route would be applicable for trade between northeast Asia (north of Singapore) and northern Europe. In the summer of 2013, about 50 laden cargo ships transited the NSR.[71]
- **The Northwest Passage** (NWP) runs through the Canadian Arctic Islands. The NWP actually consists of several potential routes. The southern route is through Peel Sound in Nunavut, which has been open in recent summers and contains mostly one-year ice. However, this route is circuitous, contains some narrow channels, and is shallow enough to impose draft restrictions on ships. The more northern route, through McClure Strait from Baffin Bay to the Beaufort Sea north of Alaska, is much more direct, and therefore more appealing to ocean carriers, but more prone to ice blockage.[72] The NWP is potentially applicable for trade between northeast Asia (north of Shanghai) and the northeast of North America, but may be less commercially viable than the NSR.[73] A ship carrying coal from western Canada to Finland became the first bulk carrier to transit the NWP in the summer of 2013.[74]

[67] This section prepared by (name redacted), Specialist in Transportation Policy, Resources, Science, and Industry Division.

[68] Extended daylight hours in the Arctic during the summer may also be an advantage.

[69] Presentation by Stephen Carmel, Senior Vice President, Maersk Line Ltd., Halifax International Security Forum, *Arctic Security: The New Great Game?* November 21, 2009, available at http://fora.tv/.

[70] A third but more remote possibility is a route directly over the North Pole.

[71] Northern Sea Route Information Office; http://www.arctic-lio.com/.

[72] This was the route pioneered by the *SS Manhattan*, an oil tanker modified for ice breaking in 1969 to carry Alaskan North Slope oil to the Atlantic. This was the first commercial passage through the NWP, but the building of the Alaskan pipeline was found to be the more economical means of transporting oil from the North Slope to the lower 48 states.

[73] Although the NWP is often compared to the alternative route through the Panama Canal in terms of distance and sailing days from Asia to the U.S. east coast, another alternative to consider is the shorter and faster transcontinental rail route across Canada or the United States. The Panama Canal is undergoing an expansion project, expected to be completed by 2015, to allow larger ships with about three times the cargo capacity to pass through.

[74] "Cargo Ship Carves a Path in Arctic Sea," *The Wall Street Journal*, September 26, 2013, p. A11.

Destination Traffic, Not Trans-Arctic Traffic

Most cargo ship activity currently taking place in the Arctic is to transport natural resources from the Arctic or to deliver general cargo and supplies to communities and natural resource extraction facilities. Thus, cargo ship traffic in the Arctic presently is mostly regional, not trans-Arctic. While there has been a recent uptick in Arctic shipping activity, this activity has more to do with a spike in commodity prices than it does with the melting of Arctic ice. Even so, recent activity is less than it has been in the past. The NSR continues to account for the bulk of Arctic shipping activity.

Cruise Ship Activity

Considerable cruise ship activity takes place in Arctic waters. In the summer of 2007, three cruise ships reportedly sailed through the NWP from the Atlantic to Alaska's North Slope.[75] In August 2010, a cruise ship with over 150 passengers ran aground in the NWP. In the Barents Sea, there are regular cruise ships sailing to Svalbard. The inherent dangers for passenger ships in the Arctic have prompted calls for international regulations promoting the safety of cruise ships in the area. Some have suggested that cruise ships sail in pairs to provide assistance to one another, given the Arctic's remoteness and the difficulty land-based rescuers would have in reaching a vessel in distress.[76] Requiring that Arctic cruise vessels have ice-strengthened hulls and be equipped with enclosed lifeboats could be other safety requirements. In 2003, some Arctic cruise and tourist operators formed the Association of Arctic Expedition Cruise Operators (AECO) to establish agreed-upon safety and environmental protection guidelines, but this organization only covers the portion of the Arctic around Greenland, Svalbard, and Jan Mayen.[77]

Unpredictable Ice Conditions Hinder Trans-Arctic Shipping

Arctic waters do not necessarily have to be ice free to be open to shipping. Multiyear ice can be over 10 feet thick and problematic even for icebreakers, but one-year ice is typically 3 feet thick or less. This thinner ice can be more readily broken up by icebreakers or ice class ships (cargo ships with reinforced hulls and other features for navigating in ice-infested waters). However, more open water in the Arctic has resulted in another potential obstacle to shipping: unpredictable ice flows. In the NWP, melting ice and the opening of waters that were once covered with one-year ice has allowed blocks of multiyear ice from farther north, or icebergs from Greenland, to flow into potential sea lanes. The source of this multiyear ice is not predicted to dissipate in spite of climate change. Moreover, the flow patterns of these ice blocks are very difficult to predict, and they have floated into potential routes for shipping.[78] Thus, the lack of ice in potential sea lanes during the summer months can add even greater unpredictability to Arctic shipping. This is in addition to the extent of ice versus open water, which is also highly variable from one year to the next and seasonally.

The unpredictability of ice conditions is a major hindrance for trans-Arctic shipping in general, but can be more of a concern for some types of ships than it is for others. For instance, it would be less of a concern for cruise ships, which may have the objective of merely visiting the Arctic

[75] "U.S. Needs to Prepare for Arctic Traffic Surge," *Anchorage Daily News*, February 12, 2008, p. A4.

[76] "Northern Waters," *The Globe and Mail* (Canada), August 14, 2008, p. A8.

[77] See http://www.aeco.no/index.htm for more information.

[78] S.E.L. Howell and J.J. Yackel, "A Vessel Transit Assessment of Sea Ice Variability in the Western Arctic, 1969-2002: Implications for Ship Navigation," *Canadian Journal of Remote Sensing*, vol. 30, no. 2, 2004.

rather than passing through and could change their route and itinerary depending on ice conditions. On the other hand, unpredictability is of the utmost concern for container ships that carry thousands of containers from hundreds of different customers, all of whom expect to unload or load their cargo upon the ship's arrival at various ports as indicated on the ship's advertised schedule. The presence of even small blocks of ice or icebergs from a melting Greenland ice sheet requires slow sailing and could play havoc with schedules. Ships carrying a single commodity in bulk from one port to another for just one customer have more flexibility in terms of delivery windows, but would not likely risk an Arctic passage under prevailing conditions.

Ice is not the sole impediment to Arctic shipping. The region frequently experiences adverse weather, including not only severe storms, but also intense cold, which can impair deck machinery. During the summer months when sea lanes are open, heavy fog is common in the Arctic.

Commercial ships would face higher operating costs on Arctic routes than elsewhere. Ship size is an important factor in reducing freight costs. Many ships currently used in other waters would require two icebreakers to break a path wide enough for them to sail through; ship owners could reduce that cost by using smaller vessels in the Arctic, but this would raise the cost per container or per ton of freight.[79] Also, icebreakers or ice-class cargo vessels burn more fuel than ships designed for more temperate waters and would have to sail at slower speeds. The shipping season in the Arctic only lasts for a few weeks, so icebreakers and other special required equipment would sit idle the remainder of the year. None of these impediments by themselves may be enough to discourage Arctic passage but they do raise costs, perhaps enough to negate the savings of a shorter route. Thus, from the perspective of a shipper or a ship owner, shorter via the Arctic does not necessarily mean cheaper and faster.[80]

Basic Navigation Infrastructure Is Lacking

Considerable investment in navigation-related infrastructure would be required if trans-Arctic shipping were to become a reality. Channel marking buoys and other floating visual aids are not possible in Arctic waters because moving ice sheets will continuously shift their positions. Therefore, vessel captains would need to rely on marine surveys and ice charts. For some areas in the Arctic, however, these surveys and charts are out of date and not sufficiently accurate.[81] To remedy this problem, aviation reconnaissance of ice conditions and satellite images would need to become readily available for ship operators.[82] Ship-to-shore communication infrastructure would need to be installed where possible. Refueling stations may be needed, as well as, perhaps, transshipment ports where cargo could be transferred to and from ice-capable vessels at both ends of Arctic routes. Shipping lines would need to develop a larger pool of mariners with ice navigation experience. Marine insurers would need to calculate the proper level of risk premium for polar routes, which would require more detailed information about Arctic accidents and incidents in the past.

[79] "Arctic Unlikely to See Major Shipping Growth," *New Zealand Transport and Logistics Business Week*, April 24, 2008.

[80] Stephen M. Carmel, Senior Vice President, Maersk Line Ltd., "The Cold, Hard Realities of Arctic Shipping," *United States Naval Institute, Proceedings*; July 2013, pp. 38-41.

[81] In July and August 2010, NOAA surveyed the Bering Straits area in order to update its charts but stated that it will take more than 25 years to map the prioritized areas of navigational significance in U.S. Arctic waters. See http://www.noaanews.noaa.gov/stories2010/20100720_fairweather.html.

[82] Ice reporting that currently exists is intended for scientists not mariners.

The U.S. Army Corps of Engineers, along with the state of Alaska, is studying the feasibility of a "deep-draft" port in the Arctic (accommodating ships with a draft of up to 35 feet). The northern and northwestern coastlines of Alaska are exceptionally shallow, generally limiting harbor and near-shore traffic to shallow-draft barges. Coast Guard cutters and icebreakers have drafts of 35 to 40 feet while NOAA research vessels have drafts of 16 to 28 feet, so at present these vessels are based outside the Arctic and must sail considerable distances to reach Arctic duty stations. Supply vessels supporting offshore oil rigs typically have drafts over 20 feet. A deep-draft port could serve as a base of operations for larger vessels, facilitating commercial maritime traffic in the Arctic.[83] The study concluded that the existing harbors of Nome or Port Clarence on Alaska's west coast may be the most suitable for deepening because of their proximity to the Bering Strait and deeper water.[84]

The U.S. Committee on the Marine Transportation System, a Cabinet-level committee of federal agencies with responsibilities for marine transportation, identified and prioritized a list of infrastructure improvements for Arctic navigation in a 2013 report.[85] In the near term (two to three years), it prioritizes improvements to information infrastructure (weather forecasting, nautical charting, ship tracking) and emergency response capabilities for ships in distress.

Regulation of Arctic Shipping

Due to the international nature of the shipping industry, maritime trading nations have adopted international treaties that establish standards for ocean carriers in terms of safety, pollution prevention, and security. These standards are agreed upon by shipping nations through the International Maritime Organization (IMO), a United Nations agency that first met in 1959.[86]

Key conventions that the 168 IMO member nations have adopted include the Safety of Life at Sea Convention (SOLAS), which was originally adopted in response to the *Titanic* disaster in 1912 but has since been revised several times; the Prevention of Pollution from Ships (MARPOL), which was adopted in 1973 and modified in 1978; and the Standards for Training, Certification, and Watchkeeping for Seafarers (SCTW), which was adopted in 1978 and amended in 1995. It is up to ratifying nations to enforce these standards. The United States is a party to these conventions, and the U.S. Coast Guard enforces them when it boards and inspects ships and crews arriving at U.S. ports and the very few ships engaged in international trade that sail under the U.S. flag.

Like the United States, most of the other major maritime trading nations lack the ability to enforce these regulations as a "flag state" because much of the world's merchant fleet is registered under so-called "flags of convenience." While most ship owners and operators are headquartered in developed countries, they often register their ships in Panama, Liberia, the Bahamas, the Marshall Islands, Malta, and Cyprus, among other "open registries," because these nations offer more attractive tax and employment regulatory regimes. Because of this

[83] For further information, see http://www.poa.usace.army.mil/en/cw/AKPortsStudy.htm, and FY2013 USACE Budget Justification, p. POD-5.

[84] *Alaska Deep-Draft Arctic Port System Study,* March 2013; http://www.poa.usace.army.mil/Library/ReportsandStudies/AlaskaRegionalPortsStudy.aspx. The navigation channel at Nome presently ranges from 10 to 20 feet in depth. Much of the harbor at Port Clarence has a natural depth of 35 to 40 feet; http://www.charts.noaa.gov/OnLineViewer/AlaskaViewerTable.shtml.

[85] U.S. Committee on the Marine Transportation System, *U.S. Arctic Marine Transportation System: Overview and Priorities for Action,* 2013; http://www.cmts.gov/downloads/CMTS_Arctic_MTS_Report_Narrative.pdf.

[86] See http://www.imo.org/ for more information.

development, most maritime trading nations enforce shipping regulations under a "port state control" regime—that is, they require compliance with these regulations as a condition of calling at their ports. The fragmented nature of ship ownership and operation can be a further hurdle to regulatory enforcement. It is common for cargo ships to be owned by one company, operated by a second company (which markets the ship's space), and managed by a third (which may supply the crew and other services a ship requires to sail), each of which could be headquartered in different countries.

Arctic Guidelines

While SOLAS and other IMO conventions include provisions regarding the operation of ships in ice-infested waters, they are not specific to the polar regions. To supplement existing requirements, in December 2002, the IMO approved guidelines for ships operating in Arctic ice-covered waters.[87] These were only recommendations for ships operating in the Arctic, not requirements. They apply to passenger and cargo ships of 500 gross tons or more engaged in international voyages. They do not apply to fishing vessels, military vessels, pleasure yachts, and smaller cargo ships. The guidelines are intended to improve safety and prevent pollution in the Arctic, and they include provisions on ship construction, ship equipment related to navigation, and crew training and ship operation. The guidelines recommend that ships carry fully enclosed lifeboats or carry tarpaulins to cover their lifeboats. They recommend that each crew include at least one ice navigator with documented evidence of having completed an ice navigation training program. The IMO is in the process of drafting mandatory requirements for ships operating in the Arctic.[88]

Nations can enforce additional requirements on ships arriving at their ports or sailing through their coastal waters. For instance, U.S. Coast Guard regulations largely follow IMO conventions but mandate additional requirements in some areas. U.S. coastal states can require ships calling at their ports to take additional safety and pollution prevention safeguards. Canada and Russia have additional pollution regulations for Arctic waters exceeding MARPOL. The U.S. Coast Guard is seeking agreement with Russia to establish a vessel traffic separation scheme for the Bering Strait between Alaska and Russia, which now experiences over 300 transits per year.[89]

Oil, Gas, and Mineral Exploration[90]

Decreases in summer polar ice will likely provide more options for exploring for oil and gas in certain offshore areas. More than 1 billion acres and 6,000 miles of coastline offshore of Alaska—more coastline than in the rest of the United States combined—are considered to have potential for energy development. These Arctic regions include the Beaufort and Chukchi Seas, the Bering Sea, Cook Inlet, and the Gulf of Alaska. Despite the warming temperatures, exploration and development in the Arctic are still subject to harsh conditions, especially in winter. This makes it costly and challenging to develop the infrastructure necessary to produce, store, and transport oil,

[87] See MSC/Circ. 1056/MEPC/Circ.399, at http://www.imo.org/.

[88] Edwin H. Anderson, "Polar Shipping, The Forthcoming Polar Code and Implications for the Polar Environments," *Journal of Maritime Law and Commerce*, v. 43, no. 1, January 2012.

[89] The Coast Guard is studying shipping routes through the Bering Strait for possible safety enhancements. See 75 FR 68568, November 8, 2010.

[90] This section prepared by Laura Comay, Analyst in Natural Resources Policy, Resources, Science, and Industry Division; (name redacted), Specialist in Energy and Natural Resources Policy, Resources, Science, and Industry Division; and (name redacted), Analyst in Energy Policy , Resources, Science, and Industry Division.

gas, and minerals from newly discovered deposits. In offshore areas, severe weather poses challenges to several ongoing federally regulated operations and to new exploration.

Shrinking sea ice cover in the Arctic has also intensified interest in surveying and mapping the continental margins of countries with lands in the Arctic. Delineating the extent of the continental margins beyond the 200 nautical mile Exclusive Economic Zone (EEZ) could lead to considering development on substantial amounts of submerged lands.[91] Mapping projects are underway, by individual countries and through cooperative government studies, to support submissions to the Commission on the Limits of the Continental Shelf for areas that may contain large amounts of oil, natural gas, methane hydrates, or minerals.

With respect to onshore energy development, shrinking glaciers could expose land containing economic deposits of gold, iron ore, or other minerals that were previously covered by glacial ice. At the same time, warming that causes permafrost to melt could pose challenges to exploration activities because ground structures, such as pipelines and other infrastructure that depend on footings sunk into the permafrost for support, could become unstable.

Offshore Oil and Gas Exploration

The shrinking Arctic ice cap, or conversely, the growing amount of ice-free ocean in the summertime, has increased interest in exploring for offshore oil and gas in the Arctic. Reduced sea ice in the summer means that ships towing seismic arrays[92] can explore previously inaccessible regions of the Arctic Ocean, Chukchi Sea, Beaufort Sea, and other offshore regions for longer periods of time without as much risk of colliding with floating sea ice. Less sea ice over longer periods compared to previous decades also means that the seasonal window for offshore drilling in the Arctic remains open longer in the summer, increasing the chances for making a discovery.

In addition to the improved access to larger portions of the Arctic afforded by shrinking sea ice, interest in Arctic oil and gas was fueled by a 2008 U.S. Geological Survey (USGS) appraisal of undiscovered oil and gas north of the Arctic Circle.[93] The USGS stated that the "extensive Arctic continental shelves may constitute the geographically largest unexplored prospective area for petroleum remaining on Earth."[94] In the report, the USGS estimated that 90 billion barrels of oil, nearly 1,700 trillion cubic feet of natural gas, and 44 billion barrels of natural gas liquids may remain to be discovered in the Arctic (including both U.S. and international resources north of the Arctic Circle).[95] An article published in *Science* magazine indicated that 30% of the world's undiscovered natural gas and 13% of the world's undiscovered oil may be found north of the

[91] One way of delineating the extent of the continental margins that is currently underway in the region is by the terms of Article 76 of the U.N. Convention on the Law of the Sea (UNCLOS).

[92] A seismic array is typically a long string or streamer of geophones—acoustic devices used for recording seismic signals—towed behind a ship while the ship traverses a prospective oil and gas-bearing portion of the seafloor. The seismic signals are processed and interpreted to give a cross-section or three-dimensional image of the subsurface.

[93] See USGS Circum-Arctic Resource Appraisal website at http://energy.usgs.gov/arctic/.

[94] USGS Fact Sheet 2008-3049, *Circum-Arctic Resource Appraisal: Estimates of Undiscovered Oil and Gas North of the Arctic Circle*, at http://pubs.usgs.gov/fs/2008/3049/. Hereinafter referred to as USGS 2008 Fact Sheet.

[95] The study included "only those resources believed to be recoverable using existing technology, but with the important assumptions for offshore areas that the resources would be recoverable even in the presence of permanent sea ice and oceanic water depth." Further, the report stated: "No economic considerations are included in these initial estimates; results are presented without reference to costs of exploration and development, which will be important in many of the assessed areas." USGS 2008 Fact Sheet, p. 1.

Arctic Circle.[96] In terms of U.S. resources specifically, DOI's Bureau of Ocean Energy Management (BOEM) estimated in 2015 that the Alaska portions of the U.S. outer continental shelf (OCS) contain undiscovered, technically recoverable resources of approximately 27 billion barrels of oil and 131 trillion cubic feet of natural gas (although not all of these resources may be economically viable to recover).[97] A 2015 report by the National Petroleum Council stated that U.S. offshore oil and gas exploration in the Arctic over the next 35 years "would help sustain domestic supplies as production of U.S. shale oil and tight oil may decline."[98]

Despite the warming trend in the Arctic, severe weather and sea ice continue to pose challenges to new exploration, as well as to ongoing federally regulated operations involving six producing wells.[99] Additionally, a discovery of new oil and gas deposits far from existing storage, pipelines, and shipping facilities cannot be developed until infrastructure is built to extract and transport the petroleum.[100]

President Obama and many in Congress have expressed interest in expanding America's ocean energy portfolio in the region.[101] As part of the Administration's strategy to enhance domestic energy production, BOEM approved a five-year offshore oil and gas leasing program for 2012-2017 that contained three lease sales in Alaska planning areas: in the Chukchi Sea (2016), Cook Inlet (2016), and Beaufort Sea (2017).[102] However, in October 2015, BOEM cancelled its scheduled Chukchi and Beaufort Sea lease sales for 2016 and 2017, citing difficult market conditions and low industry interest.[103] BOEM has released a proposed leasing program for 2017-

[96] Donald L. Gautier et al., "Assessment of Undiscovered Oil and Gas in the Arctic," *Science*, vol. 324, no. 5931, pp. 1175-1179 (2009); see also Energy Information Administration, "Today in Energy: Arctic Oil and Natural Gas Resources," January 20, 2012, at http://www.eia.gov/todayinenergy/detail.cfm?id=4650.

[97] Bureau of Ocean Energy Management, *2017-2022 Outer Continental Shelf Oil and Gas Leasing Draft Proposed Program*, January 2015, p. 5-9, at http://www.boem.gov/2017-2022-DPP/. The draft proposed program estimated a range of resources that would be economically recoverable under various oil and gas price points and cost conditions.

[98] National Petroleum Council, *Arctic Potential: Realizing the Promise of U.S. Arctic Oil and Gas Resources*, March 2015, at http://www.npc.org/reports/research.html. The report was commissioned by Secretary of Energy Ernest Moniz.

[99] Bureau of Ocean Energy Management, "BP Exploration (Alaska) (BPXA)—Northstar," at http://www.boem.gov/About-BOEM/BOEM-Regions/Alaska-Region/Leasing-and-Plans/Plans/BP-North-Star.aspx. There are no federally regulated production facilities or pipelines in the Alaska region.

[100] In 2010, Secretary of the Interior Ken Salazar asked the USGS to assess the science needs that would inform the Obama Administration's consideration of how to develop oil and gas resources in the Arctic (DOI press release, "Secretary Salazar Unveils Arctic Studies Initiative That Will Inform Oil and Gas Decisions for Beaufort and Chukchi Seas," April 13, 2010, http://www.doi.gov/news/pressreleases/2010_04_13_releaseA.cfm). The USGS released a report in response that discussed, among other issues, the need for a more refined regional understanding of climate change to inform development scenarios, better oil-spill risk assessment and preparation, and increased collaboration with Native communities and international stakeholders on science issues: U.S. Geological Survey Fact Sheet 2011-3048, *An Evaluation of the Science Needs to Inform Decisions on Outer Continental Shelf Energy Development in the Chukchi and Beaufort Seas*, Alaska, 2011, at http://pubs.usgs.gov/fs/2011/3048/.

[101] For statements of legislative interest, see, for example, Senate Committee on Energy and Natural Resources, *United States Arctic Opportunities Hearing*, 114th Cong., 1st sess., March 5, 2015, at http://www.energy.senate.gov/public/index.cfm/hearings-and-business-meetings?ID=1ecba404-f39d-487f-b6e9-17ba0f4e8f23. For interest by President Obama, see, for example, U.S. President, *National Strategy for the Arctic Region*, May 2013, at https://www.whitehouse.gov/sites/default/files/docs/nat_arctic_strategy.pdf.

[102] Bureau of Ocean Energy Management, *Proposed Final Outer Continental Shelf Oil & Gas Leasing Program, 2012-2017*, June 2012, at http://www.boem.gov/uploadedFiles/BOEM/Oil_and_Gas_Energy_Program/Leasing/Five_Year_Program/2012-2017_Five_Year_Program/PFP%2012-17.pdf.

[103] Department of the Interior, "Interior Department Cancels Arctic Offshore Lease Sales," press release, October 16, 2015, at https://www.doi.gov/pressreleases/interior-department-cancels-arctic-offshore-lease-sales.

2022 that includes three additional Arctic lease sales: in the Beaufort Sea (2020), Cook Inlet (2021), and Chukchi Sea (2022).[104]

Also in 2015, legal issues were resolved concerning a 2008 lease sale for the Chukchi Sea planning area,[105] and BOEM and other federal and state agencies approved Shell Oil Company's multiyear plan for exploratory drilling in this area.[106] Shell began exploratory drilling in summer 2015, but announced in late September 2015 that it would cease further exploration activity in offshore Alaska for the foreseeable future. Shell cited several reasons for the decision to halt its activity in the region, including insufficient indications of oil and gas at its Burger J well, the high costs associated with the project, and the "challenging and unpredictable" federal regulatory environment for offshore Alaska.[107] In May 2016, the environmental group Oceana disclosed BOEM documents showing that companies have relinquished nearly 80% of leases purchased in the 2008 Chukchi Sea auction, in the midst of the slump in oil prices.[108]

The evolving regulatory environment for Arctic offshore activities is shaped by concerns about industry's ability to respond to potential oil spills, given the region's remoteness and harsh conditions. The section of this report on "Oil Pollution Implications of Arctic Change" discusses this issue in greater detail. In February 2015, BOEM and the Bureau of Safety and Environmental Enforcement (BSEE) proposed safety regulations for Arctic exploratory drilling that include multiple requirements for companies to reduce the risks of potential oil spills—for example, the requirement that companies have a separate rig available at drill sites to drill a relief well in case of a loss of well control.[109] Some Members of Congress and industry stakeholders have opposed

[104] Bureau of Ocean Energy Management, *2017-2022 Outer Continental Shelf Oil and Gas Leasing Draft Proposed Program*, January 2015, at http://www.boem.gov/2017-2022-DPP/.

[105] DOI's Oil and Gas Lease Sale 193 in the Chukchi Sea planning area, held in 2008, was the subject of litigation alleging that DOI had not adequately analyzed the sale's potential environmental consequences. For example, the U.S. Court of Appeals for the Ninth Circuit found that BOEM needed to undertake additional analysis of production levels from OCS oil fields that might be discovered in the Chukchi Sea; see http://www.boem.gov/uploadedFiles/BOEM/About_BOEM/BOEM_Regions/Alaska_Region/Leasing_and_Plans/Leasing/Lease_Sales/Sale_193/2014-01-22_9CCoA_193_remand.pdf. In response to court orders, BOEM undertook two further environmental impact statements providing updated analysis of the sale's potential environmental effects; see Bureau of Ocean Energy Management, *Chukchi Sea Planning Area Oil and Gas Lease Sale 193 in the Chukchi Sea: Final Second Supplemental Environmental Impact Statement*, February 2015, available at http://www.boem.gov/ak193/. In March 2015 DOI issued a record of decision affirming the lease sale. For a chronology of the actions concerning Lease Sale 193, see http://www.boem.gov/ak193/.

[106] Bureau of Ocean Energy Management, press release, "BOEM Conditionally Approves Shell's Revised Chukchi Sea Exploration Plan," May 11, 2015, at http://www.boem.gov/press05112015/. Shell also obtained necessary permits and approvals from other state and federal agencies, including permits to drill from the Bureau of Safety and Environmental Enforcement, authorizations from the Fish and Wildlife Service for walrus and polar bear disturbances, and certificates of rig compliance from the Coast Guard, among others.

[107] Royal Dutch Shell, PLC, "Shell Updates on Alaska Exploration," press release, September 28, 2015, at http://www.shell.com/global/aboutshell/media/news-and-media-releases/2015/shell-updates-on-alaska-exploration.html.

[108] The documents were obtained by Oceana under the Freedom of Information Act (5 U.S.C. § 552). See Oceana press release, May 9, 2016, at http://oceana.org/press-center/press-releases/oceana-uncovers-documents-showing-shell-and-conocophillips-have; Oceana fact sheet, May 10, 2016, at http://usa.oceana.org/sites/default/files/732/arctic_ocean_oil_and_gas_leases_fact_sheet_5_10_16_updated.pdf; and Juliet Eilperin, "As Firms Abandon Arctic Drilling, Obama Comes Under Pressure to Do More to Avert Dangerous Warming There," *Washington Post*, May 10, 2016, at https://www.washingtonpost.com/news/energy-environment/wp/2016/05/10/as-oil-and-gas-firms-abandon-arctic-drilling-obama-comes-under-pressure-to-do-more-to-avert-dangerous-warming-there/?postshare=641462900425191&tid=ss_tw.

[109] Department of the Interior, "Requirements for Exploratory Drilling on the Arctic Outer Continental Shelf," 80 *Federal Register* 9915, February 24, 2015.

the proposed regulations as overly prescriptive and unnecessarily burdensome. Other Members and environmental organizations have asserted that the rules do not go far enough in protecting the region from potential environmental damage and addressing the potential contributions of Arctic oil and gas activities to climate change.[110] Such concerns had been exacerbated by Shell's experiences with exploration in the Chukchi and Beaufort Seas during the 2012 drilling season, which included difficulty meeting requirements for containment of potential spills, violations of air emission permits, and an incident in which a drillship ran aground, sparking attention to safety issues.[111] The federal review of Shell's 2012 incidents[112] informed the Arctic exploratory drilling regulations proposed by BOEM and BSEE in 2015.

Concerns about the impacts of oil and gas activities have led in the past to bans by both Congress and the President on leasing in certain Arctic ocean areas deemed especially sensitive.[113] While not affecting all Alaska operations, congressional and presidential moratoriums since the 1980s effectively banned federally regulated planning and permitting in the Bristol Bay area of the North Aleutian Basin. Congress allowed most statutory bans in the region to expire in 2004,[114] but in 2010, President Obama reinstated a moratorium in the North Aleutian Basin, withdrawing acreage located in Bristol Bay from eligibility for oil and gas leasing until after 2017.[115] On December 16, 2014, the President modified this moratorium to indefinitely withdraw the area from disposition for leasing.[116] Pursuant to the ban, gathering geological and geophysical data and other development-related activities are prohibited in Bristol Bay. Additionally, on January 27, 2015, President Obama indefinitely withdrew from leasing disposition the Hanna Shoal region of the Chukchi Sea planning area as well as certain other parts of the Beaufort and Chukchi Seas.[117]

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[110] For differing congressional viewpoints, see U.S. Congress, House Committee on Natural Resources, Subcommittee on Energy and Mineral Resources, hearing on Arctic Resources and American Competitiveness, 114th Cong., 1st sess., June 16, 2015, at http://naturalresources.house.gov/calendar/eventsingle.aspx?EventID=398713.

[111] Shell's drillship *Kulluk* ran aground off the southern coast of Alaska in a storm. The rig was towed to safe harbor, with no serious injuries to the crew.

[112] Department of the Interior, Review of Shell's 2012 Alaska Offshore Oil And Gas Exploration Program, March 8, 2013, at http://www.doi.gov/news/pressreleases/upload/Shell-report-3-8-13-Final.pdf.

[113] Section 12(a) of the Outer Continental Shelf Lands Act (43 U.S.C. § 1341(a)) authorizes the President to, "from time to time, withdraw from disposition any of the unleased lands of the outer Continental Shelf."

[114] FY2004 DOI Appropriations (P.L. 108-108). Furthermore, the Continuing Appropriations Resolution 2009 (P.L. 110-329) did not extend the annual congressional moratorium on oil and gas leasing activities in the lower 48 states. On March 11, 2009, the Omnibus Appropriations Act, 2009 (P.L. 111-8) was enacted without moratorium provisions, confirming that the congressional oil and gas development bans in federal waters along the Atlantic and Pacific coasts, parts of Alaska, and the Gulf of Mexico that had been in place since 1982 had not been restored in 2009 appropriations measures.

[115] Presidential Memorandum, "Withdrawal of Certain Areas of the United States Outer Continental Shelf from Leasing Disposition," March 31, 2010, at http://www.doi.gov/whatwedo/energy/ocs/upload/2010alaska-mem-rel.pdf.

[116] Presidential Memorandum, "Withdrawal of Certain Areas of the United States Outer Continental Shelf from Leasing Disposition," December 16, 2014, at http://www.whitehouse.gov/the-press-office/2014/12/16/presidential-memorandum-withdrawal-certain-areas-united-states-outer-con.

[117] Presidential Memorandum, "Withdrawal of Certain Areas of the United States Outer Continental Shelf Offshore Alaska from Leasing Disposition," January 27, 2015, at http://www.whitehouse.gov/the-press-office/2015/01/27/presidential-memorandum-withdrawal-certain-areas-united-states-outer-con. The withdrawal does not affect valid existing rights under previously existing leases in the withdrawn areas. For example, 10 of the leases sold in BOEM's Lease Sale 193 (see footnote 105) were at least partially in the Hanna Shoal area. Shell's proposed 2015 Arctic exploratory drilling would occur in the Burger prospect, which is near to Hanna Shoal. However, BOEM found that the exploratory drilling, given proposed mitigation measures, would have no significant impact on wildlife activities in Hanna Shoal. See BOEM, *Finding of No Significant Impact: Revised Outer Continental Shelf Lease Exploration Plan EP006, Shell 2015 Chukchi Sea, Alaska*, May 11, 2015, at http://www.boem.gov/uploadedFiles/BOEM/About_BOEM/BOEM_Regions/Alaska_Region/Leasing_and_Plans/Plans/2015-05-11-Shell-FONSI.pdf.

Extent of the Continental Margin

Increased interest in developing offshore resources in the Arctic has sparked efforts by nations bordering the Arctic Ocean to map the extent of their continental margins beyond the 200-mile EEZ limit. As discussed earlier (see "Extended Continental Shelf and United States as a Non-Party to UNCLOS"), under Article 76 of UNCLOS, nations can make a submission to the Commission on the Limits of the Continental Shelf concerning the extent of their continental shelves. Under Article 76, the extent of the continental margin beyond the 200-mile limit depends on the position of the foot of the continental slope, the thickness of sediments, and the depth of water. Also, the continental margin could include geologic features that extend from the continent out to sea, which may include undersea ridges continuing for hundreds of miles offshore.

Arctic border countries have begun the complex investigations needed to support submissions to the Commission on the Limits of the Continental Shelf for an extended continental shelf in the Arctic. Submissions have already been made by several countries, including the Russian Federation, which made its UNCLOS submission to a portion of the Arctic continental shelf in 2001.[118] Russia's submission included the Lomonosov Ridge, an undersea feature spanning the Arctic from Russia to Canada, as an extension of its continental margin. The submission demonstrated Russia's bid to extend activities in Arctic regions. The United States has started to gather and analyze data through an initiative called the Extended Continental Shelf Project.[119] In this effort, the United States is working closely with Canada to prepare and present Canada's submission to the Commission on the Limits of the Continental Shelf.

Canada and the United States share overlapping regions of the seabed as part of the extended continental margin of both nations. Both countries have conducted research singly and jointly to map the extended continental shelf.[120] Consistent with past U.S. directives addressing the extended continental shelf and boundary issues in the Arctic,[121] the Obama Administration has undertaken an initiative to improve the delivery of relevant scientific information to officials responsible for energy development decisions in the Arctic.[122] This initiative is part of a broader response to USGS recommendations that more dialogue and collaborative science planning occur between and among the scientific community and federal agencies involved in Arctic oil and gas development decisions.[123] These USGS recommendations stem from earlier USGS findings that most of the potential oil and gas resources estimated for the Arctic are likely to exist within

[118] Tony Halpin, "President Medvedev Threatens Russian Arctic Annexation," *Times Online* (September 18, 2008), at http://www.timesonline.co.uk/tol/news/world/europe/article4773567.ece.

[119] The purpose of the U.S. Extended Continental Shelf Project is to establish the full extent of the continental shelf of the United States, consistent with international law. Involved in this mission are the U.S. Coast Guard (USCG), Department of State (DOS), and the University of New Hampshire (UNH). NOAA has the lead in collecting bathymetric data. The U.S. Geological Survey has the lead in collecting seismic data. For more information, see the project's website at http://www.continentalshelf.gov/.

[120] See U.S. Extended Continental Shelf Project at http://www.continentalshelf.gov/.

[121] A prominent directive issued by the Bush Administration addressed, among other issues, national security and maritime transportation. National Security Presidential Directive/NSPD-66 and Homeland Security Presidential Directive/HSPD-25, at http://www.whitehouse.gov/news/releases/2009/01/20090112-3.html.

[122] This initiative is part of an effort Arctic Research Commission Chairman Fran Ulmer began in December 2011. For a full discussion of this initiative see "Obama Administration Outlines Arctic Energy Policy Initiatives," *Oil and Gas Journal* **(**February 7, 2012), at http://www.ogj.com/articles/2012/02/obama-administration-outlines-arctic-energy-policy-initiatives.html.

[123] Leslie Holland-Bartels and Brenda Pierce, eds., *An evaluation of the science needs to inform decisions on Outer Continental Shelf energy development in the Chukchi and Beaufort Seas, Alaska*, U.S. Geological Survey Circular 1370 (2011). This report is available at http://pubs.usgs.gov/circ/1370/.

already agreed-upon territorial boundaries.[124] (For further discussion, see "Extended Continental Shelf Submissions, Territorial Disputes, and Sovereignty Issues.")

Onshore Mineral Development

A warming Arctic means new opportunities and challenges for mineral exploration and development onshore. Receding glaciers expose previously ice-covered land that could host economic mineral deposits that were previously undetectable and un-mineable below the ice. Longer summers would also extend exploration seasons for areas that are not currently ice-covered but are only accessible for ground surveys during the warmer months. In some parts of the Arctic, such as Baffin Island, Canada, less sea ice allows ships to transport heavy equipment to remote locations, and to convey ore from mines to the market further south. Some railway and mining operators are considering developing railroads and other infrastructure to transport ore year-round.[125] As with onshore oil and gas development, however, mining infrastructure that depends on footings sunk into permafrost could become unstable if the permafrost melts in response to warmer temperatures. Also, as with oil and gas development, mineral deposits that may be technically recoverable with current technology may not be economically profitable.

Some industry commentators suggest that mining might offer better long-term economic development opportunities compared to oil and gas development because of a larger permanent workforce and project lifelines of several decades.[126] Similar to oil and gas, however, industry observers note that uncertainties and knowledge gaps exist in the understanding of environmental change in the Arctic, and how to deal with the risks of significant Arctic industrial activity.[127]

One important part of the current infrastructure in the Arctic that supports oil, gas, and mineral development is the construction and use of ice roads—built and used during the winter—but which are not passable during the warmer months. Warmer temperatures are shortening the ice road transport seasons and creating transportation challenges. For example, the opening date for tundra roads in northern Alaska usually occurred in early November prior to 1991 and has shifted to January in recent years.[128]

Oil Pollution and Pollution Response[129]

Oil Pollution Implications of Arctic Change

Climate change impacts in the Arctic, particularly the decline of sea ice and retreating glaciers, have stimulated human activities in the region, many of which have the potential to create oil

[124] Don Gautier, Research Geologist, USGS, quoted in "Countries in Tug-of-War Over Arctic Resources," CNN.com, January 2, 2009, at http://www.cnn.com/2009/TECH/science/01/02/arctic.rights.dispute/index.html?iref=newssearch.

[125] Carolyn Fitzpatrick, "Heavy Haul in the High North," *Railway Gazette International* (July 24, 2008), at http://www.railwaygazette.com/news/single-view/view/10/heavy-haul-in-the-high-north.html.

[126] Cecelia Jamasmie, "Melting Arctic is nothing but good news for the mining industry: Lloyd's/Chatham House," Mining.com, April 13, 2012, at http://www.mining.com/melting-arctic-is-nothing-but-good-news-for-the-mining-industry-lloydschatam-house/.

[127] Charles Emmerson and Glada Lahn, *Arctic Opening: Opportunity and Risk in the High North*, Chatham House, 2012, at https://www.chathamhouse.org/publications/papers/view/182839.

[128] See National Oceanic and Atmospheric Administration, "Arctic Change," at http://www.arctic.noaa.gov/detect/land-road.shtml?page=land.

[129] This section prepared by (name redacted), Specialist in Environmental Policy, Resources, Science, and Industry Division.

pollution. A primary concern is the threat of a large oil spill in the area. Although a major oil spill has not occurred in the Arctic region,[130] recent economic activity, such as oil and gas exploration and tourism (cruise ships), increases the risk of oil pollution (and other kinds of pollution) in the Arctic. Significant spills in high northern latitudes (e.g., the 1989 *Exxon Valdez* spill in Alaska and spills in the North Sea) suggest that the "potential impacts of an Arctic spill are likely to be severe for Arctic species and ecosystems."[131]

Risk of Oil Pollution in the Arctic

A primary factor determining the risk of oil pollution in the Arctic is the level and type of human activity being conducted in the region. Although climate changes in the Arctic are expected to increase access to natural resources and shipping lanes, the region will continue to present logistical challenges that may hinder human activity in the region. For example (as discussed in another section of this report),[132] the unpredictable ice conditions may discourage trans-Arctic shipping. If trans-Arctic shipping were to occur on a frequent basis, it would represent a considerable portion of the overall risk of oil pollution in the region. In recent decades, many of the world's largest oil spills have been from oil tankers, which can carry millions of gallons of oil.[133]

Although the level of trans-Arctic shipping is uncertain, many expect oil exploration and extraction activities to intensify in the region.[134] Oil well blowouts from offshore oil extraction operations have been a source of major oil spills, eclipsing the largest tanker spills. The largest unintentional oil spill in recent history was from the 2010 *Deepwater Horizon* incident in the Gulf of Mexico.[135] During that incident, the uncontrolled well released (over an 87-day period) approximately 200 million gallons of crude oil.[136] The second-largest unintentional oil spill in recent history—the *IXTOC I*, estimated at 140 million gallons—was due to an oil well blowout in Mexican Gulf Coast waters in 1979.[137]

Until the 2010 *Deepwater Horizon* incident, the spill record for offshore platforms in U.S. federal waters had shown improvement from prior years.[138] A 2003 National Research Council (NRC)

[130] Arctic Council, Emergency Prevention, Preparedness and Response Working Group, *Guide to Oil Spill Response in Snow and Ice Conditions*, 2015, at https://oaarchive.arctic-council.org/handle/11374/403.

[131] Arctic Monitoring and Assessment Programme (AMAP), Arctic Oil and Gas 2007 (2008).

[132] See this report's section "Implications for Sea Transportation," by (name redacted).

[133] For example, the *Exxon Valdez* spilled approximately 11 million gallons of oil, but its carrying capacity was approximately 60 million gallons.

[134] See this report's section "Implication of Changes in the Arctic for Oil, Gas, and Mineral Exploration and Development," by (name redacted) and (name redacted).

[135] Larger oil spills occurred during the 1991 Iraq War, but many of those spills were deliberate. A 1910-1911 onshore oil blowout in the California San Joaquin Valley is reported to have spilled 9.4 million barrels of crude oil (almost 400 million gallons).

[136] An estimated 17% of this oil did not enter the Gulf environment but was directly recovered from the wellhead by the responsible party (British Petroleum, BP). See the Federal Interagency Solutions Group, Oil Budget Calculator Science and Engineering Team, *Oil Budget Calculator: Deepwater Horizon-Technical Documentation*, November 2010; and CRS Report R42942, *Deepwater Horizon Oil Spill: Recent Activities and Ongoing Developments*, by (name redacted) .

[137] National Research Council (NRC) of the National Academies of Science, *Oil in the Sea III: Inputs, Fates, and Effects* (2003).

[138] See CRS Report RL33705, *Oil Spills: Background and Governance*, by (name redacted) ; and Dagmar Etkin (Environmental Research Consulting), Analysis of U.S. Oil Spillage, Prepared for American Petroleum Institute, August 2009.

study of oil and gas activities on Alaska's North Slope stated "blowouts that result in large spills are unlikely."[139] Similar conclusions were made in federal agency documents regarding deepwater drilling in the Gulf of Mexico before the 2010 *Deepwater Horizon* event.[140] Some would likely contend that the underlying analyses behind these conclusions should be adjusted to account for the 2010 Gulf oil spill. However, others may argue that the proposed activities in U.S. Arctic waters present less risk of an oil well blowout than was encountered by the *Deepwater Horizon* drill rig, because the proposed U.S. Arctic operations would be in shallower waters (150 feet) than the deepwater well (approximately 5,000 feet) that was involved in the 2010 Gulf oil spill. In addition, Shell Oil has stated that the pressures in the Chukchi Sea (the location of Shell's recent interest) would be two to three times less than they were in well involved in the 2010 Gulf oil spill.[141] Regardless of these differences, even under the most stringent control systems, some oil spills and other accidents are likely to occur from equipment failure or human error.

Potential Impacts

No oil spill is entirely benign. Even a relatively minor spill, depending on the timing and location, can cause significant harm to individual organisms and entire populations. Regarding aquatic spills, marine mammals, birds, bottom-dwelling and intertidal species, and organisms in early developmental stages—eggs or larvae—are especially vulnerable. However, the effects of oil spills can vary greatly. Oil spills can cause impacts over a range of time scales, from only a few days to several years, or even decades in some cases.

Conditions in the Arctic may have implications for toxicological effects that are not yet understood. For example, oil spills on permafrost may persist in an ecosystem for relatively long periods of time, potentially harming plant life through their root systems. Moreover, little is known about the effects of oil spills on species that are unique to the Arctic, particularly, species' abilities to thrive in a cold environment and the effect temperature has on toxicity.[142]

The effects of oil spills in high-latitude, cold-ocean environments may last longer and cause greater damage than expected. Some recent studies have found that oil spills in lower latitudes have persisted for longer than initially expected, thus raising the concern that the persistence of oil in the Arctic may be understated. In terms of wildlife, population recovery may take longer in the Arctic because many of the species have longer life spans and reproduce at a slower rate.[143]

Response and Cleanup Challenges in the Arctic Region

Climate changes in the Arctic are expected to increase human activities in the region, many of which impose a risk of oil pollution, particularly from oil spills. Conditions in the Arctic region impose unique challenges for personnel charged with (1) oil spill response, the process of getting people and equipment to the incident, and (2) cleanup duties, either recovering the spilled oil or

[139] National Research Council of the National Academies of Science, *Cumulative Environmental Effects of Oil and Gas Activities on Alaska's North Slope* (2003).

[140] See, for example, Minerals Management Service (MMS), Outer Continental Shelf Oil & Gas Leasing Program: 2007-2012, Final Environmental Impact Statement, April 2007, Chapter 4; MMS, Proposed Gulf of Mexico OCS Oil and Gas Lease Sale 206, Central Planning Area, Environmental Assessment, October 2007.

[141] Letter from Marvin E. Odum, President, Shell Oil Company to S. Elizabeth Birnbaum, Minerals Management Service (May 14, 2010). Cited in a staff paper from the National Commission on the BP Deepwater Horizon Oil Spill and Offshore Drilling ("The Challenges of Oil Spill Response in the Arctic," January 2011).

[142] AMAP, *Arctic Oil and Gas 2007 (2008).*

[143] AMAP, *Arctic Oil and Gas 2007* (2008).

mitigating the contamination so that it poses less harm to the ecosystem. These challenges may play a role in the policy development for economic activities in the Arctic.

Spill Response Challenges

Response time is a critical factor for oil spill recovery. With each hour, spilled oil becomes more difficult to track, contain, and recover, particularly in icy conditions, where oil can migrate under or mix with surrounding ice.[144] Most response techniques call for quick action, which may pose logistical challenges in areas without prior staging equipment or trained response professionals. Many stakeholders are concerned about a "response gap" for oil spills in the Arctic region.[145] A response gap is a period of time in which oil spill response activities would be unsafe or infeasible. The response gap for the northern Arctic latitudes is likely to be extremely high compared to other regions.[146]

According to a 2014 National Research Council (NRC) report, "the lack of infrastructure in the Arctic would be a significant liability in the event of a large oil."[147] The Coast Guard has no designated air stations north of Kodiak, AK, which is almost 1,000 miles from the northernmost point of land along the Alaskan coast in Point Barrow, AK.[148] Although some of the communities have airstrips capable of landing cargo planes, no roads connect these communities.[149] Vessel infrastructure is also limited. The nearest major port is in the Aleutian Islands, approximately 1,300 miles from Point Barrow. Two of the major non-mechanical recovery methods—in situ burning and dispersant application—may be limited (or "precluded") by the Arctic conditions and lack of logistical support: aircraft, vessels, and other infrastructure.[150]

A 2010 Government Accountability Office (GAO) report identified further logistical obstacles that would hinder an oil spill response in the region, including "inadequate" ocean and weather information for the Arctic and technological problems with communications.[151] A 2014 GAO report highlighted steps taken by some groups (e.g., the National Oceanic and Atmospheric Administration) to improve some of these logistical elements.[152]

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[144] World Wildlife Fund, *Oil Spill: Response Challenges in Arctic Waters* (2007).

[145] Coastal Response Research Center, *Opening the Arctic Seas: Envisioning Disasters and Framing Solutions* (2009), partnership between the National Oceanic and Atmospheric Administration and the University of New Hampshire.

[146] Although the response gap in the Arctic has not been quantified, a recent estimate of Prince William Sound (PWS) may be instructive. A 2007 study found a response gap for PWS of 38% for the time of the study period (65% during the winter season). Note that PWS has existing infrastructure for response, while the more remote Arctic areas do not. Nuka Research and Planning Group, LLC, *Response Gap Estimate for Two Operating Areas in Prince William Sound, Alaska* (2007), Report to Prince William Sound Regional Citizens' Advisory Council.

[147] National Research Council (NRC) of the National Academies of Science, *Responding to Oil Spills in the U.S. Arctic Marine Environment*, 2014.

[148] U.S. Coast Guard, *Report to Congress: U.S. Coast Guard Polar Operations*, December 2008.

[149] A single road connects Deadhorse, Alaska and the Prudhoe Bay with central Alaska (Fairbanks). For more details and maps of the area, see Nuka Research and Planning Group, *Oil Spill Prevention and Response in the U.S. Arctic Ocean: Unexamined Risks, Unacceptable Consequences*, Commissioned by Pew Environment Group, November 2010.

[150] World Wildlife Fund, Oil Spill: Response Challenges in Arctic Waters (2007). For further discussion of issues relating to oil spills, see CRS Report RL33705, *Oil Spills: Background and Governance*, by (name redacted) .

[151] Government Accountability Office, *Coast Guard: Efforts to Identify Arctic Requirements Are Ongoing, but More Communication about Agency Planning Efforts Would Be Beneficial*, GAO-10-870, September 2010.

[152] Government Accountability Office, *Key Issues Related to Commercial Activity in the U.S. Arctic over the Next Decade*, GAO-14-299, March 2014.

Oil Spill Cleanup Challenges

The history of oil spill response in the Aleutian Islands highlights the challenges and concerns for potential spills in the Arctic region:

> The past 20 years of data on response to spills in the Aleutians has also shown that almost no oil has been recovered during events where attempts have been made by the responsible parties or government agencies, and that in many cases, weather and other conditions have prevented any response at all.[153]

The behavior of oil spills in cold and icy waters is not as well understood as oil spills in more temperate climates.[154] The 2014 NRC report highlights some recent advancements in understanding oil spill behavior in arctic climates. At the same time, the report recommends further study in multiple areas.

The 2014 NRC report states that in colder water temperatures or sea ice, "the processes that control oil weathering—such as spreading, evaporation, photo-oxidation, emulsification, and natural dispersion—are slowed down or eliminated for extended periods of time."[155] In some respects, the slower weathering processes may provide more time for response strategies, such as in situ burning or skimming. On the other hand, the longer the oil remains in an ecosystem, the more opportunity there is for exposure.

In addition, the 2014 report states:

> Arctic conditions impose many challenges for oil spill response—low temperatures and extended periods of darkness in the winter, oil that is encapsulated under ice or trapped in ridges and leads, oil spreading due to sea ice drift and surface currents, reduced effectiveness of conventional containment and recovery systems in measurable ice concentrations, and issues of life and safety of responders.

Existing Policy Framework

Considering both the recent increase in human activity in the region (and expectation of further interest) and the response and recovery challenges that an oil spill would impose in Arctic waters, many would assert that the region warrants particular attention in terms of governance. However, the existing framework for international governance of maritime operations in the Arctic region lacks legally binding requirements. While the Safety of Life at Sea Convention (SOLAS) and other International Maritime Organization (IMO) conventions include provisions regarding ships in icy waters, the provisions are not specific to the polar regions. Although the IMO has "Guidelines for Ships Operating in Arctic," a 2009 NOAA report described the non-binding IMO provisions as "inconsistent with the hazards of Arctic navigation and the potential for environmental damage from such an incident."[156]

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[153] Transportation Research Board of the National Academy of Sciences, *Risk of Vessel Accidents and Spills in the Aleutian Islands: Designing a Comprehensive Risk Assessment* (2008), Special Report 293, National Academies Press. Washington, DC.

[154] National Research Council (NRC) of the National Academies of Science, *Responding to Oil Spills in the U.S. Arctic Marine Environment*, 2014.

[155] National Research Council (NRC) of the National Academies of Science, *Responding to Oil Spills in the U.S. Arctic Marine Environment*, 2014.

[156] Coastal Response Research Center, *Opening the Arctic Seas: Envisioning Disasters and Framing Solutions*, (2009), partnership between the National Oceanic and Atmospheric Administration and the University of New Hampshire.

In 2013, the member states of the Arctic Council signed an Agreement on Cooperation on Marine Oil Pollution Preparedness and Response in the Arctic.[157] The agreement's objective is to "strengthen cooperation, coordination, and mutual assistance ... on oil pollution preparedness and response in the Arctic."

In addition, the United States has separate bilateral agreements with Canada and Russia that address oil spill response operations. The agreement with Canada was established in 1974 for the Great Lakes and has been amended several times to add more geographic areas, including Arctic waters. According to the 2014 NRC report: "Formal contingency planning and exercises with Canada have enabled both the United States and Canada to refine procedures and legal requirements for cross-border movement of technical experts and equipment in the event of an emergency."

The U.S.-Russian agreement was made in 1989 and applies to oil spills in Arctic waters. However, the 2014 NRC report asserts that the agreement has not been tested to the same extent as the U.S.-Canada agreement.

Fisheries[158]

The effects of climate change such as increasing sea surface temperatures and decreasing permanent sea ice are altering the composition of marine ecosystems in the Arctic. These changes are likely to affect the ranges and productivity of living marine resources including species that support marine fisheries. Furthermore, as a greater portion of the waters in the central Arctic Ocean become open for longer periods, the region's resources will become more accessible to commercial fishing. Large commercial fisheries already exist in the Arctic, including in the Barents and Norwegian Seas north of Europe, the Central North Atlantic off Greenland and Iceland, the Bering Sea off Russia and the United States (Alaska), and the Newfoundland and Labrador Seas off northeastern Canada.[159] As environmental changes occur, fisheries managers will be challenged to adjust management measures for existing fisheries. Uncertainties related to these changes and potential new fisheries in the central Arctic Ocean have prompted many fishery managers to support precautionary approaches to fisheries management in the region.

On June 1, 2008, Congress passed a joint resolution (P.L. 110-243) that directed "the United States to initiate international discussions and take necessary steps with other nations to negotiate an agreement for managing migratory and transboundary fish stocks in the Arctic Ocean." The joint resolution also supported establishment of a new international fisheries management organization or organizations for the region. International cooperation is necessary to manage Arctic resources because fish stocks are shared to some degree among the five adjacent jurisdictional zones of the Arctic rim nations. Further, a large portion of the central Arctic Ocean lies outside the Exclusive Economic Zones (EEZ) of these nations. Ideally, regional management would recognize the need to coordinate management for those fish populations that move among these national jurisdictional zones and high seas.

For waters under U.S. jurisdiction, in 2009, the National Marine Fisheries Service in the Department of Commerce's National Oceanic and Atmospheric Administration implemented the

[157] Available at http://www.arctic-council.org.

[158] This section was prepared by Harold Upton, Analyst in Natural Resources Policy, Resources, Science, and Industry Division.

[159] Erik J. Molenaar and Robert Corell, *Arctic Fisheries*, Arctic Transform, February 9, 2009; available at http://arctic-transform.org/download/FishBP.pdf.

North Pacific Council's Fishery Management Plan for Fish Resources of the Arctic Management Area.[160] The management area includes marine waters in the U.S. EEZ of the Chukchi and Beaufort Seas.[161] The plan initially prohibits commercial fishing in the Arctic Management Area and moves the northern boundary of the Bering Sea/Aleutian Islands king and tanner crab fishery management plan out of the Arctic Management Area south to the Bering Strait. The plan takes a precautionary approach by requiring the collection of more information before developing commercial fisheries in the region.

On July 16, 2015, the five nations that surround the Arctic Ocean signed a declaration to prevent unregulated commercial fishing in the high seas portion of the central Arctic Ocean.[162] The five nations agree that a precautionary approach to fishing is needed because there is limited scientific knowledge of marine resources in the region. Currently, there is no commercial fishing in central Arctic Ocean and it is questionable whether existing fisheries resources could sustain a fishery. The declaration includes the following interim measures:

- to authorize our vessels to conduct commercial fishing in the high seas area only pursuant to one or more marine regional or subregional fisheries management organizations or arrangements that are or may be established to manage such fishing in accordance with recognized international standards;
- to establish a joint program of scientific research with the aim of improving understanding of the ecosystems of this area and promote cooperation with relevant scientific bodies;
- to promote compliance with these interim measures and with relevant international law, including by coordinating our monitoring, control, and surveillance activities in this area; and
- to ensure that any non-commercial fishing in this area does not undermine the purpose of the interim measures, is based on scientific advice and is monitored, and that data obtained through any such fishing is shared.

The declaration also recognizes the interests of indigenous peoples and the need to encourage other countries to take actions that are consistent with the interim measures. It appears that future management arrangements may include China, the EU, Iceland, Japan, and South Korea. Iceland has stated it regrets that although it has repeatedly asked to participate in the collaboration, the five states decided to keep Iceland outside consultations on the declaration.[163] It remains an open question as to whether an Arctic Ocean regional fishery management organization will be established, which countries would be included in such an arrangement, and if commercial fisheries will be developed in the central Arctic Ocean.

[160] 74 *Federal Register* 56734-56746, November 3, 2009.

[161] The state of Alaska has jurisdiction over waters from 0-3 nautical miles from the baseline. The baseline generally follows the shoreline.

[162] The five nations include Canada, Denmark, Norway, the Russian Federation, and the United States. See https://www.regjeringen.no/globalassets/departementene/ud/vedlegg/folkerett/declaration-on-arctic-fisheries-16-july-2015.pdf.

[163] Ministry of Foreign Affairs, Iceland, "The Position of Iceland on the Consultation on Arctic Fishing," press release, July 24, 2015, http://arcticportal.org/library/press-releases/1524-the-position-of-iceland-on-the-consultation-on-arctic-fishing.

Protected Species[164]

Concern over development of the Arctic relates to how such development might affect threatened and endangered species. Under the Endangered Species Act (ESA, 16 U.S.C. §§1531-1543), the polar bear was listed as threatened on May 15, 2008. The failure by the Fish and Wildlife Service (FWS) to make a 90-day finding on a 2008 petition to list Pacific walrus led to submission of 60-days' notice of a future citizen suit. However, eventually walruses were listed as candidate species under ESA;[165] this status means that federal agencies carrying out actions that may affect the species must confer with FWS though they are not necessarily obliged to modify their actions. Both polar bears and walruses are heavily dependent during their life cycles on thick sea ice, making them especially susceptible to the shrinking Arctic ice cap.

On December 30, 2008, the National Marine Fisheries Service (NMFS) determined that a listing of ribbon seal as threatened or endangered was not warranted.[166] On October 22, 2010, NMFS listed the southern distinct population segment (DPS) of spotted seals as threatened.[167] Listing of two other DPS (Okhotsk and Bering Sea) had earlier been determined to not be warranted.[168] On December 10, 2010, NMFS proposed that (1) four subspecies of ringed seal be listed as threatened,[169] and (2) that two DPS of one subspecies of bearded seal be listed as threatened.[170]

In either terrestrial or marine environments, the extreme pace of change makes a biological response many times more difficult. For species with adaptations for a specific optimum temperature for egg development, or production of young timed to match the availability of a favored prey species, or seed dispersal in predictable fire regimes, etc., evolutionary responses may well not keep pace with the rate of change.[171] While species of plants and animals farther south might migrate, drift, or be transplanted from warming habitats to more northerly sites that may continue to be suitable,[172] once a terrestrial species reaches the Arctic Ocean, it is very literally at the end of the line. No more northern or colder habitat is available.

The Marine Mammal Protection Act (MMPA; 16 U.S.C. §§1361 et seq.) protects whales, seals, walruses, and polar bears. The MMPA established a moratorium on the "taking" of marine mammals in U.S. waters and by U.S. nationals on the high seas, including the Arctic. The MMPA

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[164] Prepared by (name redacted) and Eugene Buck, Specialist in Natural Resources Policy, Resources, Science, and Industry Division.

[165] Fish and Wildlife Service, "Endangered and Threatened Wildlife and Plants; Review of Native Species That Are Candidates for Listing as Endangered or Threatened; Annual Notice of Findings on Resubmitted Petitions; Annual Description of Progress on Listing Actions; Proposed Rule," 76 *Federal Register* 66370-66439, October 26, 2001.

[166] 73 *Federal Register* 79822-79828.

[167] 75 *Federal Register* 65239-65248.

[168] 74 *Federal Register* 53683-58696, October 20, 2009.

[169] 75 *Federal Register* 77476-77495.

[170] 75 *Federal Register* 77496-77515.

[171] Among biologists, it is traditionally said that a species faced with extreme change can respond in three basic ways: "migrate, mutate, or die." When change is rapid enough, mutation (accompanied by natural selection of individuals within the population more suited to the changed environment) may not be able to occur fast enough, leaving migration and death as the only options. The problem of response rate is more severe for species that reproduce slowly (e.g., polar bears) and less severe for species that reproduce rapidly (e.g., algae).

[172] The efficacy and the effect of this tactic is often questioned, since natural migration is unlikely to involve the entire suite of species in an ecosystem (e.g., host plants might not move north (or up) as fast as their moth herbivores, nor as fast as the birds that depend on the moths). Moreover, the southerners will not find a land of sterile bare dirt—the species that are already there may be threatened themselves by the competition from the new arrivals, perhaps tipping the balance and pushing still more species toward extinction.

protects marine mammals from "clubbing, mutilation, poisoning, capture in nets, and other human actions that lead to extinction." Under the MMPA, the Secretary of Commerce, acting through National Marine Fisheries Service, is responsible for the conservation and management of whales and seals. The Secretary of the Interior, acting through the Fish and Wildlife Service, is responsible for walruses and polar bears.[173] Despite the MMPA's general moratorium on taking, the MMPA allows U.S. citizens to apply for and obtain authorization for taking small numbers of mammals incidental to activities other than commercial fishing (e.g., offshore oil and gas exploration and development) if the taking would have only a negligible impact on any marine mammal species or stock, provided that monitoring requirements and other conditions are met.

Indigenous People Living in the Arctic[174]

People have been living in the Arctic for thousands of years, and indigenous peoples developed highly specialized cultures and economies based on the physical and biological conditions of the long-isolated region. However, with trade, the influx of additional populations especially since the 19th century, and ongoing physical changes in the Arctic, indigenous populations have already experienced substantial change in their lifestyles and economies. Over the past two decades, greater political organization across indigenous populations has increased their demands for international recognition and broader rights, as well as attention to the economic, health, and safety implications of climate change in the North.

Background

Seven of the eight Arctic nations have indigenous peoples,[175] whose predecessors were present in parts of the Arctic over 10,000 years ago, well before the arrival of peoples with European backgrounds.[176] Current Arctic indigenous peoples comprise dozens of diverse cultures and speak dozens of languages from eight or more non-Indo-European language families.[177]

Before the arrival of Europeans, Arctic indigenous peoples lived in economies that were chiefly dependent, in varying proportions, on hunting land and marine mammals, catching salt- and fresh-water fish, herding reindeer (in Eurasia), and gathering, for their food, clothing, and other products.[178] Indigenous peoples' interaction with and knowledge of Arctic wildlife and environments has developed over millennia and is the foundation of their cultures.[179]

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[173] Under the MMPA, both NMFS and FWS have responsibility for additional marine mammal species (e.g., manatees, sea otters, dolphins) which are not currently found in the Arctic.

[174] This section was originally prepared by (name redacted), who was a Specialist in American Indian Policy, Domestic Social Policy Division, until his retirement from CRS in October 2010. It has been updated by (name redacted), Specialist in Environmental and Energy Policy in CRS's Resources, Science and Industry Division.

[175] *Arctic Human Development Report*, ed. Joan Nymand Larsen et al. (Akureyri, Iceland: Stefansson Arctic Institute, 2004), p. 47; this report is subsequently cited in this section as *AHDR*. The seven countries are Canada, Denmark-Greenland, Finland, Norway, Russia, Sweden, and the United States.

[176] John F. Hoffecker, *A Prehistory of the North: Human Settlement of the Higher Latitudes* (New Brunswick, NJ: Rutgers University Press, 2005), pp. 8, 81, 112-115.

[177] *AHDR*, pp. 47, 53; David Crystal, *Cambridge Encyclopedia of Language*, 2nd ed. (Cambridge: Cambridge University Press, 1997), chap. 50; *Ethnologue: Languages of the World*, 16th ed., ed. M. Paul Lewis (Dallas: SIL International, 2009), available at http://www.ethnologue.com/. The number of languages and language families varies not only with definitions of the Arctic but with definitions of languages and language families.

[178] Jim Berner et al., *Arctic Climate Impact Assessment* (Cambridge: Cambridge University Press, 2005), chapter 12; this report is subsequently cited in this section as *ACIA*.

[179] *ACIA*, pp. 654-655.

The length of time that Arctic indigenous peoples were in contact with Europeans varied across the Arctic. As recorded by Europeans, contact began as early as the 9th century CE, if not before, in Fennoscandia[180] and northwestern Russia, chiefly for reasons of commerce (especially furs); it progressed mostly west-to-east across northern Asia, reaching northeastern Arctic Asia by the 17th century.[181] North American Arctic indigenous peoples' contact with Europeans started in Labrador in the 16th century and in Alaska in the 18th century, and was not completed until the early 20th century.[182] Greenland's indigenous peoples first saw European-origin peoples in the late 10th century, but those Europeans died out during the 15th or 16th century and Europeans did not return permanently until the 18th century.[183]

Contact led to significant changes in Arctic indigenous economies, political structures, foods, cultures, and populations, starting especially in the 20th century. For example, life expectancy among Alaska Natives has increased from 47 years in 1950 to over 69 years in 2000 (though it still lags behind that of U.S. residents overall, at 77 years).[184]

Also, at present, most Arctic indigenous peoples have become minorities in their countries' Arctic areas, except in Greenland and Canada. (One source estimates that, around 2003, about 10% of an estimated 3.7 million people in the Arctic were indigenous.[185]) While many Arctic indigenous communities remain heavily dependent on hunting, fishing, and herding and are more likely to depend on traditional foods than non-indigenous Arctic inhabitants,[186] there is much variation. Most Arctic indigenous people may no longer consume traditional foods as their chief sources of energy and nutrition.[187] Major economic change is also relatively recent but ongoing.[188] Many Arctic indigenous communities have developed a mixture of traditional economic activities and

[180] Fennoscandia refers to the Scandinavian Peninsula, Finland, the Kola Peninsula of Russia, and certain parts of Russia bordering on Finland.

[181] Janet Martin, *Treasure in the Land of Darkness: The Fur Trade and Its Significance for Medieval Russia* (Cambridge: Cambridge University Press, 1986), pp. 41-42; James Forsyth, *A History of the Peoples of Siberia: Russia's North Asian Colony, 1581-1990* (Cambridge: Cambridge University Press, 1992), pp. 69-83, 102; Lassi K. Heininen, "Different Images of the Arctic and the Circumpolar North in World Politics," in *Knowledge and Power in the Arctic*, Proceedings at a Conference in Rovaniemi, April 16-18, 2007, Arctic Centre Reports 48, ed. Paula Kankaanpaa et al. (Rovaniemi, Finland: University of Lapland, Arctic Centre, 2007), p. 125.

[182] James W. VanStone, "Exploration and Contact History of Western Alaska," and David Damas, "Copper Eskimo," and J. Garth Taylor, "Historical Ethnography of the Labrador Coast," in *Handbook of North American Indian: Vol. 5, Arctic*, vol. ed. David Damas, gen. ed. William C. Sturtevant (Washington: Smithsonian, 1984), pp. 149-155, 408, 509-510.

[183] Inge Kleivan, "History of Norse Greenland," in *Handbook, Vol. 5, Arctic, op. cit.*, pp. 549-555; Finn Gad, "Danish Greenland Policies," in *Handbook of North American Indians: Vol. 4, History of Indian-White Relations*, vol. ed. Wilcomb E. Washburn, gen. ed. William C. Sturtevant (Washington: Smithsonian, 1988), p. 110.

[184] Parkinson, Alan J. The Arctic Human Health Initiative. Washington, DC: U.S. Department of Health and Human Services, 2006.

[185] *AHDR*, pp. 19, 29. Estimates of Arctic indigenous populations are complicated by varying definitions not only of the Arctic but also of indigenous peoples; for instance, Russia does not count some non-European Arctic ethnic groups, such as the Yakut, as "indigenous minorities" (see "Peoples of the Arctic: Characteristics of Human Populations Relevant to Pollution Issues," in *AMAP Assessment Report: Arctic Pollution Issues*, ed. Simon J. Wilson et al. (Oslo: Arctic Monitoring and Assessment Programme, 1998), pp. 167-169; this report is subsequently cited in this section as *AMAP 1998*.

[186] *AMAP 1998*, chapter 5; see also Birger Poppel et al., *SLiCA Results*, Survey of Living Conditions in the Arctic (Anchorage: Institute of Social and Economic Research, University of Alaska Anchorage, 2007), pp. 4-7, http://www.arcticlivingconditions.org.

[187] Annika E. Nilson and Henry P. Huntington, *Arctic Pollution 2009* (Oslo: Arctic Monitoring and Assessment Programme, 2009), pp. 39-41; this report is subsequently cited in this section as *AMAP 2009*.

[188] *ACIA*, p. 1000.

wage employment.[189] The economics of subsistence and globalization will be key factors in the effects of climate change on Arctic indigenous peoples, and on their reactions to Arctic climate change.

Arctic indigenous peoples' current political structures vary, as do their relationships with their national governments. Some indigenous groups govern their own unique land areas within the national structure, as in the United States and Canada; others have special representative bodies, such as the Saami parliaments in Norway, Finland, and Sweden;[190] a few areas have general governments with indigenous majorities, such as Greenland (a member country of Denmark), Nunavut territory in Canada, and the North Slope and Northwest Arctic boroughs in Alaska.[191] Control of land, through claims and ownership, also varies among Arctic indigenous peoples, as do rights to fishing, hunting, and resources.[192] Arctic indigenous peoples' political relationships to their national and local governments, and their ownership or claims regarding land, are also significant factors in the responses to Arctic climate change by the indigenous peoples and by Arctic nations' governments.

Effects of Climate Change

Arctic climate change is expected to affect the economies, population, subsistence, health, infrastructure, societies, and cultures of Arctic indigenous peoples. Changes in sea ice and sea level, permafrost, tundra, weather, and vegetation distributions, as well as increased commercial shipping, mineral extraction, and tourism, will affect the distribution of land and sea mammals, of freshwater and marine fish, and of forage for reindeer. These will in turn affect traditional subsistence activities and related indigenous lifestyles.[193] Arctic indigenous peoples' harvesting of animals is likely to become riskier and less predictable, which may increase food insecurity, change diets, and increase dependency on outside, non-traditional foods.[194] Food cellars in many locations have thawed during summers, threatening food safety. Related health risks of diabetes, obesity, and mental illness have been associated with these changes.[195]

Sea, shoreline ice, and permafrost changes have damaged infrastructure and increased coastal and inland erosion, especially in Alaska, where GAO found in 2003 that "coastal villages are becoming more susceptible to flooding and erosion caused in part by rising temperatures."[196] In response, Congress funded the U.S. Army Corps of Engineers to conduct a Baseline Erosion Assessment that identified and prioritized among the 178 communities identified at risk from erosion.[197] (Risks from flooding were not examined.) GAO concluded in 2009 that many Native

[189] *SLiCA Results, op.cit.*, pp. v, 4-8.

[190] *AHDR*, p. 232.

[191] *AHDR*, chapter 4, and pp. 232-233.

[192] *AHDR*, chapters 6-7, and pp. 232-233.

[193] *ACIA*, pp. 1000-1001, 1004.

[194] *ACIA*, pp. 1000-1001, 1004.

[195] Parkinson, Alan J. *The Arctic Human Health Initiative*. Washington, DC: U.S. Department of Health and Human Services, 2006; Brubaker, Michael, James Berner, Raj Chavan, and John Warren. "Climate Change and Health Effects in Northwest Alaska." *Global Health Action* 4 (October 18, 2011).

[196] U.S. Government Accountability Office (GAO), *Alaska Native Villages: Villages Affected by Flooding and Erosion Have Difficulty Qualifying for Federal Assistance*, GAO-04-895T, June 29, 2004, p. i, http://www.gao.gov/new.items/d04895t.pdf. See also, Government Accountability Office, *Alaska Native Villages: Most Are Affected by Flooding and Erosion, but Few Qualify for Federal Assistance*, GAO-04-142, December 12, 2003, http://www.gao.gov/new.items/d04142.pdf.

[197] U.S. Army Corps of Engineers. Alaska Baseline Erosion Assessment (BEA), March 2009.

villages must relocate, but even those facing imminent threats have been impeded by various barriers, including difficulties identifying appropriate new sites, piecemeal programs for state and federal assistance, and obstacles to eligibility for certain federal programs.[198] The Alaska Federation of Natives placed among its 2010 federal priorities a request to Congress to mitigate flooding and erosion in Alaska Native villages and to fund relocation of villages where necessary.[199] However, "the cost is extraordinary," acknowledges Senator Lisa Murkowski.[200]

Oil, gas, and mineral exploration and development are expected to increase, as are other economic activities, such as forestry and tourism, and these are expected to increase economic opportunities for all Arctic residents, including indigenous peoples.[201] Pressures to increase participation in the wage economy, however, may speed up changes in indigenous cultures. Increased economic opportunities may also lead to a rise in the non-indigenous population, which may further change the circumstances of indigenous cultures. Some representatives of Arctic indigenous people have related a "conflicting desire between combating climate change and embracing the potential for economic growth through foreign investment."[202]

Although important advances in public health have occurred in indigenous communities over past decades, some health problems may increase with continued Arctic climate change. Economic development may exacerbate Arctic pollution problems, including higher exposure to mercury, air pollution, and food contamination. The influx and redistribution of contaminants in the air, oceans, and land may change in ways that are now poorly understood.[203] Warmer temperatures and longer warm seasons may increase insect- and wildlife-borne diseases.[204] Climate change may lead to damage to water and sanitation systems, reducing protection against waterborne

[198] GAO, *Alaska Native Villages: Limited Progress Has Been Made on Relocating Villages Threatened by Flooding and Erosion*, June 3, 2009.

[199] Alaska Federation of Natives, Human Resources Committee, *2010 Federal Priorities* (Anchorage: Alaska Federation of Natives, 2010), pp. 22-23, available at http://www.nativefederation.org/documents/2010_AFN_Federal_Priorities.pdf. See also, Government Accountability Office, *Alaska Native Villages: Limited Progress Has Been Made on Relocating Villages Threatened by Flooding and Erosion*, GAO-09-551, June 3, 2009, http://www.gao.gov/new.items/d09551.pdf. For a more detailed anecdote, see a 2012 interview with Brice Eningowuk, Shishmaref Erosion and Relocation Committee member at Shearer, Christine. "Climate Crisis: Alaskan Village Shishmaref Sinking Into the Sea." *Imagined Magazine*, July 8, 2012, http://imaginedmag.com/2012/07/climate-crisis-alaskan-village-shishmaref-sinking-into-the-sea/.

[200] Press Office of Senator Lisa Murkowski. "Murkowski Urges Greater Tribal Consultation from Administration; Senator Spotlights 'Monumental' Climate Struggles Faced by Alaska Natvies, Coastal Communities", July 19, 2012.

[201] *ACIA*, pp. 1001, 1004.

[202] Aqqaluk Lynge, Chair, Inuit Circumpolar Council, quoted in Stephanie McFeeters, "Lynge talks future of Inuit people," *The Dartmouth*, February 8, 2012.

[203] See, for example, "Health: Increased Bacterial Loads in Potable Water Could Have Significant Health Effects on Indigenous People From the Arctic to Uganda, Says Vanier Scholar." National Aboriginal Health Organization (NAHO), February 17, 2012. http://www.naho.ca/blog/2012/02/17/health-increased-bacterial-loads-in-potable-water-could-have-significant-health-effects-on-indigenous-people-from-the-arctic-to-uganda-says-vanier-scholar/; or, Kallenborn et al., *Combined Effects of Selected Pollutants and Climate Change in the Arctic Environment*. Oslo, Norway: Arctic Monitoring and Assessment Programme (AMAP), Arctic Council, 2011.

[204] *AMAP Assessment 2009: Human Health in the Arctic*, ed. Simon J. Wilson and Carolyn Symon (Oslo: Arctic Monitoring and Assessment Programme, 2009), pp. 4-6, 143.

diseases.[205] Changes in Arctic indigenous cultures may increase mental stress and behavioral problems.[206]

The response to climate change by Arctic indigenous peoples has included international activities by Arctic indigenous organizations and advocacy before their national governments. As one report noted, "the rise of solidarity among indigenous peoples organizations in the region is surely a development to be reckoned with by all those interested in policy issues in the Arctic."[207] Six national or international indigenous organizations are permanent participants of the Arctic Council, the regional intergovernmental forum.[208] Due in part to advocacy by Arctic indigenous people, the United Nations General Assembly adopted in 2007 the Declaration on the Rights of Indigenous Peoples.[209] In April 2009, the Inuit Circumpolar Council (an organization of Inuit in the Arctic regions of Alaska, Canada, Greenland, and Russia) hosted in Alaska the worldwide "Indigenous Peoples Global Summit on Climate Change."[210] The conference report, forwarded to the Copenhagen Conference of the Parties of the U.N. Framework Convention on Climate Change (December 2009), noted "accelerating" climate change caused by "unsustainable development" and, among several recommendations, called for a greater indigenous role in national and international decisions on climate change, including a greater role for indigenous knowledge in climate change research, monitoring, and mitigation.[211]

Polar Icebreaking[212]

Polar Icebreaker Operations

Within the U.S. government, the Coast Guard is the U.S. agency responsible for polar icebreaking. The Coast Guard's polar ice operations support 9 of the service's 11 statutory missions.[213] The broad roles of U.S. polar icebreakers can be summarized as follows:

- conducting and supporting scientific research in the Arctic and Antarctic;

[205] Brubaker, Michael, James Berner, Raj Chavan, and John Warren. "Climate Change and Health Effects in Northwest Alaska." *Global Health Action* 4 (October 18, 2011); John Warren, "Climate change could affect human health," *Mukluk Telegraph*, January/February 2005, pp. 5-6.

[206] John Warren, "Climate change could affect human health," *Mukluk Telegraph*, January/February 2005, pp. 5-6.

[207] *AHDR*, p. 235.

[208] See http://www.arctic-council.org/. The six organizations are the Aleut International Association, Arctic Athabaskan Council, Gwich'in Council International, Inuit Circumpolar Council, RAIPON (Russian Association of Indigenous Peoples of the North), and Saami Council.

[209] United Nations, Declaration on the Rights of Indigenous Peoples, Resolution A/RES/61/295, at http://social.un.org/index/IndigenousPeoples/DeclarationontheRightsofIndigenousPeoples.aspx.

[210] See http://www.indigenoussummit.com/servlet/content/home.html.

[211] K. Galloway-McLean et al., *Report of the Indigenous Peoples' Global Summit on Climate Change: 20-24 April 2009, Anchorage, Alaska* (Darwin, Australia: United Nations University—Traditional Knowledge Initiative, 2009), pp. 5-7; available at http://www.indigenoussummit.com/servlet/content/home.html.

[212] This section prepared by Ronald O'Rourke, Specialist in Naval Affairs, Foreign Affairs, Defense, and Trade Division. or more on the Coast Guard's polar icebreakers, see CRS Report RL34391, *Coast Guard Polar Icebreaker Modernization: Background and Issues for Congress*, by (name redacted) .

[213] The nine missions supported by polar ice operations are search and rescue; maritime safety; aids to navigation; ice operations; marine environmental protection; living marine resources; other law enforcement (protect the exclusive economic zone [EEZ]); ports, waterways and costal security; and defense readiness. The two missions not supported by polar ice operations are illegal drug interdiction and undocumented migrant interdiction. (Department of Homeland Security, *Polar Icebreaking Recapitalization Project Mission Need Statement, Version 1.0*, approved by DHS June 28, 2013, p. 10.)

- defending U.S. sovereignty in the Arctic by helping to maintain a U.S. presence in U.S. territorial waters in the region;
- defending other U.S. interests in polar regions, including economic interests in waters that are within the U.S. exclusive economic zone (EEZ) north of Alaska;
- monitoring sea traffic in the Arctic, including ships bound for the United States; and
- conducting other typical Coast Guard missions (such as search and rescue, law enforcement, and protection of marine resources) in Arctic waters, including U.S. territorial waters north of Alaska.

Operations to support National Science Foundation (NSF) research activities in the Arctic and Antarctic have accounted in the past for a significant portion of U.S. polar icebreaker operations. Supporting NSF research in the Antarctic has included performing an annual mission, called Operation Deep Freeze, to break through the Antarctic ice so as to resupply McMurdo Station, the large U.S. Antarctic research station located on the shore of McMurdo Sound, near the Ross Ice Shelf.

Although polar ice is diminishing due to climate change, observers generally expect that this development will not eliminate the need for U.S. polar icebreakers, and in some respects might increase mission demands for them. Even with the diminishment of polar ice, there are still significant ice-covered areas in the polar regions. Diminishment of polar ice could lead in coming years to increased commercial ship, cruise ship, and naval surface ship operations, as well as increased exploration for oil and other resources, in the Arctic—activities that could require increased levels of support from polar icebreakers. Changing ice conditions in Antarctic waters have made the McMurdo resupply mission more challenging since 2000.[214]

Polar Icebreaker Fleet

The operational U.S. polar icebreaking fleet currently consists of one heavy polar icebreaker, *Polar Star*, and one medium polar icebreaker, *Healy*. In addition to *Polar Star*, the Coast Guard has a second heavy polar icebreaker, *Polar Sea*. This ship suffered an engine casualty in June 2010 and has been non-operational since then. *Polar Star* and *Polar Sea* entered service in 1976 and 1978, respectively, and are now well beyond their originally intended 30-year service lives.

A Department of Homeland Security (DHS) Mission Need Statement (MNS) approved in June 2013 states that "current requirements and future projections ... indicate the Coast Guard will need to expand its icebreaking capacity, potentially requiring a fleet of up to six icebreakers (3 heavy and 3 medium) to adequately meet mission demands in the high latitudes...."[215]

The current condition of the U.S. polar icebreaker fleet, the DHS MNS, and concerns among some observers about whether the United States is adequately investing in capabilities to carry out its responsibilities and defend its interests in the Arctic, have focused policymaker attention on the question of whether and when to procure one or more new heavy polar icebreakers as replacements for *Polar Star* and *Polar Sea*.

[214] National Research Council, *Polar Icebreakers in a Changing World, An Assessment of U.S. Needs*, Washington, 2007, pp. 6-7, 14, 63.

[215] Department of Homeland Security, *Polar Icebreaking Recapitalization Project Mission Need Statement, Version 1.0*, approved by DHS June 28, 2013, p. 9.

On September 1, 2015, the White House issued a fact sheet in conjunction with a visit to Alaska by President Obama indicating that the Administration wants to procure a new polar icebreaker in FY2020, and that the Administration will also "begin planning for construction of additional icebreakers" beyond the one that the Administration proposes to procure in FY2020.[216]

On January 13, 2016, the Coast Guard announced that "the United States Coast Guard (USCG) Polar Icebreaker Replacement Program intends to host an Industry Day followed by one-on-one meetings with prospective shipbuilders and ship designers as a part of ongoing market research.... Industry Day is tentatively planned to occur in March 2016."[217] As part of this announcement, the Coast Guard released an industry data package for the polar icebreaker replacement program. A notional schedule for the program included in the package shows a draft Request for Proposals (RFP) being released in the first quarter of FY2017, a final RFP being released in the fourth quarter of FY2017 or the first quarter of FY2018, a contract award being made between the fourth quarter of FY2018 and the fourth quarter of FY2019, and construction of the ship beginning as soon as the fourth quarter of FY2019.[218]

The Coast Guard's proposed FY2017 budget requests $150 million in acquisition funding for a new polar icebreaker that the Coast Guard wants to begin building in FY2020. The total acquisition cost of the ship might be roughly $1 billion. The project to acquire a new polar icebreaker was initiated in Coast Guard's FY2013 budget submission and has received $15.6 million in acquisition funding through FY2016. The $150 million requested for FY2017 is the first major increment of acquisition funding requested for the ship, and would fund planning design activities required to begin production of the ship in FY2020.

A polar icebreaker procured in FY2020 might enter service in 2024 or 2025. *Polar Star* has been refurbished and reentered service in December 2012 for an intended period of 7 to 10 years—a period that will end between December 2019 and December 2022. Consequently, unless the service life of *Polar Star* is further extended (or unless *Polar Sea* is repaired and returned to service), there will be a period of perhaps two to six years during which the United States will have no operational heavy polar icebreakers.

Search and Rescue[219]

General

Increasing sea and air traffic through Arctic waters has increased concerns regarding Arctic-area search and rescue capabilities. **Table 1** presents figures on ship casualties in Arctic Circle waters from 2005 to 2014, as shown in the 2015 edition of an annual report on shipping and safety by the insurance company Allianz Global Corporate & Specialty.

[216] The White House, "FACT SHEET: President Obama Announces New Investments to Enhance Safety and Security in the Changing Arctic," September 1, 2015, accessed September 2, 2015, at https://www.whitehouse.gov/the-press-office/2015/09/01/fact-sheet-president-obama-announces-new-investments-enhance-safety-and.

[217] "USCG Polar Class Icebreaker Replacement Program," accessed January 15, 2016, at https://www.fbo.gov/index?s=opportunity&mode=form&id=a778c49349c443d2658666e19cc100e9&tab=core&tabmode=list&=.

[218] *Polar Icebreaker Industry Data Package*, undated, released January 13, p. 3. Accessed January 15, 2016, at https://www.fbo.gov/index?tab=documents&tabmode=form&subtab=core&tabid=a82ce0769a3dc86fc8984d6854dea47f.

[219] This section prepared by Ronald O'Rourke, Specialist in Naval Affairs, Foreign Affairs, Defense, and Trade Division.

Given the location of current U.S. Coast Guard operating bases, it could take Coast Guard aircraft several hours, and Coast Guard cutters days or even weeks, to reach a ship or a downed aircraft in distress in Arctic waters. In addition, the harsh climate complicates search and rescue operations in the region. Particular concern has been expressed about cruise ships that may experience problems and need assistance; there have already been incidents of this kind with cruise ships in recent years in waters off Antarctica. Coast Guard officials have noted the long times that would be needed to respond to potential emergency situations in certain parts the Arctic.

Table 1. Ship Casualties in Arctic Circle Waters, 2005-2014

Ships of 100 gross tons or more

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	Total
Machinery damage/failure	2	3	5	13	14	16	12	13	20	27	125
Wrecked/stranded	1	4	10	11	14	9	9	8	10	14	90
Miscellaneous	0	0	5	1	4	4	2	6	5	5	32
Fire/explosion	0	0	3	1	2	6	6	1	4	2	25
Collision	0	0	0	1	4	10	4	4	2	0	25
Contact (e.g., harbor wall)	0	0	1	1	1	3	1	3	6	4	20
Hull damage	0	1	3	1	6	2	2	1	2	1	19
Foundered (i.e., sunk or submerged)	0	0	1	1	2	0	3	1	1	2	11
Total	**3**	**8**	**28**	**30**	**47**	**50**	**39**	**37**	**50**	**55**	**347**

Source: Allianz Global Corporate & Specialty, Safety and Shipping Review 2015, p. 28. (Table entitled "Arctic Circle Waters—All Casualties including Total Losses 2005–2014." The table includes its own source note, which states, "Source: Lloyd's List Intelligence Casualty Statistics Analyses: AGCS [Allianz Global Corporate & Specialty].")

Notes: Of the 55 ship casualties in 2014, one ship (located near Iceland and Northern Norway) was a total loss.

Increasing U.S. Coast Guard search and rescue capabilities for the Arctic could require one or more of the following: enhancing or creating new Coast Guard operating bases in the region; procuring additional Arctic-capable aircraft, cutters, and rescue boats for the Coast Guard; and adding systems to improve Arctic maritime communications, navigation, and domain awareness.[220] It may also entail enhanced forms of cooperation with navies and coast guards of other Arctic countries.

May 2011 Arctic Council Agreement on Arctic Search and Rescue

On May 12, 2011, representatives from the member states of the Arctic Council, meeting in Nuuk, Greenland, signed an agreement on cooperation on aeronautical and maritime search and rescue in the Arctic. Key features of the agreement include the following:

- Article 3 and the associated Annex to the agreement essentially divide the Arctic into search and rescue areas within which each party has primary responsibility for conducting search and rescue operations, stating that "the delimitation of

[220] For a report assessing certain emergency scenarios in the Arctic, including search and rescue scenarios, see *Opening the Arctic Seas, Envisioning Disasters and Framing Solutions*, Coastal Response and Research Center, University of New Hampshire, report of January 2009, based on conference held March 18-20, 2008, at Durham, New Hampshire.

search and rescue regions is not related to and shall not prejudice the delimitation of any boundary between States or their sovereignty, sovereign rights or jurisdiction," and that "each Party shall promote the establishment, operation and maintenance of an adequate and effective search and rescue capability within its area."

- Article 4 and the associated Appendix I to the agreement identify the competent authority for each party. For the United States, the competent authority is the Coast Guard.
- Article 5 and the associated Appendix II to the agreement identify the agencies responsible for aeronautical and maritime search and rescue for each party. For the United States, those agencies are the Coast Guard and the Department of Defense.
- Article 6 and the associated Appendix III to the agreement identify the aeronautical and/or maritime rescue coordination centers (RCCs) for each party. For the United States, the RCCs are Joint Rescue Coordination Center Juneau (JRCC Juneau) and Aviation Rescue Coordination Center Elmendorf (ARCC Elmendorf).
- Article 12 states that "unless otherwise agreed, each Party shall bear its own costs deriving from its implementation of this Agreement," and that "implementation of this Agreement shall be subject to the availability of relevant resources."[221]

Figure 4 shows an illustrative map of the national areas of search and rescue responsibility based on the geographic coordinates listed in the Annex to the agreement.

An October 12, 2015, press report states:

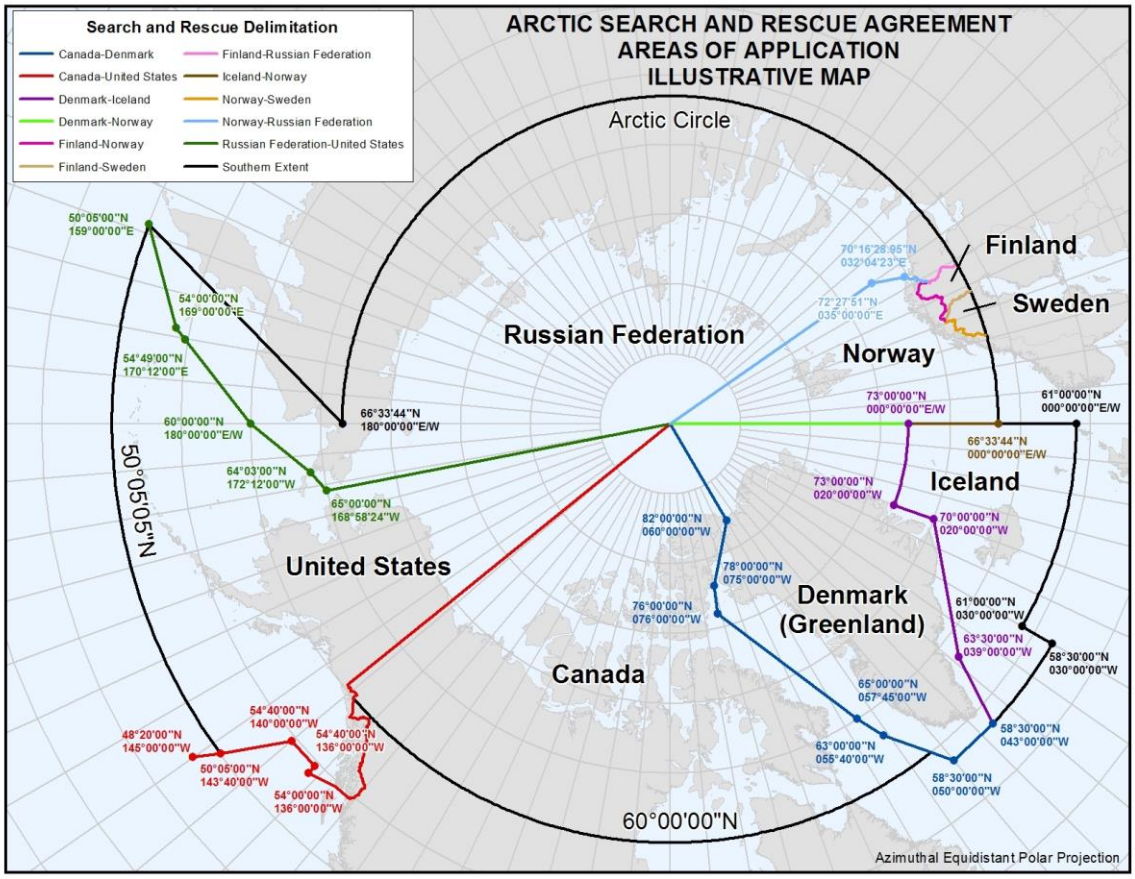
> More people are wishing to explore icy environments, says Peter Hellberg, manager responsible for the SAR process at the Swedish Maritime Administration. Hellberg is part of an IMO/International Civil Aviation Organization (ICAO) working group that is re-evaluating search and rescue (SAR) operations in Polar waters as a result of this push.
>
> The working group includes both a maritime and aeronautical perspective, and it has identified a need for more detailed guidance for SAR organizations which will be achieved through an update of the International Aeronautical and Maritime Search and Rescue Manual (IAMSAR) planned for 2019.
>
> While the IAMSAR manual is not mandatory, it is followed by most SAR organizations around the world. It provides the framework for setting up a multi-national SAR, giving different parties guidance on the necessary arrangements for Arctic areas.
>
> The guidance will be expanded on based on the Polar Code and other recent IMO regulatory updates, and from an aeronautical perspective, from lessons learned after the disappearance of Malaysian Airlines' MH370.[222]

[221] Source: Text of final version of agreement made ready for signing and dated April 21, 2011, http://arctic-council.org/filearchive/Arctic_SAR_Agreement_EN_FINAL_for_signature_21-Apr-2011.pdf. For a State Department fact sheet on the agreement, see "Secretary Clinton Signs the Arctic Search and Rescue Agreement with Other Arctic Nations," May 12, 2011, accessed October 2, 2015, at http://www.state.gov/r/pa/prs/ps/2011/05/163285.htm.

[222] Wendy Laursen, "MH370, Polar Code Spark SAR Rethink," *Maritime Executive*, October 12, 2015.

Figure 4. Illustrative Map of Arctic SAR Areas in Arctic SAR Agreement

(Based on geographic coordinates listed in the agreement)



Source: "Arctic Search and Rescue Agreement," accessed July 7, 2011, at http://www.arcticportal.org/features/features-of-2011/arctic-search-and-rescue-agreement.

Geopolitical Environment[223]

In recent years, many observers have noted that the loss of Arctic ice is leading to stepped-up human activity in the high north, particularly in the form of increasing commercial traffic and economic development. This trend has brought forth a range of issues on the geopolitical front, from environmental protection to search-and-rescue capabilities to the delineation of national boundaries—which will determine access to natural resources. These concerns are being addressed cooperatively in both bilateral and multilateral fashion, especially under the aegis of the Arctic Council and the U.N. Convention on the Law of the Sea (UNCLOS). International law Professor William Moomaw of the Fletcher School of Law and Diplomacy has noted that "the lure of riches in the Arctic draws ever more companies and nations, but so far it's been relatively amicable jousting and jostling there."[224]

[223] This section was prepared by (name redacted), who was a Specialist in International Relations, Foreign Affairs, Defense, and Trade Division, until his retirement on April 30, 2014. For questions relating to this section, contact (name redacted), Analyst in European Affairs, Foreign Affairs, Defense, and Trade Division.

[224] "China Pushes for Arctic Foothold – From a Thousand Miles Away," Christian Science Monitor Global News Blog, (continued...)

Nonetheless, some observers continue to raise questions concerning security in the high north, and have advanced sometimes conflicting views regarding the potential roles of military forces in the region. Of the other Arctic coastal nations, the United States enjoys strong political and economic ties with Canada, Norway, and Denmark; all four countries are members of NATO. Although the United States views Russia as an important partner in developing policies to cope with changing conditions in the Arctic, relations with Moscow have had numerous areas of tension in recent years. Several non-Arctic nations, including India and China, have also evinced interest in the high north, and recently gained permanent observer status in the Arctic Council. In addition, the European Union, which sought but was denied full observer status in 2009 and 2013, is nonetheless developing policy toward the Arctic.[225]

Multilateral Political Cooperation

As noted elsewhere in this report, in May 2008, ministerial representatives of the five Arctic littoral states attended a meeting convened by Denmark in Ilulissat, Greenland (a semi-autonomous territory of Denmark). Danish Foreign Minister Stig Møller implied that the meeting was intended to develop interim measures for Arctic governance: "We must continue to fulfill our obligations in the Arctic area until the U.N. decides who will have the right to the sea and the resources in the region. We must agree on the rules and what to do if climate changes make more shipping possible."[226] Attendees discussed a variety of issues, including the environment, transportation, resources, and security. The Danish Foreign Ministry stated that the resulting Ilulissat Declaration

> sent a clear political signal to the local inhabitants and the rest of the world that we will act responsibly when addressing the development in the Arctic Ocean. We have committed ourselves politically to solve any disagreements through negotiation. Thus, hopefully, we have eradicated all the myths about a 'race for the North Pole.' The legal framework is in place and the five States have now declared that they will abide by it.[227]

The Arctic Council

The Arctic has increasingly become a subject of discussions in bilateral meetings among leaders of the nations in the region and elsewhere around the globe. The main international forum for cooperation in the high north, however, is the eight-nation Arctic Council, of which the United States is an active member.

A series of meetings initiated by Finland in 1989 eventually led to the creation of the Arctic Council in 1996. The Council has become the primary intergovernmental "high level forum" for cooperation in the Arctic region. It addresses a wide range of issues, including regional

(...continued)

March 7, 2013.

[225] "China, India Enter Heating-up Arctic Race," *Asia Times*, January 25, 2012; "Aston in Far North to Reach EU Policy on Arctic," *Agence France Presse*, March 8, 2012; "EU Application to Arctic Council Postponed," North Norway European Office, May 18, 2011, http://www.northnorway.org/nyheter/847-eu-application-to-arctic-council-postponed. See also: "Arctic Governance: Balancing Challenges and Development," European Parliament Regional Briefing 2012, DG EXPO/B/PolDep/Note/2012_136 June, 2012.

[226] Conference on the Arctic Ocean, May 26, 2008, Arctic Council website: http://arctic-council.org/article/2008/5/conference_on_the_arctic_ocean.

[227] Conference In Ilulissat, Greenland: Landmark Political Declaration on the Future of the Arctic, Edited December 11, 2008, website of the Danish Foreign Ministry, http://www.um.dk/en.

development, the environment, emergency response, climate change, and natural resource extraction.

The Council membership consists of the eight countries that have sovereign territory within the Arctic Circle: the United States, Canada, Norway, Denmark (by virtue of its territory Greenland), Russia, Sweden, Finland, and Iceland. Only these countries have voting rights. Six indigenous Arctic peoples' organizations are permanent participants. Permanent observer status is held by France, Germany, the Netherlands, Poland, Spain, the UK, China, India, Italy, Japan, South Korea, and Singapore; the latter six were added during the May 2013 summit meeting. Also represented on the Council are several intergovernmental and nongovernmental observers, including the International Red Cross, the United Nations Development Program, the Nordic Council, and the Worldwide Fund for Nature.

The Council has six working groups devoted to various issues: (1) the Arctic Contaminants Action Program; (2) the Arctic Monitoring and Assessment Program; (3) Conservation of Arctic Flora and Fauna; (4) Emergency Prevention, Preparedness and Response; (5) Protection of the Arctic Marine Environment; and (6) the Sustainable Development Working Group. The United States reportedly vetoed security as an issue of consideration for the Council.[228]

Each member state is represented by a Senior Arctic Official (SAO), who is usually drawn from that country's foreign ministry. The SAOs hold meetings every six months. The Council convenes ministerial-level meetings every two years, at the end of each chairmanship, while the working groups meet more frequently. The Council has a two-year rotating chairmanship. In May 2013, Sweden passed the gavel to Canada. The United States took over the chairmanship on April 24, 2015. The United States previously held the chairmanship from 1998 to 2000.

In May 2011, U.S. Secretary of State Hillary Clinton attended the Arctic Council ministerial summit, held in Nuuk, Greenland; she was accompanied by U.S. Interior Secretary Ken Salazar. They were the first U.S. Cabinet members to attend an Arctic Council meeting, and observers stated that their visits served to raise the profile of Arctic issues. Noting the increased commercial activity in the region, Secretary Clinton declared, "We need to pursue these opportunities in a smart, sustainable way that preserves the Arctic environment and ecosystem."[229] Among other issues, attendees focused on efforts to reduce emissions that cause "black carbon" to settle on the Arctic region, accelerating ice melt. In addition, the Council discussed launching a longer-term study on methods to cope with possible future oil spills.

The major "deliverable" of the summit, however, was the signing of an Agreement on Cooperation on Aeronautical and Maritime Search and Rescue (SAR) in the Arctic. The accord was the "first legally-binding instrument negotiated under the auspices of the Arctic Council."[230] The SAR initiative, developed mainly by the United States and Russia, had been introduced during the April 2009 summit. The Council also approved the establishment of a permanent secretariat, to be based in Tromsø, Norway.

In June 2012, then-Secretary Clinton traveled once more to the Arctic, visiting the newly opened secretariat in Tromsø as part of an eight-day trip to Scandinavia. While there, she emphasized that

[228] A New Security Architecture for the Arctic: An American Perspective, By Heather A. Conley, Center for Strategic and International Studies, January, 2012, p. 14.

[229] "States Set Rules on Exploiting Arctic Wealth," *Agence France Presse*, May 12, 2011.

[230] U.S. Department of State, "Secretary Clinton Signs the Arctic Search and Rescue Agreement with Other Arctic Nations," May 12, 2011. "Warming Arctic Opens Way to Competition For Resources," *Washington Post*, May 16, 2011.

the U.S. government "want[s] the Arctic Council to remain the premier institution that deals with Arctic questions."[231]

The Council held its most recent summit on May 15, 2013, in Kiruna, Sweden. Secretary of State John Kerry's attendance, following on the heels of Secretary Clinton's two years earlier, underlined the growing importance attached by the U.S. government to polar issues. The Council revisited several of its core topics, including ocean acidification, ice loss, black carbon, biodiversity, the status of indigenous peoples, and emergency preparedness. Consideration of the latter issue resulted in the approval of a second Council accord: the Agreement on Cooperation on Marine Oil Pollution Preparedness and Response in the Arctic.

From a geopolitical perspective, perhaps the most important step taken by the Council at the May 2013 summit was enlargement; six countries—China, India, Singapore, South Korea, Japan, and Italy—were approved for permanent observer status.[232] Prior to the meeting, the five Nordic countries reportedly had endorsed the admission of new observers, while Russia and Canada were said to be opposed—the latter for fear of diluting the interest of indigenous peoples.[233] Washington reportedly played its cards close to the vest, remaining silent on the issue until the day of the decision. Secretary of State John Kerry is said to have brokered the compromise. Not long before the conference, one analyst summarized the arguments for and against (mostly for) adding new seats to the table:

> Openness would be a shrewd move, at a stroke enhancing the council's legitimacy and the quality of its deliberations, and reducing the risk of being bypassed by countries acting unilaterally. Some of the council's recent applicants could also represent a financial boon: China, South Korea, India and Japan have the fastest-growing stable of Arctic scientists, while the EU last year proposed devoting €80 billion to Arctic research. Meanwhile, the risks of admitting new members, even heavy-hitters like China, are low. First, observers' powers are limited: they may engage with the forum's working groups, propose projects and state their views (all with permission), but they have no vote. Secondly, observer status does not alter international law: under UNCLOS [United Nations Convention on the Law of the Sea], extra-regional actors have no jurisdiction in Arctic waters, and no applicant disputes this. Thirdly, the council is still fundamentally devoted to promoting research and knowledge sharing, and new observers could contribute greatly in this regard. Some Permanent Participants also fear being marginalised if new observers are admitted, but the same countries could still engage bilaterally with Arctic states from outside of the council, and there is no difference in power between permanent and ad hoc observer status. The main danger of admitting too many new observers is therefore likely to be confined to a diminished capacity for reaching swift consensus.[234]

According to some observers, the decision to add India and Singapore—which are situated thousands of miles from the Arctic Circle—would seem to indicate that the Council is transforming itself from a regional to an international forum. As noted, the revolving chair of the Council has passed from Scandinavia to North America—Canada held the post from 2013 until April 2015, when the United States took over. Patrick Borbey, Chair of Canadian Senior Arctic Officials, stated that his government hopes the Council will "evolve from a very solid

[231] "Clinton in Arctic to See Impact of Climate Change," *Agence France Presse*, June 2, 2012.

[232] For additional information, see Japan, Korea, Singapore and the Arctic Sea Lanes. *The Diplomat.* March, 2014.

[233] The European Union (EU) had applied for observer status, but its request was put on hold pending the resolution of a dispute with Canada and indigenous peoples regarding commercial sealing.

[234] "The Arctic Council: Underpinning Stability in the Arctic," The Arctic Institute/Centre for Circumpolar Security Studies, March 26, 2013, http://www.thearcticinstitute.org/2013/03/the-arctic-council-underpinning.html.

organization doing great scientific assessment to one that actually makes policy and implements it ... and makes sure it's monitored on an ongoing basis."[235] Canada's stated priorities for its chairmanship are intended to benefit the 4 million people of the north through responsible resource development, safe shipping, and the promotion of sustainable circumpolar communities. Canada also will seek to strengthen the Arctic Council in an effort to "enhance the capacity of the Permanent Participant organizations, improve the Council's coordination and maximize efficiencies."[236]

Russia

It has been noted that Russia "has at least half of the Arctic in terms of area, coastline, population and probably mineral wealth."[237] Moscow is keen to capitalize on natural resource development and shipping in the region. As noted elsewhere in this report, Russia and Norway in late 2010 resolved a 40-year dispute over national borders in the Barents Sea; the accord permits exploration for undersea oil, believed to be in rich supply there. In March 2013, it was announced that Russia and China had signed an agreement under which China would purchase oil from Russia in exchange for exploration licenses in the Arctic. In addition, scientists estimate that the sea route along the Siberian coast (referred to as the Northeast Passage or the Northern Sea Route, or NSR) will be ice-free and navigable well before the Northwest Passage through the Canadian archipelago.[238] Indeed, the route is already being used: 34 vessels traversed the NSR in 2011, 46 sailed the passage in 2012, and 71 did so in 2013.[239] Russia sees significant economic opportunities in offering icebreaker escorts, refueling posts, and supplies to the commercial ships that will ply the waterway.[240] The NSR will cut transport times and costs for Russian ships as well—the development of the shale gas industry in the United States means that Russia will likely now turn to Asia to market its liquefied natural gas (LNG).[241] But analysts note that Russia's ability to capitalize on new opportunities will require international cooperation and goodwill.

A demonstration of such cooperation took place in August 2012, when Russia joined the United States and Norway in the Barents Sea for the biannual *Northern Eagle 2012* naval maneuvers, an exercise that Norwegian Defense Minister Espen Barth Eide referred to as "a strong and interest-based neighborhood cooperation with Russia."[242] However, planning for the 2014 exercise, which

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[235] "Nations Ponder How to Handle Busier, More Polluted Arctic," *Climatewire*, May 13, 2013, http://www.eenews.net/climatewire/stories/1059981040.

[236] Canada's Arctic Council Chairmanship. Ministry of Foreign Affairs, Trade, and Development Canada. Modified February 7, 2014. http://www.international.gc.ca/arctic-arctique/chairmanship-presidence.aspx?lang=eng.

[237] "The Arctic: Special Report," *The Economist,* June 16, 2012, p. 11.

[238] Canada's Arctic Passage Still a Ways Off. *Maritime Executive.* March 27, 2014.

[239] Transit Statistics. Northern Sea Route Information Office. Accessed April 20, 2014. http://www.arctic-lio.com/nsr_transits.

[240] During an October 2011 conference on Arctic shipping, President Putin enthused that "the Arctic is the shortcut between the largest markets of Europe and the Asia-Pacific region.… It is an excellent opportunity to optimize costs." "Warming Revives Dream of Sea Route in Russian Arctic," *New York Times,* October 17, 2011.

[241] Arctic LNG Project Backs Russia's Political Strategy. *Maritime Executive.* April 15, 2014.

[242] "Foreign Ministers of Russia and Canada Agreed To Go To the Ice Without the Third Parties," *WPS: Defense & Security*, September 20, 2010. "Russia Will Staunchly Defend its Interests in the Arctic Region – Putin," *Interfax.* June 30, 2011. "Russia to Deploy Troops to Defend Interests in Arctic," *Wall Street Journal*, July 2, 2011; "Russia Lets China Into Arctic Rush as Energy Giants Embrace," *Bloomberg.com,* March 25, 2013; "Russia, U.S., Norway to Hold Joint Naval Drills in August," *RIA Novosti,* May 24, 2012, http://en.rian.ru/world/20120524/173654802.html. "Norway Hails Northern Eagle as Bridge-builder," *Defense New;* August 24, 2012; "China Eyes Arctic Options in Energy, Transport," *CNN Wire.* May 16, 2013.

was scheduled to be held in May, was put on hold. In the wake of Russia's annexation of Crimea and its efforts to further destabilize Ukraine, some analysts have questioned whether Moscow will continue to pursue a policy of multilateral cooperation in the Arctic. Other Arctic Council member states have begun to push back. In protest of Russia's recent actions in Crimea/Ukraine, Canada announced that it would not participate in an April 2014 working-level-group Arctic Council meeting in Moscow. In addition, former Secretary of State Hillary Clinton, during whose tenure a "reset" in relations with Russia was sought, reportedly stated that Arctic cooperation may be jeopardized if Russia pursues expansionist policies in the high north.[243]

China

China expert Elizabeth Economy has noted that Beijing "has begun the process of engaging in the Arctic through research, investment, and diplomacy."[244] Although its borders lie some distance from the Arctic, China has displayed a growing interest in the region, based mainly upon the potential opportunities for shorter sea routes and the eventual development of energy-related natural resources, as well as metals and minerals; the International Institute of Strategic Studies states that "China is the world's largest consumer of raw materials and hydrocarbon resources.[245] China's economy is strongly dependent upon exports; some analysts have estimated that as much as one-half of China's GDP is reliant upon exports and shipping. Ocean transportation is the chief avenue for China's large petroleum imports. Beijing is keenly interested in having free access to the future northern waterways, which would drastically reduce both sailing times and transportation costs. Other observers have argued that China's interest is motivated in the Arctic's emerging status as "the new fishing grounds—the world's largest storehouse of biological protein."[246] Finally, some have also interpreted China's growing interest in the Arctic as further evidence of its effort to expand its influence as a global player: "They know that [the] Arctic may be one of the hot spots of the 21st century."[247]

Many Chinese believe that the Arctic should be considered as part of the "global commons." According to David Curtis Wright of the U.S. Naval War College, "The mantra that the Arctic and its natural resource wealth belong to no one country but constitute the common heritage of all humankind is virtually *de rigueur* in recent Chinese public commentary on Arctic affairs."[248] This attitude was reflected during a May 2012 workshop on Sino-Nordic cooperation hosted in Beijing, when Chinese participants referred to their country as a "near-Arctic state" and a "stakeholder." Some analysts believe that China will likely remain officially circumspect on this question, as its "foreign policy rests on a profound respect for territorial integrity."[249]

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[243] Naval Exercise on Hold Due to Ukraine Tensions. *Navy Times*. March 13, 2014. Hillary Warns Against Russia in Arctic. Barents Observer. April 3, 2014. http://barentsobserver.com/en/arctic/2014/04/hillary-warns-against-russia-arctic-03-04 Canada Takes Principled Stand on Arctic Council Meetings. Ministry of Foreign Affairs, Trade, and Development Canada. April 15, 2014, http://www.international.gc.ca/media/arctic-arctique/news-communiques/2014/04/15a.aspx?lang=eng, Crimea Crises Changes Nordic Defense Perspective.

[244] China's Arctic Play: Just the Tip of the Iceberg. *The Diplomat.* April 5, 2014.

[245] It was reported that China in December 2012 "offered Greenland a $5 billion investment package that included rights to mine iron, gold, nickel, and rare earth metals.... " See "Denmark, Norway Focus on Arctic Security," *Defense News,* March 11, 2013. China's Strategic Arctic Interests. *Strategic Comments.* IISS. Vol. 20, Comment 6. March 2014.

[246] "What Is China's Arctic Game Plan?" *The Atlantic,* May 2013.

[247] "China Plans First Commercial Trip through Arctic Shortcut in 2013," *Reuters.* March 12, 2013. "China Pushes for Arctic Foothold—From a Thousand Miles Away," Christian Science Monitor Global News Blog, March 7, 2013.

[248] "The Dragon Eyes the Top of the World," David Curtis Wright, Naval War College, China Maritime Studies Institute, Number 8, August 2011.

[249] "China Defines Itself as a 'Near-Arctic State,' Says SIPRI," Swedish International Peace Research Institute, May (continued...)

Nonetheless, some Chinese analysts reportedly are encouraging their government to challenge Canada's assertion that it has sovereignty over the Northwest Passage.

In recent years, China has been cultivating relationships with the Nordic countries. In April 2012, former Chinese Premier Wen Jiabao visited Sweden and Iceland, and two months later former President Hu Jintao went to Denmark; the two leaders reportedly discussed large-scale investments in the region, and in February 2014, a Greenlandic representative was in Beijing to discuss economic cooperation. In April 2013, China and Iceland signed a free trade agreement—China's first such pact with a European government. In addition, China (like several other nations) has established a research station in the Svalbard archipelago and has beefed up the size of its embassy staff in Iceland. In October 2013, Chinese Vice Premier Ma Kai met with Icelandic President Grimsson and stated that "China is willing to expand pragmatic [cooperation] with Iceland in fields of economy, trade, geothermal energy, Arctic research environment, science and technology and social development."[250]

China has been active in conducting research on the Arctic; in 1994, Beijing purchased from Ukraine a research icebreaker it named the *Xuelong,* and has constructed a state-of-the-art polar capable research vessel, the *Snow Dragon*; in August 2012, the latter conducted a trans-Arctic voyage, from Shanghai to Iceland; it was China's fifth Arctic research expedition. In September 2013, the *Yong Shen, a* Chinese cargo ship, became the first commercial vessel to complete the voyage from Asia to Rotterdam via the Northern Sea route.[251]

United States

The attendance by Secretaries of State Clinton and Kerry of the last two Arctic Council summits, as mentioned above, indicates that the Obama Administration has placed some degree of priority on the far north. Consistent with this, the Obama Administration has recently updated national policy toward the region.

As noted elsewhere in this report, the Bush Administration in early January 2009 issued a presidential directive outlining its policy on the Arctic region; the last such directive had been issued in 1994. The Obama Administration operates under the Bush Administration's policy directive and augmented it on May 10, 2013, when it announced its National Strategy for the Arctic Region. The new policy blueprint identifies three major "lines of effort": (1) Advancing United States security interests; (2) Pursuing responsible Arctic region stewardship; and (3) Strengthening international cooperation. These activities are to be guided by four principles: (1) Safeguard peace and stability; (2) Make decisions using the best available information; (3) Pursue innovative arrangements among various levels of government and the private sector; and (4) Consult and coordinate with Alaska natives.

Regarding the Arctic Council, the National Strategy states that "[w]orking through bilateral relationships and multilateral bodies, including the Arctic Council, we will pursue arrangements that advance collective interests, promote shared Arctic state prosperity, protect the Arctic

(...continued)

10, 2012. "China's Arctic Ambitions," *Stratfor,* June 18, 2012. "China: Icebreaking in the Arctic," *The ISN Blog,* May 4, 2012; "Ice Station Dragon: China's Strategic Arctic Interest," *Defense News*, May 16, 2011.

[250] "China Knocks on Iceland's Door," *New York Times,* March 12, 2013; "China Signs Free Trade Agreement with Iceland as it Looks for Foothold in the Arctic," *The Washington Post,* April 16, 2013. China Willing To Expand Co-op with Iceland: Vice Premier. ECNS.CN. October 28, 2013. http://www.ecns.cn/2013/10-28/85976.shtml.

[251] "Chinese Icebreaker Concludes Arctic Expedition," *Xinhua News Agency,* September 27, 2012. Chinese Make First Successful North Sea Route Voyage. *The Arctic Journal.* September 12, 2013.

environment, and enhance regional security, and we will work toward U.S. accession to the United Nations Convention on the Law of the Sea (Law of the Sea Convention)." Thus, the Council is regarded as one of the organizations, though not the only one, through which the United States will seek to fulfill its goals for the region. The Strategy highlights the Arctic Council under its third "line of effort"—that of strengthening international cooperation.

> In recent years, the Arctic Council has facilitated notable achievements in the promotion of cooperation, coordination, and interaction among Arctic states and Arctic indigenous peoples. Recent successes of the Council include its advancement of public safety and environmental protection issues, as evidenced by the 2011 Arctic Search-and-Rescue Agreement and by the 2013 Arctic Marine Oil Pollution Preparedness and Response Agreement. The United States will continue to emphasize the Arctic Council as a forum for facilitating Arctic states' cooperation on myriad issues of mutual interest within its current mandate.[252]

Besides the Arctic Council, the strategy document appears to suggest that the Administration will adopt a multilateral approach to problem-solving, utilizing unspecified "existing partnerships," "multilateral fora," "new arrangements," and "efficient and effective joint ventures" to address emerging challenges in the high north.

The strategy defines the issue of security in the widest sense: "U.S. security in the Arctic encompasses a broad spectrum of activities, ranging from those supporting safe commercial and scientific operations to national defense." Some of these issues involve solutions that can be viewed as appropriate for the Arctic Council to generate, such as the above-mentioned 2011 search-and-rescue agreement. On the issue of national defense, which concerns protection of state sovereignty, many of the issues, such as developing infrastructure and enhancing domain awareness, are primarily domestic in nature. Concerning freedom of navigation, the strategy document states that the United States will rely upon "[e]xisting international law [which] provides a comprehensive set of rules governing the rights, freedoms, and uses of the world's oceans and airspace, including the Arctic." The document states: "we encourage Arctic and non-Arctic states to work collaboratively through appropriate fora to address the emerging challenges and opportunities in the Arctic region, while we remain vigilant to protect the security interests of the United States and our allies."

The document also frequently asserts that the interests of the Arctic region's indigenous peoples must be protected. As noted above, indigenous Arctic peoples' organizations have permanent participant status on the Arctic Council. According to the Council's website, they "have full consultation rights in connection with the Council's negotiations and decisions." The Council thus represents a potentially important venue for the Administration's goal of ensuring that their voices are heard and heeded.

In a speech at the aforementioned Arctic Council's ministerial in May 2013, Secretary of State Kerry stated that there was considerable overlap in interests among the eight member states, and that their decisions "don't stop at the 66th parallel." He cited climate change as the most far-reaching issue, and also noted other areas of concern, including "acidification, pollution, ice melt, rising sea levels, disappearing species, and indiscriminate development practices" that can have an effect "downstream" on further challenges "to our economies, to our national security, and to

[252] White House, National Strategy for the Arctic Region, May 2013. http://www.whitehouse.gov/sites/default/files/docs/nat_arctic_strategy.pdf.

international stability." He lauded the work of the Arctic Council, "which addresses these challenges."[253]

Finally, the U.S. Department of State has raised the issue of fisheries, stating that as stocks move northward, there will be a need to adapt current fisheries management mechanisms and create new ones for regions not currently being fished. According to the State Department, "The United States is ... considering whether it would be desirable for a group of States with interests in present and future Arctic fisheries to adopt some form of general statement or declaration." While the Arctic Council's Kiruna Declaration[254] does not specifically mention fisheries management, the Council's goal of promoting sustainable and responsible use of natural resources make it a potential venue for the Administration to explore interest in adopting a general statement on the issue.

At the end of January 2014, the White House released the Implementation Plan for the National Strategy for the Arctic Region. The plan essentially follows and complements the objectives spelled out in the May 2013 Strategy document. Under the rubric of security, for example, the Implementation Plan calls for the development of communication infrastructure to support aerial and maritime transportation, and to improve domain awareness. Under the heading of Arctic stewardship, the plan lists a wide array of topics, including developing greater understanding of environmental and ecological processes, and improving conditions for indigenous peoples through addressing issues concerning health, cultural heritage, and community sustainability. On the international level, the plan calls for greater preparedness on oil pollution cleanup and search-and-rescue capabilities, as well as safeguarding marine ecosystems. It calls for the development of a "robust agenda" for the U.S. chairmanship of the Arctic Council, and for U.S. accession to the Law of the Sea Convention.[255] On February 13, 2014, Alaska Senator Lisa Murkowski stated in a letter to the President that she was "severely disappointed" with the implementation plan, which, she argued, "provides a snapshot of existing Arctic-related programs and projects with numerous assessments to be undertaken, but no real path of action." The following day, Secretary of State Kerry announced the creation of a new, high-level position: Special Representative for the Arctic Region. In a press statement, Secretary Kerry stated that he would "look forward to work closely with Alaska's Congressional delegation to strengthen American's engagement in Arctic issues."[256]

Security Issues

Throughout the Cold War, the Arctic region was a zone of major strategic interest, where the United States, the Soviet Union, and allied states conducted air and naval maneuvers and tested ballistic missiles. With the collapse of the Warsaw Pact and the Soviet Union, however, the

[253] U.S. Department of State, "Remarks at the Arctic Council Ministerial Session," U.S. Secretary of State John Kerry, available at http://www.state.gov/secretary/remarks/2013/05/209403.htm.

[254] U.S. Department of State, "Kiruna Declaration: On the Occasion of the Eighth Ministerial Meeting of the Arctic Council," May 15, 2013, available at http://www.state.gov/r/pa/prs/ps/2013/05/209405.htm.

[255] Implementation Plan for the National Strategy for the Arctic Region. The White House. January 2014. https://www.whitehouse.gov/sites/default/files/docs/implementation_plan_for_the_national_strategy_for_the_arctic_region_-_fi.... pdf.

[256] Adaptation of a letter from Senator Murkowski to President Obama. *Alaska Dispatch.* February 13, 2014. Secretary Kerry Announces Department Will Establish a Special Representative for the Arctic Region. U.S. Department of State. Press Release. February 14, 2014. As noted earlier (see "U.S. Special Representative for the Arctic" in "Background"), on July 16, 2014, Secretary Kerry announced the appointment of retired Coast Guard Admiral Robert J. Papp, Jr., who served as Commandant of the Coast Guard from May 2010 to May 2014, as the first U.S. Special Representative for the Arctic.

importance of the high north diminished in the 1990s. Although the establishment of the Arctic coastal states' sovereignty through the demarcation of boundaries in the region is being conducted peacefully under the auspices of the U.N. Convention on the Law of the Sea, the Arctic is once again being viewed by some as a potential emerging security issue. In a December 2011 *Washington Post* op-ed, Heather Conley, a senior fellow at the Center for Strategic and International Studies, noted several developments:

> In April [2011], President Obama signed a new command plan that gives NORAD and the U.S. Northern Command greater responsibility in protecting the North Pole and U.S. Arctic territory.… In 2009, Norway moved its operational command to its northern territories above the Arctic Circle. Russia has plans to establish a brigade that is specially equipped and prepared for military warfare in Arctic conditions. Denmark has made it a strategic priority to form an Arctic Command. Canada is set to revitalize its Arctic fleet, including spending $33 billion to build 28 vessels over the next 30 years.[257]

Similarly, Canadian academic Rob Huebert pointed out that in August 2010 the United States, Canada, and Denmark conducted in the Canadian Arctic their annual joint naval exercises involving several advanced and powerful warships. Huebert observed that "while defence officials are quick to point out they see no military threat to the region, it's still interesting to see these three Arctic friends coming together to improve their naval combat capability in the Far North."[258] In varying degrees, the Arctic coastal states have indicated a willingness to establish and maintain a military presence in the high north.[259]

Although some have argued that terrorism and hijacking may constitute security concerns in the region, others maintain that such threats are chimerical, given the challenges of distance and geography, and the difficulty of navigating in a polar environment. *The Economist* has asserted that "the risks of Arctic conflict have been exaggerated. Most of the Arctic is clearly assigned to individual countries. According to a Danish estimate, 95% of Arctic mineral resources are within agreed national boundaries."[260] Other factors may also postpone energy exploration. For example, in the *New York Times*, three scholars noted that "the shale gas revolution is already delaying some Arctic energy projects." In addition, some companies are reportedly "fearful of the financial and public relations risk of working in the pristine icy wilderness."[261]

A report by the Arctic Institute noted that "[t]he armed forces, beyond their responsibility for handling all contingencies, are also the only agencies with both the requisite monitoring instruments and the physical capabilities to operate in such a vast and inhospitable region."[262] However, as mentioned above, the Arctic Council does not address regional security issues. To fill this apparent void, a report by the Washington, DC-based Center for Strategic and International Studies has proposed the creation of a separate organization, the Arctic Coast Guard

[257] Heather Conley, "The Colder War: U.S., Russia and Others Are Vying for Control of Santa's Back Yard," *Washington Post,* December 23, 2011.

[258] "Welcome To a New Era of Arctic Security," Rob Huebert, Canadian Defense and Foreign Affairs Institute, August, 2010.

[259] See, for example, "Canada Vows 'Firm' Defence of Arctic Border," *Canwest News Service,* November 24, 2009. "Danes With Dogs To Join Military Sovereignty Patrol Of Canadian Arctic," *The Canadian Press,* March 3, 2010. "Norway Plans One New Arctic Base, Perhaps More," *Defense News,* March 8, 2010.

[260] "The Arctic: Special Report," *The Economist,* June 16, 2012, p. 10.

[261] "Hands Across the Melting Ice," by James F. Collins, Ross A. Virginia, and Kenneth Yalowitz, *New York Times,* May 13, 2013. "Oil Executives Tune Out the Call of the Wild Arctic," *Reuters,* May 31, 2013.

[262] "The Arctic Council: Underpinning Stability in the Arctic," the Arctic Institute/Centre for Circumpolar Security Studies, March 26, 2013. http://www.thearcticinstitute.org/2013/03/the-arctic-council-underpinning.html.

Forum (ACGF), consisting initially of the eight Arctic Council states, but possibly expanding eventually to include other countries willing to contribute assets. The ACGF, which could potentially be headquartered at the U.S. Air Force base in Thule, Greenland, would "focus first on information sharing yet should also seek to develop methods of cooperation in support of the Arctic Council's search-and-rescue agreement and future international oil spill response agreement."[263] (The ACGF was established in October 2015; see "October 2015 Agreement on Arctic Coast Guard Forum (ACGF)" in "U.S. Military Forces and Operations.")

However, other, relatively little-publicized multilateral discussions of security issues have already been taking place. In mid-2011, the U.S. European Command (EUCOM), in cooperation with the Norwegian Ministry of Defense, established the Arctic Security Forces Roundtable (ASFR), consisting of high-ranking military officers from the eight members of the Arctic Council, plus France, Germany, the Netherlands, and the UK. Their first meeting, held in June 2011 in Oslo, addressed a range of issues, including infrastructure, the environment, joint exercises and training, and marine domain awareness. In August 2012, the ASFR held a conference Bodo, Norway; the meeting focused mainly on how to improve the communications infrastructure in the high north.[264] Another newly formed venue at which military leaders discuss Arctic issues is the Northern Chiefs of Defense conference, the first of which was held in Goose Bay, Labrador, in May 2012; it was attended by military representatives from the eight Arctic Council governments.[265]

NATO

The Arctic has also become a region of interest for NATO. However, as one writer has noted, "[t]here is currently no consensus within the alliance that NATO has any role to play in the Arctic, as Canada strongly opposes any NATO involvement on sovereignty grounds and other NATO members are concerned with negative Russian reaction."[266] Speaking in Reykjavík in January 2009, former NATO Secretary General Jaap de Hoop Scheffer urged that member states not allow the Arctic to become a divisive issue. He also recommended that the alliance and Russia cooperate through building upon their shared experience in search-and-rescue operations. Former Danish Prime Minister Anders Fogh Rasmussen, who became secretary general of the alliance in August 2009, has also addressed security in the high north. Citing the "potentially huge security implications" of Arctic climate change, Rasmussen in October 2009 stated that "I think it is within the natural scope of work for NATO to be the forum for consultation and discussion on [selected Arctic] issues." In March 2009, however, Russia's NATO ambassador stated that Moscow would not cooperate with the alliance on Arctic matters. And in September 2010, then-Russian President Medvedev reportedly observed that "the Arctic can do fine without NATO," and that his government "views [possible NATO] activity with quite serious tension, because it is after all a zone of peaceful cooperation, economic cooperation, and of course the military factor

[263] "A New Security Architecture for the Arctic: An American Perspective," Center for Strategic and International Studies (CSIS), January 2012, p. 37.

[264] "Arctic Nations Meet to Discuss Communication, Maritime Domain Awareness Strategy," EUCOM website, August 30, 2012, http://www.eucom.mil/blog-post/24109/arctic-nations-meet-to-discuss-communication-maritime-domain-awareness-strategy.

[265] "General Natynczyk and Fellow Northern Chiefs of Defence Discuss Shared Arctic Interests," News release, Canadian National Defense web page, April 13, 2012, http://www.forces.gc.ca/site/news-nouvelles/news-nouvelles-eng.asp?id=4151 "Northcom Strives to Promote Safe, Secure Arctic," U.S. Department of Defense web page, December 17, 2012, http://www.defense.gov/news/newsarticle.aspx?id=118814.

[266] "A New Security Architecture for the Arctic: An American Perspective," Center for Strategic and International Studies (CSIS), January 2012, p. 30.

always—at a minimum—creates additional questions." On a visit to Moscow in November 2010, Rasmussen assured the Russians that NATO does not intend to establish a presence in the Arctic.[267] Since 2006, several member and partner states have participated in *Cold Response*, a wide-ranging annual crisis response exercise hosted by Norway. During the most recent joint maneuvers, held in March 2014, 16 nations fielded air, land, and naval assets and approximately 16,000 troops. Although the exercises are multilateral, they are not conducted under the auspices of NATO.[268]

A 2013 NATO Parliamentary Assembly report noted that "50% of the territory surrounding the Arctic Sea is a territory of a NATO member state," and suggested that "NATO could serve as a forum for dialogue on military issues.... "[269] The report contends that the alliance is well-equipped to play a key role in addressing security challenges that will likely emerge, particularly those that involve surveillance, search-and-rescue, and environmental cleanup. However, observers note that the lack of unanimity over a NATO presence in the Arctic is reflected by the fact that the high north is mentioned neither in the alliance's 2010 strategic concept, nor in the final declaration of the 2012 Chicago summit. On May 8, 2013, following a visit to Norway, Secretary General Rasmussen stated that "at the present time," the alliance had "no intention of raising its presence and activities in the High North." He later tweeted that "the Arctic is a harsh environment. It rewards cooperation, not confrontation. I trust we'll continue to see cooperation."[270]

Writing in an Atlantic Council blog, Dr. Page Wilson, of the UK's Royal Military Academy Sandhurst, has argued that, for the present, "NATO's reluctance to increase its focus on the Arctic may appear curious," whereas, "[i]n fact, it is eminently sensible." She notes that the alliance is already active in the region, with regular military exercises (such as the above-mentioned *Cold Response*), the air policing mission over Iceland, and the presence in Greenland of elements of the U.S. Active Layered Theater Ballistic Missile Defense. In addition, she notes that several international fora, chief among them the Arctic Council, are fostering cooperation in areas such as environmental, social, and economic issues, and that discussion of security matters can be deferred "until such time as greater clarity and agreement emerges about the nature of the Arctic as a political space." However, another scholar has noted that the March 28, 2014, appointment of former Norwegian Prime Minister Jens Stoltenberg as the alliance's new Secretary General "should alert global attention to ... the Arctic."[271]

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[267] "Russia, Norway Sign Border Deal For Arctic Energy," *Reuters*, September 15, 2010. "NATO Chief Cautions Against Division Over Arctic," *Canwest News Service*, January 29, 2009. "NATO Proposes Arctic Cooperation With Russia," Reuters, January 29, 2009. Speech by NATO Secretary General Jaap de Hoop Scheffer On Security Prospects In the High North, January 29, 2009, http://www.nato.int/docu/speech/2009/s090129a.html. "NATO Chief Wars Of Climate Change Security Risks," *Agence France Presse*, October 1, 2009. "Rogozin Says He Won't Discuss Cooperation In Arctic With NATO," *Interfax: Russia & CIS General Newswire*, March 27, 2009.

[268] "NATO Tests Its Forces in Arctic," February 16, 2012, Atlantic Council web page: http://www.acus.org/natosource/nato-tests-its-forces-arctic, "NATO, Russia Stage Arctic War Games," April 25, 2012. Atlantic Council web page: http://www.acus.org/print/68922. See also Cold Response 2014, Norwegian Armed Forces web page: http://mil.no/excercises/coldresponse/Pages/about.aspx. "Øvelse Cold Response er en norskledet, internasjonal øvelse som foregår i store deler av Nord-Norge," Norwegian Ministry of Defense, January 21, 2013, http://forsvaret.no/aktuelt/ovelser/Sider/Cold-Response.aspx.

[269] "Security in the High North: NATO's Role," NATO Parliamentary Assembly draft report, 071 PCTR 13 E, March 28, 2013.

[270] "NATO Won't Up Presence in the Arctic: Chief," *Agence France Presse*, May 8, 2013. "NATO Rejects Direct Arctic Presence," *Defense News*, May 27, 2013.

[271] Between a Rock and a Cold Place? NATO and the Arctic. January 15, 2014. Atlantic Council website: http://www.atlanticcouncil.org/blogs/natosource/between-a-rock-and-a-cold-place-nato-and-the-arctic, What the New NATO Secretary General Appointment Means for the Arctic. *The Fletcher Forum.* April 8, 2014.

Russia

The Russian government has stated that, although it deplores the notion of an arms race in the high north and does not foresee a conflict there, it intends to protect its Arctic interests.[272] However, Russia has at times appeared to be sending out mixed messages in this regard. For example, at the conclusion of a meeting in September 2010, Russian Foreign Minister Sergei Lavrov and former Canadian Foreign Minister Lawrence Cannon stated that "any militarization [of the Arctic] is out of the question." And in June 2011, then-Prime Minister (and currently President) Vladimir Putin stated, "Russia will definitely expand its presence in the Arctic. We are open for dialogue with our foreign partners and with all neighbors in the Arctic region. But we will naturally defend our own geopolitical interests firmly and consistently." The following month, Putin announced plans to build a large shipping port on the Yamal peninsula, and the government stated that it would be sending two brigades to the north to protect its interests. In addition, Russia is reportedly rebuilding former Soviet airbases in the region. In addition, President Putin in December 2013 stated that there was a need for "every lever for the protection of its security and national interests" in the Arctic, and ordered the development by 2014 of a strategic command in the region. However, as noted above, in order to reap the economic benefits of natural resources development and shipping, the Russians will need to rely heavily on foreign capital and technology, and, according to Canadian Arctic specialist Michael Byers, "probably they realize how expensive it would to take another approach [than cooperation], especially one involving militarization."[273]

However, some analysts believe that Russia's recent occupation of Crimea and its continuing interference in Eastern Ukraine may have repercussions for Arctic cooperation in the security arena. In March 2014, Norway announced that it was suspending scheduled military activities with Russia.[274] On April 1, 2014, NATO Foreign Ministers issued a statement condemning Russia's intervention in Ukraine and refused to recognize Moscow's "illegal and illegitimate attempt to annex Crimea," and expressed "grave concern over the authorisation by the Russian Parliament to use the armed forces of the Russian Federation on the territory of Ukraine." Later in April, the defense ministers of the five Nordic states met to discuss military cooperation in the Arctic. In addition, Alaska Senator Mark Begich recently stated that "with unpleasant reminders of the Cold War, ... a strong military presence in the Arctic is more important than ever."[275]

China

Some Chinese leaders also have voiced concern over perceived emerging security issues in the Arctic. In early March 2010, a Chinese admiral stated that "the current scramble for the sovereignty of the Arctic among some nations has encroached on many other countries' interests," and added that China had to "make short and long term ocean strategic development plans to exploit the Arctic because it will become a future mission for the navy." Some analysts, however, believe that China's general approach toward the Arctic will remain decidedly low-key: "To date,

[272] "Russia Will Protect Interests in Arctic: Official," *Agence France Presse,* June 10, 2009. "Russia Opposes Arms Race In Arctic Region—Diplomat," *ITAR-TASS World Service,* July 21, 2009.

[273] Putin Says Beefing Up Presence in the Arctic Among Top Priorities for Russian Military. *Associated Press.* December 10, 2013. Vows To Increase Russia's Arctic Military Presence. *The World Post.* December 10, 2013. The Arctic: The Arctic: Where the U.S. and Russia Could Square Off Next. *The Atlantic.* March 28, 2014.

[274] Nevertheless, Norwegian petroleum giant Statoil stated that it would continue with its joint drilling operations with Russia. Norway's Statoil Says Business as Usual in Russia. *Reuters News.* April 14, 2014.

[275] NATO's Relations with Russia. Accessed April 24, 2014. NATO website: http://www.nato.int/cps/en/natolive/topics_50090.htm, Begich: Military Presence in the Arctic Is 'More Important than Ever.' *The Hill.* March 19, 2014.

China has adopted a wait-and-see approach to Arctic developments, wary that active overtures would cause alarm in other countries due to China's size and status as a rising global power." China is believed to be keen on resolving through diplomacy the national interests of both littoral and non-Arctic states in the high north. Toward that end, it sought permanent observer status on the Arctic Council. Its candidacy reportedly was delayed by a dispute with Norway, which in 2010 awarded the Nobel Peace Prize to Chinese dissident Liu Xiaobo.[276] It was reported in early April 2013 that Norway would support China's bid for observer status at the May Arctic Council meeting. As noted above, China was approved at the meeting for observer status.[277]

U.S. Military Forces and Operations[278]

During the Cold War, the Arctic was an arena of military competition between the United States and the Soviet Union, with both countries, for example, operating nuclear-powered submarines, long-range bombers, and tactical aircraft in the region. The end of the Cold War and the collapse of most elements of the Russian military establishment following the dissolution of the Soviet Union in December 1991 greatly reduced this competition and led to a reduced emphasis on the Arctic in U.S. military planning.

Renewed tensions with Russia following its seizure and annexation of Crimea in March 2014, combined with a significant recent increase in Russian military operations in the Arctic,[279] have

[276] "China Prepares For an Ice-free Arctic," Linda Jakobson, *SIPRI Insights On Peace and Security*, No. 2010/2, March 2010. "Admiral Urges Government to Stake Claim in the Arctic," *South China Morning Post*, March 6, 2010. "Norway Wants to Block China from Arctic Council Over 2010 Nobel Peace Prize Row," *Agence France Presse*, January 25, 2012. "Clinton in Arctic to See Impact of Climate Change," *Agence France Presse*, June 2, 2012.

[277] "China Pours Cash into Melting Arctic in Bid to Win Influence," *RIA-Oreanda News* [Russia], April 2, 2013.

[278] This section prepared by Ronald O'Rourke, Specialist in Naval Affairs, Foreign Affairs, Defense, and Trade Division.

[279] See, for example, Kyle Mizokami, "How Russia Is Fortifying The Arctic," *The Week*, March 29, 2016; "Russia Building New Tor Missile for Arctic Defense, TASS Reports, *Radio Free Europe/Radio Liberty*, March 3, 2016; "Russia Developing Arctic Version of Tor Missile System" *TASS*, March 2, 2016; Trude Pettersen, "Northern Fleet Gets Own Air Force, Air Defense Forces," *The Independent Barents Observer*, February 1, 2016; Andrew Poulin, "5 Ways Russia is Positioning to Dominate the Arctic," *International Policy Digest*, January 24, 2016; "Russia Plans New Airborne Drills on North Pole," *The Independent Barents Observer*, January 21, 2016; "Russia to Complete Construction of the Arctic Military Bases in 2016," *Arctic-info.com*, January 20, 2016; "New Series of Frigates for Arctic Waters," *The Independent Barents Observer*," January 14, 2016; "Russia Prepares for Arctic Terrorism," *Maritime Executive*, December 30, 2015; Tom Parfitt, "Russia Sends Troops and Missiles to Arctic Bases," The Times (UK), December 26, 2015; "Russian Airborne Troops Plan Large-Scale Arctic Exercises In 2016," *Radio Free Europe/Radio Liberty*, November 30, 2015; "Russia in the Arctic: A Different Kind of Military Presence," *Stratfor*, November 11, 2015; Associated Press, "Russia to Station Military Unit in The Arctic By 2018, Says Defense Minister," *Military Times*, October 22, 2015; Agence France-Press and Jiji News, "Russia Asserts Arctic Clout, Opens Large Military Complex on 80th Parallel," *Japan Times*, October 21, 2015; "Russia Builds Second Military Base To Support Arctic Ambitions," *Radio Free Europe/Radio Liberty*, October 21, 2015; Cristina Silva, "Russian Amphibious Assault Ships Travel To Arctic Military Base For Defense Exercises," *International Business Times*, September 15, 2015; Agence France-Presse, "Russia Launches Military Drills In Arctic," *Defense News*, August 24, 2015; Jeremy Bender, "Pentagon Report: Russia Is Deploying New, Specially Modified Air-Defense Systems to the Arctic," *Business Insider*, August 19, 2015; Maxim Pyadushkin, "A Return to the Arctic, Russia Backs Up Economic Expansion with Military Buildup," *Aviation Week & Space Technology*, August 17-30: 52; Jeremy Bender and Mike Nudelman, "This Map Shows Russia's Dominant Militarization of the Arctic," *Business Insider*, August 7, 2015; Trude Pettersen, "Arctic Training for Strategic Nuclear Submarines," *Barents Observer*, July 30, 2015; Trude Pettersen, "Russia's New Maritime Doctrine to Strengthen Arctic Presence," *Alaska Dispatch News*, July 29, 2015; "Russia Sees Arctic As Naval Priority in New Doctrine," *BBC*, July 27, 2015; "Russia to Double Military Troops on Novaya Zemlya," *Arctic-Info*, July 10, 2015; Jeremy Bender, "Russia Is Deploying Advanced Aerial Weapon Systems to the Arctic," *Business Insider Australia*, June 23, 2015; Sohrab Ahmari, "The New Cold War's Arctic Front," *Wall Street Journal*, June 9, 2015.

led to growing concerns among observers that the Arctic is once again becoming a region of military tension and competition,[280] and to concerns about whether the United States is adequately prepared militarily to defend its interests in the region.[281]

U.S. military officials, military officials from other Arctic states, and other observers have stressed the cooperative aspects of how the Arctic states have addressed Arctic issues, and have sometimes suggested that the competitive aspects of the situation have been exaggerated in some press accounts.[282] Some observers argue that that Russia's recent military investment in the Arctic is being exaggerated, or reflects normal modernization of aging capabilities, or is intended partly for domestic Russian consumption.[283] Even so, U.S. military forces (and U.S. intelligence agencies[284]) are paying renewed attention to the Arctic. This is particularly true in the case of the Navy and Coast Guard, for whom diminishment of Arctic sea ice is opening up potential new operating areas for their surface ships. The U.S. Army and Marine Corps, too, are beginning to focus more on Arctic operations,[285] and Canada and the Nordic countries are taking or contemplating steps to increase their own military presence and operations in the region.[286]

DOD in General

2010 QDR (Submitted February 2010)

DOD's report on the 2010 QDR, submitted to Congress in February 2010, states:

> The effect of changing climate on the Department's operating environment is evident in the maritime commons of the Arctic. The opening of the Arctic waters in the decades

[280] See, for example, Michael Birnbaum, "3 Maps That Show How Russia and NATO Might Accidentally Escalate Into War," *Washington Post*, August 12, 2015; Roland Oliphant, "Russia and NATO launch Rival War Games, *Telegraph (UK)*, May 26, 2015.

[281] See, for example, Agence France-Presse, "Actic Attracting New Military Scrutiny," *Defense News*, November 1, 2015; "Meltdown: Where Is the U.S. in the Race for the Arctic?" *NBC News*, September 16, 2015; Steven Lee Myers, "U.S. Is Playing Catch-Up With Russia in Scramble for the Arctic," *New York Times*, August 29, 2015; Jen DiMascio, "Frozen in Place? U.S. Military Slow to Respond to Arctic Change," *Aviation Week & Space Technology*, August 17-30: 54.

[282] See, for example, Benjamin Schaller, "Deconstructing the Narrative of Arctic War," *World Policy Blog*, March 9, 2016; Jennifer Peters, "Russia Isn't Trying to Start a War in the Arctic—It's Just Keeping Out the Riffraf," *Vice*, October 2, 2015; Heather Exner-Pirot, "Northern Expert: Put Up Or Shut Up With Your Arctic Conflict Theory," *Alaska Dispatch News*, October 21, 2015.

[283] See, for example, Alexander Sergunin and Valery Konyshev, "Modernisation or Militarisation?" *The Arctic Journal*, February 29, 2016; Ekaterina Klimenko, *Russia Arctic Security Policy*, SPIRI Policy Paper 45, February 2016, 36 pp.Brian Whitmore, "What's Putin Doing in the Arctic? Trying To Keep Russians Distracted," *Defense One*, August 12, 2015.

[284] See Brian Bennett and W.J. Hennigan, "US Builds Up Arctic Spy Network As Russia, China Increase Presence," *Los Angeles Times*, September 7, 2015.

[285] See, for example, DJ Summers, "Army Officially Delays Plan to Slash Arctic Warrior Force Level," *Alaska Journal of Commerce*, March 23, 2016; Austin Wright, "Army Delays Inactivation of Alaska Brigade Combat Team," *Politico*, March 21, 2016; James Waterhouse and Matt Wareham, Royal Marines Train US Forces in Arctic Over Fears of Russian Aggression," *Newsbeat*, March 7, 2016; Tyler Rogoway, "Army Sends Stryker Armored Vehicles To Arctic Circle For The First Time," *Foxtrot Alpha*, November 7, 2015; Michelle Tan, "Inside the Army's Growing Arctic Circle Mission," Military Times, May 7, 2014.

[286] See, for example, Gerard O'Dwyer, "9.8% Budget Hike Set for Norwegian Armed Forces," *Defense News*, October 9, 2015; Lydia Tomkiw, "Russia-Norway Conflict? Defenses Being Modernized Amid Russian Arctic Military Buildup," *International Business Times*, October 1, 2015; Henrik Stolen, "Norway Must Hike Defense To Counter Russian Build-Up: Military Chief," *Reuters*, October 1, 2015; Tore Andre Kjetland Fjeldsbo, Norwegian Militarization in the High North," *Nora Region Trends*, September 21, 2015.

> ahead[,] which will permit seasonal commerce and transit[,] presents a unique opportunity to work collaboratively in multilateral forums to promote a balanced approach to improving human and environmental security in the region. In that effort, DoD must work with the Coast Guard and the Department of Homeland Security to address gaps in Arctic communications, domain awareness, search and rescue, and environmental observation and forecasting capabilities to support both current and future planning and operations. To support cooperative engagement in the Arctic, DoD strongly supports accession to the United Nations Convention on the Law of the Sea.[287]

April 2011 Change to DOD Unified Command Plan

In April 2011, President Obama assigned responsibility for the Arctic to U.S. Northern Command. Previously, U.S. Northern Command, U.S. European Command, and U.S. Pacific Command had shared responsibility for the Arctic. The April 2011 change in DOD's Unified Command Plan also assigned Alaska to U.S. Northern Command. Previously, U.S. Northern Command and U.S. Pacific Command had shared responsibility for Alaska and adjacent waters.[288]

May 2011 DOD Report to Congress

In May 2011, DOD submitted a report to Congress on Arctic operations and the Northwest Passage that was prepared at congressional direction.[289] A January 2012 GAO report reviewed the May 2011 DOD report.[290]

November 2013 DOD Arctic Strategy

On November 22, 2013, DOD released a DOD strategy for the Arctic.[291] The executive summary of the document states (highlights as in the original):

> The Arctic is at a strategic inflection point as its ice cap is diminishing more rapidly than projected and human activity, driven by economic opportunity—ranging from oil, gas, and mineral exploration to fishing, shipping, and tourism—is increasing in response to the growing accessibility. Arctic and non-Arctic nations are establishing their strategies and positions on the future of the Arctic in a variety of international forums. Taken together, these changes present a compelling opportunity for the Department of Defense (DoD) to work collaboratively with allies and partners to promote a balanced approach to improving human and environmental security in the region in accordance with the 2013 *National Strategy for the Arctic Region*.

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[287] Department of Defense, *Quadrennial Defense Review Report*, February 2010, p. 86. The Arctic is also mentioned on pages 19, 57, and 62.

[288] For an article discussing the change, see Jim Garamone, "Unified Command Plan Reflects Arctic's Importance," *American Forces Press Service*, April 7, 2011.

[289] Department of Defense, *Report to Congress on Arctic Operations and the Northwest Passage, OUSD (Policy)*, May 2011. The direction to submit the report was contained on page 337 of H.Rept. 111-491 of May 21, 2010, the House Armed Services Committee's report on H.R. 5136, the FY2011 National Defense Authorization Act.

[290] Government Accountability Office, Arctic Capabilities[:]DOD Addressed Many Specified Reporting Elements in Its 2011 Arctic Report but Should Take Steps to Meet Near- and Long-term Needs, GAO-12-180, January 2012. The direction to GAO to write the report was contained on page 291 of H.Rept. 112-78 of May 17, 2011, the House Armed Services Committee's report on H.R. 1540, the FY2012 National Defense Authorization Act.

[291] Department of Defense, *Arctic Strategy*, November 2013, 14 pp. The news release announcing the document is posted at http://www.defense.gov/Releases/Release.aspx?ReleaseID=16389. The document itself is posted at http://www.defense.gov/pubs/2013_Arctic_Strategy.pdf.

> Security in the Arctic encompasses a broad spectrum of activities, ranging from resource extraction and trade to activities supporting safe commercial and scientific operations to national defense. Security cooperation activities and other military-to-military forms of engagement establish, shape, and maintain international relations and the partnerships necessary to meet security challenges and reduce the potential for friction. The Department will continue to build cooperative strategic partnerships that promote innovative, affordable security solutions, and burden-sharing in the Arctic, and seek to increase opportunities with Arctic partners to enhance regional expertise and cold-weather operational experience.
>
> The Department will continue to train and operate routinely in the region4 as it monitors the changing environment, revisiting assessments and taking appropriate action as conditions change.
>
> This strategy identifies the Department's desired end-state for the Arctic: ***a secure and stable region where U.S. national interests are safeguarded, the U.S. homeland is protected, and nations work cooperatively to address challenges.*** It also articulates two main supporting objectives: *Ensure security, support safety, and promote defense cooperation, and prepare to respond to a wide range of challenges and contingencies*—operating in conjunction with other nations when possible, and independently if necessary—in order to maintain stability in the region. Finally, it identifies the *ways* and *means* the Department intends to use to achieve these objectives as it implements the *National Strategy for the Arctic Region*.[292]

The document also states:

> U.S. national security interests in the Arctic are delineated in National Security Presidential Directive (NSPD) 66/Homeland Security Presidential Directive (HSPD) 25, Arctic Region Policy. This policy states that national security interests include such matters as missile defense and early warning; deployment of sea and air systems for strategic sealift, strategic deterrence, maritime presence, and maritime security operations; and ensuring freedom of the seas. Preserving freedom of the seas, which includes all of the rights, freedoms, and uses of the seas and adjacent airspace, including freedom of navigation and overflight, in the Arctic supports the nation's ability to exercise these rights, freedoms, and uses of the sea and airspace throughout the world, including through strategic straits.[293]

The document states that DOD

> will pursue comprehensive engagement with allies and partners to protect the homeland and support civil authorities in preparing for increased human activity in the Arctic. Strategic partnerships are the center of gravity in ensuring a peaceful opening of the Arctic and achieving the Department's desired end-state. Where possible, DoD will seek innovative, low-cost, small-footprint approaches to achieve these objectives (e.g., by participating in multilateral exercises ...). The Department [of Defense] will also evolve its infrastructure and capabilities in step with the changing physical environment in order to ensure security, support safety, promote defense cooperation, and prepare to respond to a wide range of challenges and contingencies in the Arctic in the coming decades. The Department [of Defense] will accomplish its objectives through the following ways:
>
> • Exercise sovereignty and protect the homeland;
>
> • Engage public and private sector partners to improve domain awareness in the Arctic;

[292] Department of Defense, *Arctic Strategy*, November 2013, p. 2.

[293] Department of Defense, *Arctic Strategy*, November 2013, p. 3.

> • Preserve freedom of the seas in the Arctic;
>
> • Evolve Arctic infrastructure and capabilities consistent with changing conditions;
>
> • Support existing agreements with allies and partners while pursuing new ones to build confidence with key regional partners;
>
> • Provide support to civil authorities, as directed;
>
> • Partner with other departments and agencies and nations to support human and environmental safety; and
>
> • Support the development of the Arctic Council and other international institutions that promote regional cooperation and the rule of law.[294]

The document states that challenges and risks to DOD's Arctic strategy include the possibility that projections about future access to and activity in the Arctic may prove inaccurate; the possibility that fiscal constraints may delay or deny needed investment in Arctic capabilities and curtail Arctic training; the possibility that "political rhetoric and press reporting about boundary disputes and competition for resources may inflame regional tensions"; and the possibility that "being too aggressive in taking steps to address anticipated future security risks may create the conditions of mistrust and miscommunication under which such risks could materialize."[295] Regarding the final two of these risks, the document states:

> Efforts to manage disagreements diplomatically may be hindered if the public narrative becomes one of rivalry and conflict. The Department [of Defense] will mitigate this risk by ensuring its plans, actions, and words are coordinated, and when appropriate, by engaging the press to counter unhelpful narratives with facts. The Under Secretary of Defense for Policy will monitor DoD activities, programs, and posture in the region to ensure the Department [of Defense] is sending a clear message to key audiences regarding the Department's efforts to promote security, safety, and defense cooperation....
>
> There is some risk that the perception that the Arctic is being militarized may lead to an "arms race" mentality that could lead to a breakdown of existing cooperative approaches to shared challenges. The Department [of Defense] will mitigate this risk by focusing on collaborative security approaches as outlined in the 2013 *National Strategy for the Arctic Region*, and by supporting other Federal departments and agencies where they have leadership roles. Building trust through transparency about the intent of our military activities and participation in bilateral and multilateral exercises and other engagements that facilitate information-sharing will be a key means of addressing this risk.[296]

January 2014 Implementation Plan for National Strategy for Arctic Region

The Administration's January 2014 implementation plan for its national strategy for the Arctic region (see "Background") makes DOD the lead federal agency for one of the plan's 36 or so specific initiatives, and a supporting agency for 18 others.[297] The initiative for which DOD is designated the lead federal agency is entitled "Develop a framework of observations and modeling to support forecasting and prediction of sea ice."[298]

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[294] Department of Defense, *Arctic Strategy*, November 2013, p. 7.

[295] Department of Defense, *Arctic Strategy*, November 2013, pp. 12-13.

[296] Department of Defense, *Arctic Strategy*, November 2013, p. 13.

[297] *Implementation Plan for The National Strategy for the Arctic Region*, January 2014, pp. 6-32.

[298] *Implementation Plan for The National Strategy for the Arctic Region*, January 2014, pp. 15-16.

2014 Quadrennial Defense Review (QDR) (Submitted March 2014)

The Department of Defense's (DOD's) report on the 2014 Quadrennial Defense Review (QDR), submitted to Congress in March 2014, states:

> Climate change also creates both a need and an opportunity for nations to work together, which the Department will seize through a range of initiatives. We are developing new policies, strategies, and plans, including the Department's Arctic Strategy and our work in building humanitarian assistance and disaster response capabilities, both within the Department and with our allies and partners.[299]

May 2015 House Armed Services Committee Report Language

The House Armed Services Committee, in its report (H.Rept. 114-102 of May 5, 2015) on H.R. 1735, the FY2016 National Defense Authorization Act, stated:

> Arctic Investments and Capabilities
>
> The committee notes that as one of seven Arctic nations, the United States has a vested interest in the security and stability of the Arctic region. With the Arctic becoming increasingly accessible and more broadly transited in the coming decades by both Arctic and non-Arctic nations, it is imperative that the United States be prepared to operate in the Arctic region when needed. To that end, the committee notes that the Department of Defense released a document outlining its Arctic Strategy in November 2013 and the Department of the Navy released its updated ''Arctic Roadmap'' in February 2014. The committee commends the Department for its focus on the Arctic region as its activity in the region increases.
>
> In order to meet the strategic objectives in the region, the committee believes it is important for the Department to continue to invest in training exercises, partnerships, infrastructure, and capabilities necessary to support potential operations in the Arctic region. The committee also encourages the Department to continue research efforts to develop security capabilities and strategies for the Arctic region. The committee notes that the Navy's ''Arctic Roadmap'' provided a plan to identify the requirements for an Arctic Center of Excellence in Fiscal Year 2015. Once the Navy has established the requirements for the Arctic Center of Excellence, the committee encourages the Navy to establish the center in a timely manner.
>
> Therefore, the committee directs the Secretary of the Navy to provide a report to the House Committee on Armed Services not later than February 1, 2016, that identifies the formal requirements that have been established for this center and a timeline for standing up the initial capabilities of the center. In establishing this center and determining a suitable location, the committee encourages the Navy to coordinate with other government agencies, academic institutions, and existing polar research efforts that can provide support and promote the United States security interests. (Pages 117-118)

June 2015 GAO Report

A June 2015 Government Accountability Office (GAO) report states:

> Recent strategic guidance on the Arctic issued by the administration and the Department of Defense (DOD) establish a supporting role for the department relative to other federal agencies, based on a low level of military threat expected in the region. In January 2014

[299] Department of Defense, *Quadrennial Defense Review 2014*, p. 25. An electronic word search of the document shows that this is the only occurrence of the word *Arctic* in the document.

the administration issued the Implementation Plan to the National Strategy for the Arctic Region that designated DOD as having a largely supporting role for the activities outlined in the plan. Additionally, DOD's Arctic Strategy issued in November 2013 and the Navy's Arctic Roadmap 2014-2030 issued in February 2014 emphasize that, as sea ice diminishes and the Arctic Ocean opens to more activity, the department may be called upon more frequently to support other federal agencies and work with partners to ensure a secure and stable region. To further its role, DOD participates in a number of forums focused on military security cooperation in the Arctic, including the Arctic Security Forces Roundtable, a senior-level event aimed at encouraging discussion among the security forces of Arctic and non-Arctic nations. In addition, DOD leads training exercises focused on building partner capacity in the region, including Arctic Zephyr, a multilateral scenario-based exercise. DOD continues to monitor the security environment in the region and is tracking indicators that could change its threat assessment and affect DOD's future role.

DOD has taken actions, along with interagency partners, to address some near-term capabilities needed in the Arctic, such as maritime domain awareness and communications. In recent years, DOD has conducted a number of studies to identify near-term capabilities the department needs to operate in the Arctic. The Implementation Plan to the National Strategy for the Arctic Region created an interagency framework and identified activities to address many of these needed capabilities. For example, as the lead agency for Arctic sea ice forecasting, DOD has established an interagency team to focus on improved sea ice modeling. DOD has also begun other efforts within the department to address capability needs. For example, the Navy's Arctic Roadmap prioritizes near-term actions to enhance its ability to operate in the Arctic and includes an implementation plan and timeline for operations and training, facilities, equipment, and maritime domain awareness, among other capabilities.

U.S. Northern Command—the DOD advocate for Arctic capabilities—stated that it is in the process of updating its regional plans for the Arctic and is conducting analysis to determine future capability needs. For example, Northern Command is updating the Commander's Estimate for the Arctic, which establishes the commander's intent and missions in the Arctic and identifies near-, mid-, and long-term goals. Additionally, the command is conducting studies of various Arctic mission areas, such as maritime homeland defense and undersea surveillance, to identify future capability needs. However, according to DOD's Arctic Strategy, uncertainty remains around the pace of change and commercial activity in the region that may affect its planning timelines. Difficulty in developing accurate sea ice models, variability in the Arctic's climate, and the uncertain rate of activity in the region create challenges for DOD to balance the risk of having inadequate capabilities or insufficient capacity when required to operate in the region with the cost of making premature or unnecessary investments. According to its Arctic Strategy, DOD plans to mitigate this risk by monitoring the changing Arctic conditions to determine the appropriate timing for capability investments.[300]

Bill Language in Conference Version of FY2016 National Defense Authorization Act

Section 1068 of the conference version of H.R. 1735, the FY2016 National Defense Authorization Act, requires DOD to submit a report setting forth an updated military strategy for protecting U.S. national security interests in the Arctic. Section 1248 amends the list of items to

[300] Government Accountability Office, *Arctic Planning[:] DOD Expects to Play a Supporting Role to Other Federal Agencies and Has Efforts Under Way to Address Capability Needs and Update Plans*, GAO-15-566, June 2015, summary page.

be included in an annual DOD report on military and security developments involving Russia to include an assessment of the force structure and capabilities of Russian military forces stationed in the Arctic and an assessment of Russian military strategy and objectives for the Arctic.

DOD Cooperation with Canada and Other Countries

In December 2009, it was reported that "U.S. and Canadian defense officials are studying emerging gaps in their awareness of Arctic activities, seeking to boost North American Aerospace Defense [NORAD] Command's maritime-warning mission and crafting a new threat assessment for the region." The effort would reportedly involve both NORAD and a Canadian-American advisory board called the Permanent Joint Board on Defense.[301]

In May 2010, it was reported that "American and Canadian defense officials are bolstering collaboration on military exercises, investment plans and technology development related to the Arctic." The report stated that "U.S. and Canadian intelligence officials have created a classified joint "utilization" assessment for the Arctic looking out to 2020, which will be continuously updated." It also stated that "American and Canadian defense officials have just started implementing a new five-year work plan that contains specific initiatives and requires concrete deliverables, Stockton said, noting the Arctic received special attention in the plan. The plan also covers defense critical infrastructure protection, defense support to civil agencies and defense cooperation in the Americas."[302]

In December 2012, the commander of NORAD and USNORTHCOM and the commander of the Canadian Joint Operations Command signed two documents on Arctic cooperation. A December 11, 2012, statement issued by NORAD and USNORTHCOM on the signing of the documents stated in part:

> Army Gen. Charles Jacoby, Jr., commander of NORAD and U.S. Northern Command, and Lt.-Gen. Stuart Beare, Canadian Joint Operations Command commander, signed two significant documents today—the Tri Command Framework for Arctic Cooperation and the Tri-Command Training and Exercise Statement of Intent—during the 230th meeting of the Canada-U.S. Permanent Joint Board on Defense in Colorado Springs, Colo.
>
> The Tri-Command Framework for Arctic Cooperation acknowledges the Arctic is not a region of conflict and the Canadian and U.S. militaries will support other departments and agencies in response to threats and hazards in the region when requested and directed. In that context, the goal of the Framework is to promote enhanced military cooperation in the Arctic and identify specific areas of potential Tri-Command cooperation in the preparation for and conduct of safety, security and defense operations. It strengthens an already unique and mature partnership where coordination and cooperation occurs on a regular basis. The Tri-Command Framework for Arctic Cooperation document is not a plan but rather outlines a process that supports the identification of opportunities for potential cooperation in the Arctic. Areas that continue to be improved, particularly in the Arctic, include planning, domain awareness, information-sharing, training and exercises, operations, capability development, and science and technology....
>
> The second document, the Tri Command Training and Exercise Statement of Intent, is aimed at enhancing joint and combined readiness in support of safety, security and

[301] Christopher J. Castelli, "DOD, Canada Aim TO Develop Arctic Policy Options By Early 2010," *Inside the Navy*, December 7, 2009.

[302] Christopher J. Castelli, "American, Canadian Defense Officials Tighten Ties On Arctic Issues," *Inside the Navy*, May 3, 2010.

> defence missions through combined training and exercises and reinforcing partnerships and collaboration among the Commands. The Tri-Command Training and Exercise Directive will help to ensure a timely and coordinated response to safety, security and defence challenges to North America.
>
> The signing of the Tri Command Framework for Arctic Cooperation and the Tri-Command Training and Exercise Statement of Intent follows on a Tri Command Strategy that spells out a series of shared tasks designed to strengthen working relationships with all Tri-Command defense and security partners.[303]

In June 2013, it was reported that

> Defense chiefs representing the world's eight main Arctic nations will strengthen cooperation in marine surveillance and expand joint military exercises.
>
> Moreover, defense commanders agreed to identify and appraise the military and civilian capabilities in each country that can be used to support civilian missions in the Arctic over the next 12 months.
>
> The new strategy, following a two-day meeting of defense commanders in the coastal Greenland town of Ilulissat that ended June 12, will focus on how the eight Arctic nations can bolster defense and security cooperation in the Arctic and how military resources can be better deployed to support civilian needs across borders.[304]

In March 2014 it was reported that

> The joint Canada-U.S. North American Aerospace Defence Command wants improved surveillance systems to keep close tabs on increasing activity in the Arctic, particularly in the region's waters, according to documents obtained by the *[Ottawa] Citizen*.
>
> Although the installation of any new systems wouldn't take place until around 2025, the final report on what needs to be done will be presented to top military commanders on both sides of the border this spring.
>
> The "Norad Next" initiative aims to provide direction for the alliance in the coming decades and determine what threats North America might face. It would see "the future modernization of the Norad surveillance network to provide improved multi-domain coverage, particularly in the Arctic region," according to a May 2012 briefing paper obtained by the Citizen under the Access to Information law.
>
> The initiative is spearheaded by Norad's U.S. commander Gen. Charles Jacoby.
>
> "A cornerstone of Gen. Jacoby's direction to his staff has been to emphasize the importance of outpacing emerging capabilities of potential adversaries," the briefing added.
>
> Norad Next coincides with the need to replace the alliance's inventory of aging surveillance equipment. Many of its current radars reach the end of their life cycles in the 2020-2025 time frame, according to the U.S. Department of Defense.
>
> Norad spokeswoman Capt. Jennifer Stadnyk noted that the alliance has maintained forward operating locations in the North for many years. "Additionally, the ever-increasing numbers of vessels transiting Arctic waters emphasize the need for Norad to

[303] NORAD news release, "NORAD, USNORTHCOM and Canadian Joint Operations Command Commander Sign Cooperative U.S./Canada Documents," December 11, 2012, accessed December 21, 2012, at http://www.norad.mil/News/2012/121112a.html.

[304] Gerard O'Dwyer, "Arctic Nations Set Cooperation Guidelines," *DefenseNews.com*, June 27, 2013. See also Gerard O'Dwyer, "Greenland Meeting Highlights Arctic's Growing Importance," *DefenseNews.com*, June 2, 2013.

observe, share and act on activity in that domain," she added in an email. "This will be studied during the Norad Next analysis."

Members of the Permanent Joint Board of Defence, with representatives from both countries, discussed the Norad Next concept during their meeting in December.

The initiative will make recommendations only; any decision for follow on action will have to be considered and approved by Canadian and U.S. leadership, Stadnyk added.[305]

In May 2014 it was reported that

Canadian and US military officials are looking at modernizing the North American Aerospace Defense Command's (NORAD's) surveillance capabilities as well as expanding its responsibilities to include monitoring Arctic waters.

A strategic review with various recommendations from NORAD on how to proceed is expected to be presented in the coming months to both Canada's chief of the Defence Staff, Gen. Tom Lawson, and US Army Gen. Martin Dempsey, chairman of the Joint Chiefs of Staff.

Royal Canadian Air Force Lt. Gen. Alain Parent, deputy commander of NORAD, said the review will focus NORAD toward the 2025-2030 timeframe....

But a 2012 briefing for the Canadian government noted that NORAD commander US Gen. Charles Jacoby is specifically interested in "the modernization of the NORAD surveillance network to provide improved multi-domain coverage, particularly of the Arctic region."

The five-page briefing on what is being called "NORAD Next" was forwarded to the government in June 2012 by then-Canadian Chief of the Defence Staff Gen. Walter Natynczyk.

It was obtained by Defense News and declassified under the Canadian government's access to information law.

"A cornerstone of Gen. Jacoby's direction to his staff has been to emphasize the importance of outpacing emerging capabilities of potential adversaries," the briefing noted. Those capabilities, however, have been censored from the report.

Canadian Army Capt. Jennifer Stadnyk, a spokeswoman for NORAD and US Northern Command, said the alliance's aircraft have been operating from forward locations in the Arctic for many years.

In April, NORAD aircraft conducted Operation Spring Forward, practicing a number of activities in the northern region of Canada.

But Stadnyk noted there has been an increasing amount of maritime traffic in the Arctic.

"The ever-increasing numbers of vessels transiting Arctic waters emphasize the need for NORAD to observe, share and act on activity in that domain," she said. "This will be studied during the NORAD Next analysis."

NORAD Next will make recommendations to the US and Canadian governments; they will determine which recommendations they will accept and act on, NORAD officials said.

Any recommendations that are approved will be implemented during a timeframe covering 2025 to 2030, Stadnyk said.

[305] David Pugliese, "Norad To Increase Focus On Arctic Surveillance," *Ottawa Citizen (www.ottawacitizen.com)*, March 3, 2014.

> Stadnyk said it's not possible at this point to estimate the cost to Canada and the US of any recommendations from the NORAD review.[306]

Navy and Coast Guard in General

The Navy and Coast Guard are exploring the potential implications that increased human activities in the Arctic may have for Navy and Coast Guard required numbers of ships and aircraft, ship and aircraft characteristics, new or enlarged Arctic bases, and supporting systems, such as navigation and communication systems. The Navy and Coast Guard have sponsored or participated in studies and conferences to explore these implications, the Coast Guard annually deploys cutters and aircraft into the region to perform missions and better understand the implications of operating such units there, and the Navy has deployed attack submarines to the region.[307]

Points or themes that have emerged in studies, conferences, and deployments regarding the potential implications for the U.S. Navy and Coast Guard of diminished Arctic sea ice include but are not limited to the following:

- The diminishment of Arctic ice is creating potential new operating areas in the Arctic for Navy surface ships and Coast Guard cutters.
- U.S. national security interests in the Arctic include "such matters as missile defense and early warning; deployment of sea and air systems for strategic sealift, strategic deterrence, maritime presence, and maritime security operations; and ensuring freedom of navigation and overflight."[308]
- Search and rescue in the Arctic is a mission of increasing importance, particularly for the Coast Guard, and one that poses potentially significant operational challenges (see "Search and Rescue" above).
- More complete and detailed information on the Arctic is needed to more properly support expanded Navy and Coast Guard ship and aircraft operations in the Arctic.
- The Navy and the Coast Guard currently have limited infrastructure in place in the Arctic to support expanded ship and aircraft operations in the Arctic.
- Expanded ship and aircraft operations in the Arctic may require altering ship and aircraft designs and operating methods.
- Cooperation with other Arctic countries will be valuable in achieving defense and homeland security goals.

[306] David Pugliese, "Canada, US Eye Arctic Responsibilities for NORAD," *DefenseNews.com*, May 3, 2014.

[307] See, for example, Coast Guard 17th District External Affairs Office, "Coast Guard Completes Arctic Shield 2015," *Alaska Native News*, October 21, 2015; and Michael Fabey, "Arctic Plunge," *Aviation Week & Space Technology (Defense Technology International insert)*, October 12-25, 2015, p. DTI12.

[308] NSPD 66/HSPD 25, Section III B.

Navy

November 2009 Navy Arctic Roadmap

The Navy issued its first Arctic roadmap on November 10, 2009.[309] The document, dated October 2009,[310] was intended to guide the service's activities regarding the Arctic for the period FY2010-FY2014. The document has now been succeeded by the 2014-2030 Navy Arctic roadmap (see discussion below).

August 2011 Navy Arctic Environmental Assessment and Outlook Report

In August 2011, the Navy released an Arctic environment assessment and outlook report.[311] The report states:

> As the Arctic environment continues to change and human activity increases, the U.S. Navy must be prepared to operate in this region. It is important to note that even though the Arctic is opening up, it will continue to be a harsh and challenging environment for the foreseeable future due to hazardous sea ice, freezing temperatures and extreme weather. Although the Navy submarine fleet has decades of experience operating in the Arctic, the surface fleet, air assets, and U.S. Marine Corps ground troops have limited experience there. The Navy must now consider the Arctic in terms of future policy, strategy, force structure, and investments.[312]

November 2013 DOD Arctic Strategy

The November 2013 DOD Arctic strategy (see discussion above in the section on DOD) states that "The Department of the Navy, in its role as DoD Executive Agent for Maritime Domain Awareness, will lead DoD coordination on maritime detection and tracking," and that "DoD will take steps to work with other Federal departments and agencies to improve nautical charts, enhance relevant atmospheric and oceanic models, improve accuracy of estimates of ice extent and thickness, and detect and monitor climate change indicators. In particular, the Department of the Navy will work in partnership with other Federal departments and agencies (e.g., DHS, the Department of Commerce) and international partners to improve hydrographic charting and oceanographic surveys in the Arctic."[313]

January 2014 Implementation Plan for National Strategy for Arctic Region

The Administration's January 2014 implementation plan for its national strategy for the Arctic region (see "Background") mentions the Navy by name only once, as one of several agencies that will "collaborate to improve marine charting in the Arctic (Integrated Ocean and Coastal Mapping) and topographic mapping (Alaska Mapping Executive Committee)."[314] As noted above

[309] Memorandum for Distribution dated November 10, 2009, from Admiral J. W. Greenert, Vice Chief of Naval Operations, on the subject of the Navy Arctic Roadmap, accessed July 24, 2013, at http://www.navy.mil/navydata/documents/USN_artic_roadmap.pdf.

[310] U.S. Navy, *U.S. Navy Arctic Roadmap*, Washington, 2009, 29 pp. (October 2009, sponsored by Task Force Climate Change [and] Oceanographer of the Navy).

[311] Department of the Navy, *Arctic Environmental Assessment and Outlook Report*, August 2011, 25 pp., accessed July 24, 2013, at http://greenfleet.dodlive.mil/files/2011/08/U.S.-Navy-Arctic-Environmental-Assessment.pdf.

[312] Department of the Navy, *Arctic Environmental Assessment and Outlook Report*, August 2011, p. v.

[313] Department of Defense, *Arctic Strategy*, November 2013, p. 9.

[314] *Implementation Plan for The National Strategy for the Arctic Region*, January 2014, p. 23.

in the discussion of DOD in general, however, the January 2014 implementation plan makes DOD the lead federal agency for one of the plan's 36 or so specific initiatives and a supporting agency for 18 others.[315] The Navy will likely be a prominent participant in DOD's activities for a number of these 19 initiatives.

February 2014 Updated Navy Arctic Roadmap for 2014-2030

On February 24, 2014, the Navy released an updated Arctic roadmap intended to guide Navy activities regarding the Arctic for the period 2014-2030.[316] The document is the successor to the November 2009 Navy Arctic roadmap (see discussion above). The executive summary of the 2014-2030 Navy Arctic roadmap states:

> The United States Navy, as the maritime component of the Department of Defense, has global leadership responsibilities to provide ready forces for current operations and contingency response that include the Arctic Ocean. The Arctic Region remains a challenging operating environment, with a harsh climate, vast distances, and little infrastructure. These issues, coupled with limited operational experience, are just a few substantial challenges the Navy will have to overcome in the Arctic Region. While the Region is expected to remain a low threat security environment where nations resolve differences peacefully, the Navy will be prepared to prevent conflict and ensure national interests are protected....
>
> Navy functions in the Arctic Region are no different from those in other maritime regions; however, the Arctic Region environment makes the execution of many of these functions4 much more challenging....
>
> In support of National and Department of Defense aims, the Navy will pursue the following strategic objectives:
>
> • *Ensure United States Arctic sovereignty and provide homeland defense*;
>
> • *Provide ready naval forces* to respond to crisis and contingencies;
>
> • *Preserve freedom of the seas*; and
>
> • *Promote partnerships* within the United States Government and with international allies and partners....
>
> Resource constraints and competing near-term mission demands require that naval investments be informed, focused, and deliberate. Proactive planning today allows the Navy to prepare its forces for Arctic Region operations. This Roadmap emphasizes low-cost, long-lead activities that position the Navy to meet future demands. In the near to mid-term, the Navy will concentrate on improving operational capabilities, expertise, and capacity, extending reach, and will leverage interagency and international partners to achieve its strategic objectives. The Roadmap recognizes the need to guide investments by prudently balancing regional requirements with national goals....
>
> This Roadmap provides direction to the Navy for the near-term (present-2020), mid-term (2020-2030), and far-term (beyond 2030), placing particular emphasis on near-term actions necessary to enhance Navy's ability to operate in the Arctic Region in the future. In the near-term, there will be low demand for additional naval involvement in the

[315] *Implementation Plan for The National Strategy for the Arctic Region*, January 2014, pp. 6-32. The activity entitled "Develop a Framework of Observations and Modeling to Support Forecasting and Prediction of Sea Ice" is presented on pages 15-16.

[316] U.S. Navy, *U.S. Navy Arctic Roadmap 2014 – 2030*, February 2014, 43 pp., accessed February 26, 2014, at http://www.navy.mil/docs/USN_arctic_roadmap.pdf.

> Region. Current Navy capabilities are sufficient to meet near-term operational needs. Navy will refine doctrine, operating procedures, and tactics, techniques, and procedures to guide future potential operations in the Arctic Region. In the mid-term, the Navy will provide support to the Combatant Commanders, United States Coast Guard, and other United States Government agencies. In the far-term, increased periods of ice-free conditions could require the Navy to expand this support on a more routine basis.[317]

Regarding "United States Navy Ways and Means for Near-Term, Mid-Term, and Far-Term Operations," the roadmap states:

> ***Near-term: Present to 2020.***
>
> The Navy will continue to provide capability and presence primarily through undersea and air assets. Surface ship operations will be limited to open water operations in the near-term. Even in open water conditions, weather factors, including sea ice, must be considered in operational risk assessments. During shoulder seasons, the Navy may employ ice strengthened Military Sealift Command (MSC) ships to conduct Navy missions.
>
> By 2020, the Navy will increase the number of personnel trained in Arctic operations. The Navy will grow expertise in all domains by continuing to participate in exercises, scientific missions, and personnel exchanges in Arctic-like conditions. Personnel exchanges will provide Sailors with opportunities to learn best practices from other United States' military services, interagency partners, and international allies and partners.
>
> The Navy will refine or develop the necessary strategy, policy, plans, and requirements for the Arctic Region. Additionally, the Navy will continue to study and make informed decisions on pursuing investments to better facilitate Arctic operations. The Navy will emphasize low cost, long-lead time activities to match capability and capacity to future demands. The Navy will update operating requirements and procedures for personnel, ships, and aircraft to operate in the Region with interagency partners and allies. Through ongoing exercises, such as Ice Exercise (ICEX) and Scientific Ice Expeditions (SCICEX) research, and transits through the region by Navy submarines, aircraft and surface vessels, the Navy will continue to learn more about the evolving operating environment. The Navy will focus on areas where it provides unique capabilities and will leverage joint and coalition partners to fill identified gaps and seams.
>
> ***Mid-term: 2020 to 2030.***
>
> By 2030, the Navy will have the necessary training and personnel to respond to contingencies and emergencies affecting national security. As the Arctic Ocean becomes increasingly ice-free, surface vessels will operate in the expanding open water areas. The Navy will improve its capabilities by participating in increasingly complex exercises and training with regional partners. While primary risks in the mid-term will likely be meeting search and rescue or disaster response mission demands, the Navy may also be called upon to ensure freedom of navigation in Arctic Ocean waters. The Navy will work to mitigate the gaps and seams and transition its Arctic Ocean operations from a capability to provide periodic presence to a capability to operate deliberately for sustained periods when needed.
>
> ***Far-term: Beyond 2030.***
>
> In the far-term, Navy will be capable of supporting sustained operations in the Arctic Region as needed to meet national policy guidance. The Navy will provide trained and equipped personnel, along with surface, subsurface, and air capabilities, to achieve

[317] U.S. Navy, *U.S. Navy Arctic Roadmap 2014 – 2030*, February 2014, pp. 3-4. Italics as in original.

> Combatant Commander's objectives. The high confidence of diminished ice coverage and navigable waterways for much of the year will enable naval forces to operate forward, ready to respond to any potential threat to national security, or to provide contingency response. Far-term risks include increased potential for search and rescue and DSCA [Defense Support of Civil Authorities], but may also require naval forces to have a greater focus on maritime security and freedom of navigation in the Region.[318]

Coast Guard

Overview—November 2015 Coast Guard Testimony

At a November 17, 2015, hearing on Arctic operations before two subcommittees of the House Foreign Affairs Committee, the Coast Guard testified that

> The Coast Guard has been operating in the Arctic Ocean since 1867, when Alaska was purchased from Russia. Then, as now, our mission is to enforce U.S. laws and regulations, conduct search and rescue, assist scientific exploration, and foster navigation safety and environmental stewardship. The Coast Guard uses mobile command and control platforms including large cutters and ocean-going ice-strengthened buoy tenders, as well as seasonal air and communications capabilities to execute these missions within more than 950,000 square miles of ocean off the Alaskan coast.
>
> Since 2008, the Coast Guard has conducted operations in the Arctic Region to assess our capabilities and mission requirements as maritime activity and environmental conditions warrant. These operations have included establishing small, temporary Forward Operating Locations along the North Slope to test our capabilities with boats, helicopters, and personnel. Each year from April to November we also fly aerial sorties to evaluate activities in the region. We will continue to deploy a suite of Coast Guard cutters to test our equipment, train our crews, and increase our awareness of Arctic activity.[319]

Coast Guard High Latitude Study Provided to Congress in July 2011

In July 2011, the Coast Guard provided to Congress a study on the Coast Guard's missions and capabilities for operations in high-latitude (i.e., polar) areas. The study, commonly known as the High Latitude Study, is dated July 2010 on its cover. The High Latitude Study concluded the following:

> [The study] concludes that future [Coast Guard] capability and capacity gaps will significantly impact four [Coast Guard] mission areas in the Arctic: Defense Readiness, Ice Operations, Marine Environmental Protection, and Ports, Waterways, and Coastal Security. These mission areas address the protection of important national interests in a geographic area where other nations are actively pursuing their own national goals. U.S. national policy and laws define the requirements to assert the nation's jurisdiction over its territory and interests; to ensure the security of its people and critical infrastructure; to participate fully in the collection of scientific knowledge; to support commercial enterprises with public utility; and to ensure that the Arctic environment is not degraded by increased human activity.

[318] U.S. Navy, *U.S. Navy Arctic Roadmap 2014 – 2030*, February 2014, pp. 18-19.

[319] Testimony of Vice Admiral Charles D. Michel, Vice Commandant, U.S. Coast Guard, on "Arctic Operations," Before the House Foreign Affairs Committee—Western Hemisphere & Europe, Eurasia, and Emerging Threats Subcommittees, November 17, 2015, p. 1.

The Coast Guard's ability to support Defense Readiness mission requirements in the Arctic is closely linked to DoD responsibilities. The Coast Guard presently possesses the only surface vessels capable of operating in ice-covered and ice-diminished waters. The Coast Guard supports (1) DoD missions such as the resupply of Thule Air Base in Greenland and logistics support (backup) for McMurdo Station in Antarctica and (2) Department of State (DoS) directed Freedom of Navigation Operations. These unique Coast Guard capabilities have been noted by the Joint Chiefs of Staff, the Navy's Task Force Climate Change, and the recently issued Naval Operations Concept 2010.

The common and dominant contributor to these significant mission impacts is the gap in polar icebreaking capability....[320]

Other capability gaps contributing to the impact on Coast Guard ability to carry out its missions in the Arctic include

- Communications System Capability – Continuous coverage along Alaska's West Coast, the Bering Strait, and throughout the North Slope is required for exchanging voice and data communications with Coast Guard units and other government and commercial platforms offshore.
- Forward Operating Locations - No suitable facilities currently exist on the North Slope or near the Bering Strait with facilities sufficient to support extended aircraft servicing and maintenance. Aircraft must travel long distances and expend significant time transiting to and from adequate facilities. This gap reduces on-scene presence and capability to support sustained operations in the region.
- Environmental response in ice-covered waters - The technology and procedures for assessment and mitigation measures for oil spills in ice-covered waters are not fully developed or tested.

Capability gaps in the Arctic region have moderate impacts on [the Coast Guard's] Aids to Navigation (AtoN), Search and Rescue (SAR), and Other Law Enforcement (OLE) missions. Both AtoN and SAR involve the safety of mariners and will gain more importance not only as commerce and tourism cause an increase in maritime traffic, but as U.S. citizens in northern Alaska face more unpredictable conditions. Performance of OLE will be increasingly necessary to ensure the integrity of U.S. living marine resources from outside pressures....

In addition to the assessment of polar icebreaking needs, the Arctic mission analysis examined a set of theoretical mixes (force packages) of Coast Guard assets consisting of icebreakers, their embarked helicopters, and deployment alternatives using aviation forward operating locations in Arctic Alaska....

All [six] of the force mixes [considered in the study] add assets to the existing Coast Guard Alaska Patrol consisting of (1) a high-endurance cutter (not an icebreaker) deployed in the Bering Sea carrying a short range recovery helicopter, and (2) medium range recovery helicopters located at Kodiak in the Gulf of Alaska, and seasonally deployed to locations in Cold Bay and St. Paul Island....

These force packages and associated risk assessment provide a framework for acquisition planning as the Coast Guard implements a strategy for closing the capability gaps. By first recapitalizing the aging icebreakers, the Coast Guard provides a foundation for buildout of these force mixes. In addition to the cost of the icebreakers, the force packages require investment in forward operating locations and in medium range helicopters. The mission analysis reports developed rough order-of-magnitude cost

[320] For additional discussion, see "Polar Icebreaking."

> estimates for forward operating locations at approximately $36M [million] each and for helicopters at $9M each....
>
> The analysis shows that the current Coast Guard deployment posture is not capable of effective response in northern Alaska and that response may be improved through a mix of deployed cutters, aircraft, and supporting infrastructure including forward operating locations and communications/navigation systems.[321]

May 2013 Coast Guard Arctic Strategy

On May 21, 2013, the Coast Guard released a strategy document for the Arctic.[322] The executive summary of the document states in part:

> The U.S. Coast Guard, as the maritime component of the U.S. Department of Homeland Security (DHS), has specific statutory responsibilities in U.S. Arctic waters. This strategy outlines the ends, ways, and means for achieving strategic objectives in the Arctic over the next 10 years. The Coast Guard is responsible for ensuring safe, secure, and environmentally responsible maritime activity in U.S. Arctic waters. Our efforts must be accomplished in close coordination with DHS components, and involve facilitating commerce, managing borders, and improving resilience to disasters.
>
> The Coast Guard's current suite of cutters, boats, aircraft, and shore infrastructure must meet a number of near-term mission demands. The Coast Guard employs mobile command and control platforms such as large cutters and ocean-going ice-strengthened buoy tenders, as well as seasonal air and communications capabilities through leased or deployable assets and facilities. These mobile and seasonal assets and facilities have proven to be important enablers for front-line priorities in the region, including search and rescue operations, securing the maritime border, collecting critical intelligence, responding to potential disasters, and protecting the marine environment....
>
> Although winter sea travel is still severely limited due to extensive ice coverage across the region, recent summer and early autumn sea ice extent record lows have made seasonal maritime navigation more feasible. Economic development, in the forms of resource extraction, adventure tourism, and trans-Arctic shipping drives much of the current maritime activity in the region.
>
> [Oil and gas exploration] activities [in the region] bring risk, which can be mitigated through appropriate maritime governance. Additionally, tourism is increasing rapidly in the Arctic. Due to undeveloped shore-based infrastructure, much of the increased tourism is expected to involve transportation via passenger vessel, further increasing near- and offshore activities in Arctic waters.
>
> This document outlines three strategic objectives in the Arctic for the U.S. Coast Guard over the next 10 years:
>
> **• Improving Awareness**
>
> **• Modernizing Governance**
>
> **• Broadening Partnerships**
>
> ***Improving Awareness:*** Coast Guard operations require precise and ongoing awareness of activities in the maritime domain. Maritime awareness in the Arctic is currently restricted due to limited surveillance, monitoring, and information system capabilities. Persistent

[321] *United States Coast Guard High Latitude Region Mission Analysis Capstone Summary*, July 2010, pp. 10-11, 13-15.

[322] *United States Coast Guard Arctic Strategy*, Washington, May 2013, 47 pp.; accessed May 24, 2013, at http://www.uscg.mil/seniorleadership/DOCS/CG_Arctic_Strategy.pdf.

awareness enables identification of threats, information-sharing with front-line partners, and improved risk management. Improving awareness requires close collaboration within DHS, as well as with the Departments of State, Defense, Interior, the National Science Foundation and other stakeholders to enhance integration, innovation, and fielding of emerging technologies. The Intelligence Community and non-federal partners are also vital stakeholders.

Modernizing Governance: The concept of governance involves institutions, structures of authority, and capabilities necessary to oversee maritime activities while safeguarding national interests. Limited awareness and oversight challenge maritime sovereignty, including the protection of natural resources and control of maritime borders. The Coast Guard will work within its authorities to foster collective efforts, both domestically and internationally, to improve Arctic governance. In so doing, the Coast Guard will review its own institutions and regimes of governance to prepare for future missions throughout the Arctic.

Broadening Partnerships: Success in the Arctic requires a collective effort across both the public and private sectors. Such a collective effort must be inclusive of domestic regulatory regimes; international collaborative forums such as the Arctic Council, International Maritime Organization (IMO), and Inuit Circumpolar Council; domestic and international partnerships; and local engagements in Arctic communities focusing on training and volunteer service. Success in the Arctic also depends upon close intergovernmental cooperation to support national interests, including working closely within DHS, as well as with the Department of State, Department of Interior and other Federal partners as the U.S. prepares to assume Chairmanship of the Arctic Council in 2015.

Beyond these three strategic objectives, there are a number of additional factors that will position the Coast Guard for long-term success. These factors include building national awareness of the Arctic and its opportunities, strengthening maritime regimes, improving public-private relationships through a national concept of operations, seeking necessary authorities, and identifying future requirements and resources to shape trends favorably. This strategy outlines a number of priorities, ranging from capabilities and requirements to advances in science and technology that will facilitate our Nation's success in the region. Specifically, the strategy advocates to leverage the entire DHS enterprise and component capabilities to secure our borders, prevent terrorism, adapt to changing environmental conditions, enable community resilience and inform future policy.

Operating in the Arctic is not a new venture for the Coast Guard. However, adapting to changing conditions will require foresight, focus, and clear priorities. This strategy will ensure we attain the aim of safe, secure, and environmentally responsible maritime activity in the Arctic by improving awareness, modernizing governance, and broadening partnerships to ensure long-term success.[323]

January 2014 Implementation Plan for National Strategy for Arctic Region

The Administration's January 2014 implementation plan for its national strategy for the Arctic region (see "Background") makes "Department of Homeland Security (United States Coast Guard)" the lead federal agency for six of the plan's 36 or so specific initiatives, and a supporting agency for 13 others.[324] The six initiatives where the Coast Guard is designated the lead federal agency include

[323] *United States Coast Guard Arctic Strategy*, Washington, May 2013, pp. 9-10. Emphasis as in original.

[324] *Implementation Plan for The National Strategy for the Arctic Region*, January 2014, pp. 7-31.

- enhance Arctic domain awareness;
- improve hazardous material spill prevention, containment, and response;
- promote Arctic oil pollution preparedness, prevention, and response internationally;
- enhance Arctic search and rescue;
- expedite International Maritime Organization (IMO) Polar Code development and adoption; and
- promote Arctic waterways management.[325]

For the second initiative above—"Improve Hazardous Material Spill Prevention, Containment, and Response"—the Coast Guard shares lead-agency status with the Environmental Protection Agency (EPA), with the Coast Guard being the lead federal agency for open ocean and coastal spills, and EPA being the lead federal agency for inland spills.[326]

October 2015 Agreement on Arctic Coast Guard Forum (ACGF)

The Coast Guard, working with coast guards of other Arctic nations, in October 2015 established an Arctic Coast Guard Forum (ACGF). The Coast Guard states that

> The Arctic Coast Guard Forum (ACGF), modeled after the successful North Pacific Coast Guard Forum, is a unique maritime governance group where Principals of all eight Arctic countries discuss coordination of exercises, strengthen relationships, and share best practices. Complimentary to the Arctic Council, the chairmanship of the ACGF will reside with the country holding the rotating chair of the Arctic Council. The first "experts-level" meetings of the ACGF in 2014 garnered enthusiastic approval of the concept. Representatives of the eight Arctic nations finalized and agreed on a Terms of Reference document, determined working groups (Secretariat and Combined Operations), and drafted a Joint Statement. The first ever "Heads of Arctic Coast Guards" meeting took place on October 28-30, 2015 at the U.S. Coast Guard Academy, and the participating nations approved the Terms of Reference and released the Joint Statement.[327]

[325] *Implementation Plan for The National Strategy for the Arctic Region*, January 2014, pp. 7-8, 13, 24, 25, 31, and 31, respectively.

[326] *Implementation Plan for The National Strategy for the Arctic Region*, January 2014, p. 13.

[327] Testimony of Vice Admiral Charles D. Michel, Vice Commandant, U.S. Coast Guard, on "Arctic Operations," Before the House Foreign Affairs Committee—Western Hemisphere & Europe, Eurasia, and Emerging Threats Subcommittees, November 17, 2015, p. 4. See also Bob Weber, "Eight Arctic Countries to Sign Historic Coast Guard Deal," *Metro News*, October 21, 2015; Levon Sevunts, "Arctic Nations Agree on Coast Guard Cooperation," *Alaska Dispatch News*, October 29, 2015; "Arctic Coast Guard Forum Ready for Action," *Maritime Executive*, October 30, 2015; Ronald A. LaBrec, "U.S. Coast Guard Unveils a New Model for Cooperation Atop the World," Council on Foreign Relations, November 2, 2015; Andreas Osthagen, "The Arctic Coast Guard Forum: Big Tasks, Small Solutions," Arctic Institute, November 3, 2015.

Potential Oversight Questions Relating to Arctic Policy and Strategy[328]

January 2009 Arctic Policy Directive (NSPD 66/HSPD 25)

As noted earlier (see "January 2009 Arctic Policy Directive (NSPD 66/HSPD 25)" in "Background"), the Obama Administration is currently operating under the January 2009 Arctic region policy directive (NSPD 66/HSPD 25) issued by the George W. Bush Administration.[329] Potential oversight questions include but not are limited to the following:

- Is NSPD 66/HSPD 25 a suitable statement of U.S. policy for the Arctic region?[330]
- Although the Obama Administration is currently operating under NSPD 66/HSPD 25, does the Obama Administration fully agree with all parts of it? If not, with which parts does it not fully agree?
- Does the Obama Administration intend to eventually conduct a review of NSDP 66/HSPD 25? If so, what is the Administration's schedule for conducting and releasing the results of that review?

In connection with the above questions, a March 2013 report from the Center for Strategic and International Studies (CSIS) on U.S. interests and U.S. government actors in the Arctic stated:

> NSPD-66/HSPD-25 contains a rigorous implementation schedule for the federal government. Yet, as this directive passes its fourth anniversary, many implementation strategies have not been put into effect. That said, several of the policy priorities and implementation strategies are redundant. For example, to meet U.S. security interests in the Arctic, an interagency group under the leadership of the departments of State, Defense, and Homeland Security is requested to "develop greater capabilities and capacity [...] to protect U.S. air, land and sea borders" and "increase Arctic maritime domain awareness." Under maritime transportation, these same agencies, with the departments of Transportation and Commerce, are to "determine basing and logistics support requirements, including necessary airlift and icebreaking capabilities; and improve plans and cooperative agreements for search and rescue." These overlapping mandates raise the question whether this strategy is a security function, an act of commerce—or both—and who ultimately is accountable for implementing the strategy.
>
> Such policy overlap and redundancy accurately reflects U.S. Arctic policymaking today and unfortunately reflects poorly on the interagency process following the release of NSPD-66. A successful future policy demands a more streamlined and prioritized process.

[328] This section prepared by Ronald O'Rourke, Specialist in Naval Affairs, Foreign Affairs, Defense, and Trade Division.

[329] CRS communication with State Department official, October 8, 2010.

[330] On this question, a January 19, 2009, press article about the new directive stated:

> The new policy directive covers several key areas, including national security, energy exploration and the environment, but it does not specify whether any should take precedence over others.
>
> That led Jeremy Rabkin, a professor at George Mason University Law School, to comment: "It's really a list of all the things we're concerned about; that's not policy. I don't see anything here that helps you decide what gets priority."
>
> (Juliet Eilperin and Spencer S. Hsu, "White House Directive Guides Policy On Arctic," *Washington Post*, January 19, 2009: 2.)

> It is time to update NSPD-66. Other Arctic coastal states emerged with Arctic policy statements around the same time as the United States did, in the 2007 to 2009 timeframe. Since issuing these statements, however, most other Arctic nations have updated and further refined their whole-of-government strategies. Unfortunately, the United States has failed to do so. Separate federal agencies and departments have developed, or will be developing, their own separate strategies based on NSPD-66, but this effort has been uneven at best.... The Department of Defense report on Arctic Operations and the Northwest Passage was congressionally mandated by the fiscal year 2011 National Defense Authorization Act. However, there is no such mandate for other U.S. government agencies and, consequently, most other agencies have yet to develop their own implementation strategy stemming from NSPD-66.
>
> What would an updated U.S. Arctic strategy require? The seven policy areas identified in NSPD-66 remain relevant, but these areas must be defined more clearly.
>
> First and foremost, the United States must create a long-term economic strategy for the American Arctic. The first component of an Arctic economic strategy must be an energy, mineral resource, and infrastructure strategy. NSPD-66 states that "Energy development in the Arctic region will play an important role in meeting growing global energy demand." How large a role? At present, U.S. energy strategy consists of a five-year offshore licensing and permitting plan that ends in 2017. The government needs to define its long-term offshore and onshore energy strategy for Alaska, answering such questions as whether America's Arctic energy resources are intended to meet U.S. demand or to be exported to Asian markets. Other questions in need of answers include the status of port, pipeline, and liquid natural gas infrastructure; whether methane hydrates are viable; and whether energy development can be pursued in an environmentally sustainable way in such a fragile environment.
>
> Based on the answers to these questions, America's Arctic economic strategy must also include a detailed maritime transportation and infrastructure strategy. This strategy would ideally be built around ecosystem-based management. It is clear that a future U.S. Arctic maritime or infrastructure strategy will likely be a public-private partnership, as the private sector will provide significantly more financial and physical resources than will the U.S. government.[331]

May 2013 Arctic Strategy and January 2014 Implementation Plan

As noted earlier (see "Background"), the Administration on May 10, 2013, released a national strategy for the Arctic, and on January 30, 2014, released an implementation plan for that strategy. Potential oversight questions include but not are limited to the following:

- Does the May 2013 Arctic strategy document correctly identify U.S. interests in the Arctic and principal U.S. lines of effort for the region?
- Does the May 2013 Arctic strategy document adequately balance goals for the region against potential resources available for pursuing those goals, and provide an adequate guide for prioritizing the goals in a situation of constrained resources?
- Does the January 2014 implementation plan correctly identify the principal initiatives needed to implement the Arctic strategy document?

[331] Heather A. Conley et al., *The New Foreign Policy Frontier[:] U.S. Interests and Actors in the Arctic*, Washington, Center for Strategic & International Studies, March 2013, pp. 21-22.

- Does the January 2014 implementation plan correctly identify the next steps to be taken for implementing the various initiatives? Does it provide adequate metrics for measuring progress in achieving the initiatives? Does it select the correct federal agencies to act as lead agencies and supporting agencies for achieving them?
- Does the January 2014 implementation plan adequately identify risks and challenges in implementing the various initiatives, including those related to potential limits on resources? Does it provide an adequate guide for prioritizing the initiatives in a situation of constrained resources?
- Who in the executive branch has been designated as the person responsible for ensuring that the various goals in the January 2014 implementation plan are implemented in a timely manner?[332]

CRS Reports on Specific Arctic-Related Issues

CRS Report RL34266, *Climate Change: Science Highlights*, by (name redacted)

CRS Report RS21890, *The U.N. Law of the Sea Convention and the United States: Developments Since October 2003*, by (name redacted)

CRS Report RL32838, *Arctic National Wildlife Refuge (ANWR): Votes and Legislative Actions Since the 95th Congress*, by (name redacted) and (name redacted)

CRS Report RL34547, *Possible Federal Revenue from Oil Development of ANWR and Nearby Areas*, by (name redacted)

CRS Report RL33705, *Oil Spills: Background and Governance*, by (name redacted)

CRS Report RL33941, *Polar Bears: Listing Under the Endangered Species Act*, by (name reda cted), (name redacted), and (name redacted)

CRS Report RS22906, *Use of the Polar Bear Listing to Force Reduction of Greenhouse Gas Emissions: The Legal Arguments*, by (name redacted)

CRS Report RL34391, *Coast Guard Polar Icebreaker Modernization: Background and Issues for Congress*, by (name redacted)

CRS Report RL34342, *Homeland Security: Roles and Missions for United States Northern Command*, by (name redacted)

[332] For examples of congressional reactions to the January 2014 implementation plan, see, the January 30, 2014, press release from the office of Senator Mark Begich entitled "Begich Calls on White House to Fund Arctic Plan," accessed February 26, 2014, at http://www.begich.senate.gov/public/index.cfm/2014/1/begich-calls-on-white-house-to-fund-arctic-plan; and the February 13, 2014, press release from the office of Senator Lisa Murkowski entitled "Murkowski Slams "Unambitious" White House Arctic Plan," accessed February 26, 2014, at http://www.murkowski.senate.gov/public/index.cfm?p=PressReleases&ContentRecord_id=30e9f7c2-28ce-4baf-9ffe-5171ac6ceaa8&ContentType_id=b94acc28-404a-4fc6-b143-a9e15bf92da4&Group_id=c01df158-d935-4d7a-895d-f694ddf41624. The February 13, 2014, press release cites a February 11, 2014, letter from Senator Murkowski to President Obama, which was accessed February 26, 2014, at http://www.murkowski.senate.gov/public/?a=Files.Serve&File_id=875ea38b-f881-459d-a2b1-220e17f99dc7.

Appendix A. Arctic Research and Policy Act (ARPA) of 1984 (Title I of P.L. 98-373)

The text of the Arctic Research and Policy Act (ARPA) of 1984 (Title I of P.L. 98-373 of July 31, 1984)[333] is as follows:

TITLE I – ARCTIC RESEARCH AND POLICY

SHORT TITLE

SEC. 101. This title may be cited as the "Arctic Research and Policy Act of 1984".

FINDINGS AND PURPOSES

SEC. 102. (a) The Congress finds and declares that-

(1) the Arctic, onshore and offshore, contains vital energy resources that can reduce the Nation's dependence on foreign oil and improve the national balance of payments;

(2) as the Nation's only common border with the Soviet Union, the Arctic is critical to national defense;

(3) the renewable resources of the Arctic, specifically fish and other seafood, represent one of the Nation's greatest commercial assets;

(4) Arctic conditions directly affect global weather patterns and must be understood in order to promote better agricultural management throughout the United States;

(5) industrial pollution not originating in the Arctic region collects in the polar air mass, has the potential to disrupt global weather patterns, and must be controlled through international cooperation and consultation;

(6) the Arctic is a natural laboratory for research into human health and adaptation, physical and psychological, to climates of extreme cold and isolation and may provide information crucial for future defense needs;

(7) atmospheric conditions peculiar to the Arctic make the Arctic a unique testing ground for research into high latitude communications, which is likely to be crucial for future defense needs;

(8) Arctic marine technology is critical to cost-effective recovery and transportation of energy resources and to the national defense;

(9) the United States has important security, economic, and environmental interests in developing and maintaining a fleet of icebreaking vessels capable of operating effectively in the heavy ice regions of the Arctic;

(10) most Arctic-rim countries, particularly the Soviet Union, possess Arctic technologies far more advanced than those currently available in the United States;

(11) Federal Arctic research is fragmented and uncoordinated at the present time, leading to the neglect of certain areas of research and to unnecessary duplication of effort in other areas of research;

(12) improved logistical coordination and support for Arctic research and better dissemination of research data and information is necessary to increase the efficiency and utility of national Arctic research efforts;

[333] Title II of P.L. 98-373 is the National Critical Materials Act of 1984.

(13) a comprehensive national policy and program plan to organize and fund currently neglected scientific research with respect to the Arctic is necessary to fulfill national objectives in Arctic research;

(14) the Federal Government, in cooperation with State and local governments, should focus its efforts on the collection and characterization of basic data related to biological, materials, geophysical, social, and behavioral phenomena in the Arctic;

(15) research into the long-range health, environmental, and social effects of development in the Arctic is necessary to mitigate the adverse consequences of that development to the land and its residents;

(16) Arctic research expands knowledge of the Arctic, which can enhance the lives of Arctic residents, increase opportunities for international cooperation among Arctic-rim countries, and facilitate the formulation of national policy for the Arctic; and

(17) the Alaskan Arctic provides an essential habitat for marine mammals, migratory waterfowl, and other forms of wildlife which are important to the Nation and which are essential to Arctic residents.

(b) The purposes of this title are-

(1) to establish national policy, priorities, and goals and to provide a Federal program plan for basic and applied scientific research with respect to the Arctic, including natural resources and materials, physical, biological and health sciences, and social and behavioral sciences;

(2) to establish an Arctic Research Commission to promote Arctic research and to recommend Arctic research policy;

(3) to designate the National Science Foundation as the lead agency responsible for implementing Arctic research policy; and

(4) to establish an Interagency Arctic Research Policy Committee to develop a national Arctic research policy and a five year plan to implement that policy.

ARCTIC RESEARCH COMMISSION

SEC. 103. (a) The President shall establish an Arctic Research Commission (hereafter referred to as the "Commission").

(b)(1) The Commission shall be composed of five members appointed by the President, with the Director of the National Science Foundation serving as a nonvoting, ex officio member. The members appointed by the President shall include-

(A) three members appointed from among individuals from academic or other research institutions with expertise in areas of research relating to the Arctic, including the physical, biological, health, environmental, social, and behavioral sciences;

(B) one member appointed from among indigenous residents of the Arctic who are representative of the needs and interests of Arctic residents and who live in areas directly affected by Arctic resource development; and

(C) one member appointed from among individuals familiar with the Arctic and representative of the needs and interests of private industry undertaking resource development in the Arctic.

(2) The President shall designate one of the appointed members of the Commission to be chairperson of the Commission.

(c)(1) Except as provided in paragraph (2) of this subsection, the term of office of each member of the Commission appointed under subsection (b)(1) shall be four years.

(2) Of the members of the Commission originally appointed under subsection (b)(1)-

(A) one shall be appointed for a term of two years;

(B) two shall be appointed for a term of three years; and

(C) two shall be appointed for a term of four years.

(3) Any vacancy occurring in the membership of the Commission shall be filled, after notice of the vacancy is published in the Federal Register, in the manner provided by the preceding provisions of this section, for the remainder of the unexpired term.

(4) A member may serve after the expiration of the member's term of office until the President appoints a successor.

(5) A member may serve consecutive terms beyond the member's original appointment.

(d)(1) Members of the Commission may be allowed travel expenses, including per diem in lieu of subsistence, as authorized by section 5703 of title 5, United States Code. A member of the Commission not presently employed for compensation shall be compensated at a rate equal to the daily equivalent of the rate for GS-16 of the General Schedule under section 5332 of title 5, United States Code, for each day the member is engaged in the actual performance of his duties as a member of the Commission, not to exceed 90 days of service each year. Except for the purposes of chapter 81 of title 5 (relating to compensation for work injuries) and chapter 171 of title 28 (relating to tort claims), a member of the Commission shall not be considered an employee of the United States for any purpose.

(2) The Commission shall meet at the call of its Chairman or a majority of its members.

(3) Each Federal agency referred to in section 107(b) may designate a representative to participate as an observer with the Commission.

These representatives shall report to and advise the Commission on the activities relating to Arctic research of their agencies.

(4) The Commission shall conduct at least one public meeting in the State of Alaska annually.

DUTIES OF COMMISSION

SEC. 104. (a) The Commission shall-

(1) develop and recommend an integrated national Arctic research policy;

(2) in cooperation with the Interagency Arctic Research Policy Committee established under section 107, assist in establishing a national Arctic research program plan to implement the Arctic research policy;

(3) facilitate cooperation between the Federal Government and State and local governments with respect to Arctic research;

(4) review Federal research programs in the Arctic and suggest improvements in coordination among programs;

(5) recommend methods to improve logistical planning and support for Arctic research as may be appropriate and in accordance with the findings and purposes of this title;

(6) suggest methods for improving efficient sharing and dissemination of data and information on the Arctic among interested public and private institutions;

(7) offer other recommendations and advice to the Interagency Committee established under section 107 as it may find appropriate; and

(8) cooperate with the Governor of the State of Alaska and with agencies and organizations of that State which the Governor may designate with respect to the formulation of Arctic research policy.

(b) Not later than January 31 of each year, the Commission shall-

(1) publish a statement of goals and objectives with respect to Arctic research to guide the Interagency Committee established under section 107 in the performance of its duties; and

(2) submit to the President and to the Congress a report describing the activities and accomplishments of the Commission during the immediately preceding fiscal year.

COOPERATION WITH THE COMMISSION

SEC. 105. (a)(1) The Commission may acquire from the head of any Federal agency unclassified data, reports, and other nonproprietary information with respect to Arctic research in the possession of the agency which the Commission considers useful in the discharge of its duties.

(2) Each agency shall cooperate with the Commission and furnish all data, reports, and other information requested by the Commission to the extent permitted by law; except that no agency need furnish any information which it is permitted to withhold under section 552 of title 5, United States Code.

(b) With the consent of the appropriate agency head, the Commission may utilize the facilities and services of any Federal agency to the extent that the facilities and services are needed for the establishment and development of an Arctic research policy, upon reimbursement to be agreed upon by the Commission and the agency head and taking every feasible step to avoid duplication of effort.

(c) All Federal agencies shall consult with the Commission before undertaking major Federal actions relating to Arctic research.

ADMINISTRATION OF THE COMMISSION

SEC. 106. The Commission may-

(1) in accordance with the civil service laws and subchapter III of chapter 53 of title 5, United States Code, appoint and fix the compensation of an Executive Director and necessary additional staff personnel, but not to exceed a total of seven compensated personnel;

(2) procure temporary and intermittent services as authorized by section 3109 of title 5, United States Code;

(3) enter into contracts and procure supplies, services, and personal property; and

(4) enter into agreements with the General Services Administration for the procurement of necessary financial and administrative services, for which payment shall be made by reimbursement from funds of the Commission in amounts to be agreed upon by the Commission and the Administrator of the General Services Administration.

LEAD AGENCY AND INTERAGENCY ARCTIC RESEARCH POLICY COMMITTEE

SEC. 107. (a) The National Science Foundation is designated as the lead agency responsible for implementing Arctic research policy, and the Director of the National Science Foundation shall insure that the requirements of section 108 are fulfilled.

(b)(1) The President shall establish an Interagency Arctic Research Policy Committee (hereinafter referred to as the "Interagency Committee").

(2) The Interagency Committee shall be composed of representatives of the following Federal agencies or offices:

(A) the National Science Foundation;

(B) the Department of Commerce;

(C) the Department of Defense;

(D) the Department of Energy;

(E) the Department of the Interior;

(F) the Department of State;

(G) the Department of Transportation;

(H) the Department of Health and Human Services;

(I) the National Aeronautics and Space Administration;

(J) the Environmental Protection Agency; and

(K) any other agency or office deemed appropriate.

(3) The representative of the National Science Foundation shall serve as the Chairperson of the Interagency Committee.

DUTIES OF THE INTERAGENCY COMMITTEE

SEC. 108. (a) The Interagency Committee shall-

(1) survey Arctic research conducted by Federal, State, and local agencies, universities, and other public and private institutions to help determine priorities for future Arctic research, including natural resources and materials, physical and biological sciences, and social and behavioral sciences;

(2) work with the Commission to develop and establish an integrated national Arctic research policy that will guide Federal agencies in developing and implementing their research programs in the Arctic;

(3) consult with the Commission on-

(A) the development of the national Arctic research policy and the 5-year plan implementing the policy;

(B) Arctic research programs of Federal agencies;

(C) recommendations of the Commission on future Arctic research; and

(D) guidelines for Federal agencies for awarding and administering Arctic research grants;

(4) develop a 5-year plan to implement the national policy, as provided for in section 109;

(5) provide the necessary coordination, data, and assistance for the preparation of a single integrated, coherent, and multiagency budget request for Arctic research as provided for in section 110;

(6) facilitate cooperation between the Federal Government and State and local governments in Arctic research, and recommend the undertaking of neglected areas of research in accordance with the findings and purposes of this title;

(7) coordinate and promote cooperative Arctic scientific research programs with other nations, subject to the foreign policy guidance of the Secretary of State;

(8) cooperate with the Governor of the State of Alaska in fulfilling its responsibilities under this title;

(9) promote Federal interagency coordination of all Arctic research activities, including-

(A) logistical planning and coordination; and

(B) the sharing of data and information associated with Arctic research, subject to section 552 of title 5, United States Code; and

(10) provide public notice of its meetings and an opportunity for the public to participate in the development and implementation of national Arctic research policy.

(b) Not later than January 31, 1986, and biennially thereafter, the Interagency Committee shall submit to the Congress through the President, a brief, concise report containing-

(1) a statement of the activities and accomplishments of the Interagency Committee since its last report; and

(2) a description of the activities of the Commission, detailing with particularity the recommendations of the Commission with respect to Federal activities in Arctic research.

5-YEAR ARCTIC RESEARCH PLAN

SEC. 109. (a) The Interagency Committee, in consultation with the Commission, the Governor of the State of Alaska, the residents of the Arctic, the private sector, and public interest groups, shall prepare a comprehensive 5-year program plan (hereinafter referred to as the "Plan") for the overall Federal effort in Arctic research. The Plan shall be prepared and submitted to the President for transmittal to the Congress within one year after the enactment of this Act and shall be revised biennially thereafter.

(b) The Plan shall contain but need not be limited to the following elements:

(1) an assessment of national needs and problems regarding the Arctic and the research necessary to address those needs or problems;

(2) a statement of the goals and objectives of the Interagency Committee for national Arctic research;

(3) a detailed listing of all existing Federal programs relating to Arctic research, including the existing goals, funding levels for each of the 5 following fiscal years, and the funds currently being expended to conduct the programs;

(4) recommendations for necessary program changes and other proposals to meet the requirements of the policy and goals as set forth by the Commission and in the Plan as currently in effect; and

(5) a description of the actions taken by the Interagency Committee to coordinate the budget review process in order to ensure interagency coordination and cooperation in (A) carrying out Federal Arctic research programs, and (B) eliminating unnecessary duplication of effort among these programs.

COORDINATION AND REVIEW OF BUDGET REQUESTS

SEC. 110. (a) The Office of Science and Technology Policy shall-

(1) review all agency and department budget requests related to the Arctic transmitted pursuant to section 108(a)(5), in accordance with the national Arctic research policy and the 5-year program under section 108(a)(2) and section 109, respectively; and

(2) consult closely with the Interagency Committee and the Commission to guide the Office of Science and Technology Policy's efforts.

(b)(1) The Office of Management and Budget shall consider all Federal agency requests for research related to the Arctic as one integrated, coherent, and multiagency request which shall be reviewed by the Office of Management and Budget prior to submission of the President's annual budget request for its adherence to the Plan. The Commission shall, after submission of the President's annual budget request, review the request and report to Congress on adherence to the Plan.

(2) The Office of Management and Budget shall seek to facilitate planning for the design, procurement, maintenance, deployment, and operations of icebreakers needed to provide a platform for Arctic research by allocating all funds necessary to support icebreaking operations, except for recurring incremental costs associated with specific projects, to the Coast Guard.

AUTHORIZATION OF APPROPRIATIONS; NEW SPENDING AUTHORITY

SEC. 111. (a) There are authorized to be appropriated such sums as may be necessary for carrying out this title.

(b) Any new spending authority (within the meaning of section 401 of the Congressional Budget Act of 1974) which is provided under this title shall be effective for any fiscal year only to such extent or in such amounts as may be provided in appropriation Acts.

DEFINITION

SEC. 112. As used in this title, the term "Arctic" means all United States and foreign territory north of the Arctic Circle and all United States territory north and west of the boundary formed by the Porcupine, Yukon, and Kuskokwim Rivers; all contiguous seas, including the Arctic Ocean and the Beaufort, Bering, and Chukchi Seas; and the Aleutian chain.

Appendix B. P.L. 101-609 of 1990, Amending Arctic Research and Policy Act (ARPA) of 1984

The Arctic Research and Policy Act (ARPA) of 1984 (see **Appendix A**) was amended by P.L. 101-609 of November 16, 1990. The text of P.L. 101-609 is as follows:

SECTION 1. Except as specifically provided in this Act, whenever in this Act an amendment or repeal is expressed as an amendment to, or repeal of a provision, the reference shall be deemed to be made to the Arctic Research and Policy Act of 1984.

SEC. 2. Section 103(b)(1) (15 U.S.C. 4102(b)(1)) is amended—

(1) in the text above clause (A), by striking out `five' and inserting in lieu thereof `seven';

(2) in clause (A), by striking out `three' and inserting in lieu thereof `four'; and

(3) in clause (C), by striking out `one member' and inserting in lieu thereof `two members'.

SEC. 3. Section 103(d)(1) (15 U.S.C. 4102(d)(1)) is amended by striking out `GS-16' and inserting in lieu thereof `GS-18'.

SEC. 4. (a) Section 104(a) (15 U.S.C. 4102(a)) is amended—

(1) in paragraph (4), by striking out `suggest' and inserting in lieu thereof `recommend';

(2) in paragraph (6), by striking out `suggest' and inserting in lieu thereof `recommend';

(3) in paragraph (7), by striking out `and' at the end thereof;

(4) in paragraph (8), by striking out the period and inserting in lieu thereof a semicolon; and

(5) by adding at the end thereof the following new paragraphs:

'(9) recommend to the Interagency Committee the means for developing international scientific cooperation in the Arctic; and

'(10) not later than January 31, 1991, and every 2 years thereafter, publish a statement of goals and objectives with respect to Arctic research to guide the Interagency Committee established under section 107 in the performance of its duties.'.

(b) Section 104(b) is amended to read as follows:

'(b) Not later than January 31 of each year, the Commission shall submit to the President and to the Congress a report describing the activities and accomplishments of the Commission during the immediately preceding fiscal year.'.

SEC. 5. Section 106 (15 U.S.C. 4105) is amended—

(1) in paragraph (3), by striking out `and' at the end thereof;

(2) in paragraph (4), by striking out the period at the end thereof and inserting in lieu thereof; and'; and

(3) by adding at the end thereof the following new paragraph:

'(5) appoint, and accept without compensation the services of, scientists and engineering specialists to be advisors to the Commission. Each advisor may be allowed travel expenses, including per diem in lieu of subsistence, as authorized by section 5703 of title 5, United States Code. Except for the purposes of chapter 81 of title 5 (relating to

compensation for work injuries) and chapter 171 of title 28 (relating to tort claims) of the United States Code, an advisor appointed under this paragraph shall not be considered an employee of the United States for any purpose.'

SEC. 6. Subsection (b)(2) of section 108 (15 U.S.C. 4107(b)(2)) is amended to read as follows:

'(2) a statement detailing with particularity the recommendations of the Commission with respect to Federal interagency activities in Arctic research and the disposition and responses to those recommendations.'

Appendix C. January 2009 Arctic Policy Directive (NSPD 66/HSPD 25)

On January 12, 2009, the George W. Bush Administration released a presidential directive establishing a new U.S. policy for the Arctic region. The directive, dated January 9, 2009, was issued as National Security Presidential Directive 66/Homeland Security Presidential Directive 25 (NSPD 66/HSPD 25). The text of NSPD 66/HSPD 25 is as follows:

SUBJECT: Arctic Region Policy

I. PURPOSE

A. This directive establishes the policy of the United States with respect to the Arctic region and directs related implementation actions. This directive supersedes Presidential Decision Directive/NSC-26 (PDD-26; issued 1994) with respect to Arctic policy but not Antarctic policy; PDD-26 remains in effect for Antarctic policy only.

B. This directive shall be implemented in a manner consistent with the Constitution and laws of the United States, with the obligations of the United States under the treaties and other international agreements to which the United States is a party, and with customary international law as recognized by the United States, including with respect to the law of the sea.

II. BACKGROUND

A. The United States is an Arctic nation, with varied and compelling interests in that region. This directive takes into account several developments, including, among others:

1. Altered national policies on homeland security and defense;

2. The effects of climate change and increasing human activity in the Arctic region;

3. The establishment and ongoing work of the Arctic Council; and

4. A growing awareness that the Arctic region is both fragile and rich in resources.

III. POLICY

A. It is the policy of the United States to:

1. Meet national security and homeland security needs relevant to the Arctic region;

2. Protect the Arctic environment and conserve its biological resources;

3. Ensure that natural resource management and economic development in the region are environmentally sustainable;

4. Strengthen institutions for cooperation among the eight Arctic nations (the United States, Canada, Denmark, Finland, Iceland, Norway, the Russian Federation, and Sweden);

5. Involve the Arctic's indigenous communities in decisions that affect them; and

6. Enhance scientific monitoring and research into local, regional, and global environmental issues.

B. National Security and Homeland Security Interests in the Arctic

1. The United States has broad and fundamental national security interests in the Arctic region and is prepared to operate either independently or in conjunction with other states to safeguard these interests. These interests include such matters as missile defense and early warning; deployment of sea and air systems for strategic sealift, strategic

deterrence, maritime presence, and maritime security operations; and ensuring freedom of navigation and overflight.

2. The United States also has fundamental homeland security interests in preventing terrorist attacks and mitigating those criminal or hostile acts that could increase the United States vulnerability to terrorism in the Arctic region.

3. The Arctic region is primarily a maritime domain; as such, existing policies and authorities relating to maritime areas continue to apply, including those relating to law enforcement.[1] Human activity in the Arctic region is increasing and is projected to increase further in coming years. This requires the United States to assert a more active and influential national presence to protect its Arctic interests and to project sea power throughout the region.

4. The United States exercises authority in accordance with lawful claims of United States sovereignty, sovereign rights, and jurisdiction in the Arctic region, including sovereignty within the territorial sea, sovereign rights and jurisdiction within the United States exclusive economic zone and on the continental shelf, and appropriate control in the United States contiguous zone.

5. Freedom of the seas is a top national priority. The Northwest Passage is a strait used for international navigation, and the Northern Sea Route includes straits used for international navigation; the regime of transit passage applies to passage through those straits. Preserving the rights and duties relating to navigation and overflight in the Arctic region supports our ability to exercise these rights throughout the world, including through strategic straits.

6. Implementation: In carrying out this policy as it relates to national security and homeland security interests in the Arctic, the Secretaries of State, Defense, and Homeland Security, in coordination with heads of other relevant executive departments and agencies, shall:

a. Develop greater capabilities and capacity, as necessary, to protect United States air, land, and sea borders in the Arctic region;

b. Increase Arctic maritime domain awareness in order to protect maritime commerce, critical infrastructure, and key resources;

c. Preserve the global mobility of United States military and civilian vessels and aircraft throughout the Arctic region;

d. Project a sovereign United States maritime presence in the Arctic in support of essential United States interests; and

e. Encourage the peaceful resolution of disputes in the Arctic region.

C. International Governance

1. The United States participates in a variety of fora, international organizations, and bilateral contacts that promote United States interests in the Arctic. These include the Arctic Council, the International Maritime Organization (IMO), wildlife conservation and management agreements, and many other mechanisms. As the Arctic changes and human activity in the region increases, the United States and other governments should consider, as appropriate, new international arrangements or enhancements to existing arrangements.

2. The Arctic Council has produced positive results for the United States by working within its limited mandate of environmental protection and sustainable development. Its subsidiary bodies, with help from many United States agencies, have developed and undertaken projects on a wide range of topics. The Council also provides a beneficial venue for interaction with indigenous groups. It is the position of the United States that

the Arctic Council should remain a high-level forum devoted to issues within its current mandate and not be transformed into a formal international organization, particularly one with assessed contributions. The United States is nevertheless open to updating the structure of the Council, including consolidation of, or making operational changes to, its subsidiary bodies, to the extent such changes can clearly improve the Council's work and are consistent with the general mandate of the Council.

3. The geopolitical circumstances of the Arctic region differ sufficiently from those of the Antarctic region such that an "Arctic Treaty" of broad scope—along the lines of the Antarctic Treaty—is not appropriate or necessary.

4. The Senate should act favorably on U.S. accession to the U.N. Convention on the Law of the Sea promptly, to protect and advance U.S. interests, including with respect to the Arctic. Joining will serve the national security interests of the United States, including the maritime mobility of our Armed Forces worldwide. It will secure U.S. sovereign rights over extensive marine areas, including the valuable natural resources they contain. Accession will promote U.S. interests in the environmental health of the oceans. And it will give the United States a seat at the table when the rights that are vital to our interests are debated and interpreted.

5. Implementation: In carrying out this policy as it relates to international governance, the Secretary of State, in coordination with heads of other relevant executive departments and agencies, shall:

a. Continue to cooperate with other countries on Arctic issues through the United Nations (U.N.) and its specialized agencies, as well as through treaties such as the U.N. Framework Convention on Climate Change, the Convention on International Trade in Endangered Species of Wild Fauna and Flora, the Convention on Long Range Transboundary Air Pollution and its protocols, and the Montreal Protocol on Substances that Deplete the Ozone Layer;

b. Consider, as appropriate, new or enhanced international arrangements for the Arctic to address issues likely to arise from expected increases in human activity in that region, including shipping, local development and subsistence, exploitation of living marine resources, development of energy and other resources, and tourism;

c. Review Arctic Council policy recommendations developed within the ambit of the Council's scientific reviews and ensure the policy recommendations are subject to review by Arctic governments; and

d. Continue to seek advice and consent of the United States Senate to accede to the 1982 Law of the Sea Convention.

D. Extended Continental Shelf and Boundary Issues

1. Defining with certainty the area of the Arctic seabed and subsoil in which the United States may exercise its sovereign rights over natural resources such as oil, natural gas, methane hydrates, minerals, and living marine species is critical to our national interests in energy security, resource management, and environmental protection. The most effective way to achieve international recognition and legal certainty for our extended continental shelf is through the procedure available to States Parties to the U.N. Convention on the Law of the Sea.

2. The United States and Canada have an unresolved boundary in the Beaufort Sea. United States policy recognizes a boundary in this area based on equidistance. The United States recognizes that the boundary area may contain oil, natural gas, and other resources.

3. The United States and Russia are abiding by the terms of a maritime boundary treaty concluded in 1990, pending its entry into force. The United States is prepared to enter the agreement into force once ratified by the Russian Federation.

4. Implementation: In carrying out this policy as it relates to extended continental shelf and boundary issues, the Secretary of State, in coordination with heads of other relevant executive departments and agencies, shall:

a. Take all actions necessary to establish the outer limit of the continental shelf appertaining to the United States, in the Arctic and in other regions, to the fullest extent permitted under international law;

b. Consider the conservation and management of natural resources during the process of delimiting the extended continental shelf; and

c. Continue to urge the Russian Federation to ratify the 1990 United States-Russia maritime boundary agreement.

E. Promoting International Scientific Cooperation

1. Scientific research is vital for the promotion of United States interests in the Arctic region. Successful conduct of U.S. research in the Arctic region requires access throughout the Arctic Ocean and to terrestrial sites, as well as viable international mechanisms for sharing access to research platforms and timely exchange of samples, data, and analyses. Better coordination with the Russian Federation, facilitating access to its domain, is particularly important.

2. The United States promotes the sharing of Arctic research platforms with other countries in support of collaborative research that advances fundamental understanding of the Arctic region in general and potential Arctic change in particular. This could include collaboration with bodies such as the Nordic Council and the European Polar Consortium, as well as with individual nations.

3. Accurate prediction of future environmental and climate change on a regional basis, and the delivery of near real-time information to end-users, requires obtaining, analyzing, and disseminating accurate data from the entire Arctic region, including both paleoclimatic data and observational data. The United States has made significant investments in the infrastructure needed to collect environmental data in the Arctic region, including the establishment of portions of an Arctic circumpolar observing network through a partnership among United States agencies, academic collaborators, and Arctic residents. The United States promotes active involvement of all Arctic nations in these efforts in order to advance scientific understanding that could provide the basis for assessing future impacts and proposed response strategies.

4. United States platforms capable of supporting forefront research in the Arctic Ocean, including portions expected to be ice-covered for the foreseeable future, as well as seasonally ice-free regions, should work with those of other nations through the establishment of an Arctic circumpolar observing network. All Arctic nations are members of the Group on Earth Observations partnership, which provides a framework for organizing an international approach to environmental observations in the region. In addition, the United States recognizes that academic and research institutions are vital partners in promoting and conducting Arctic research.

5. Implementation: In carrying out this policy as it relates to promoting scientific international cooperation, the Secretaries of State, the Interior, and Commerce and the Director of the National Science Foundation, in coordination with heads of other relevant executive departments and agencies, shall:

a. Continue to play a leadership role in research throughout the Arctic region;

b. Actively promote full and appropriate access by scientists to Arctic research sites through bilateral and multilateral measures and by other means;

c. Lead the effort to establish an effective Arctic circumpolar observing network with broad partnership from other relevant nations;

d. Promote regular meetings of Arctic science ministers or research council heads to share information concerning scientific research opportunities and to improve coordination of international Arctic research programs;

e. Work with the Interagency Arctic Research Policy Committee (IARPC) to promote research that is strategically linked to U.S. policies articulated in this directive, with input from the Arctic Research Commission; and

f. Strengthen partnerships with academic and research institutions and build upon the relationships these institutions have with their counterparts in other nations.

F. Maritime Transportation in the Arctic Region

1. The United States priorities for maritime transportation in the Arctic region are:

a. To facilitate safe, secure, and reliable navigation;

b. To protect maritime commerce; and

c. To protect the environment.

2. Safe, secure, and environmentally sound maritime commerce in the Arctic region depends on infrastructure to support shipping activity, search and rescue capabilities, short- and long-range aids to navigation, high-risk area vessel-traffic management, iceberg warnings and other sea ice information, effective shipping standards, and measures to protect the marine environment. In addition, effective search and rescue in the Arctic will require local, State, Federal, tribal, commercial, volunteer, scientific, and multinational cooperation.

3. Working through the International Maritime Organization (IMO), the United States promotes strengthening existing measures and, as necessary, developing new measures to improve the safety and security of maritime transportation, as well as to protect the marine environment in the Arctic region. These measures may include ship routing and reporting systems, such as traffic separation and vessel traffic management schemes in Arctic chokepoints; updating and strengthening of the Guidelines for Ships Operating in Arctic Ice-Covered Waters; underwater noise standards for commercial shipping; a review of shipping insurance issues; oil and other hazardous material pollution response agreements; and environmental standards.

4. Implementation: In carrying out this policy as it relates to maritime transportation in the Arctic region, the Secretaries of State, Defense, Transportation, Commerce, and Homeland Security, in coordination with heads of other relevant executive departments and agencies, shall:

a. Develop additional measures, in cooperation with other nations, to address issues that are likely to arise from expected increases in shipping into, out of, and through the Arctic region;

b. Commensurate with the level of human activity in the region, establish a risk-based capability to address hazards in the Arctic environment. Such efforts shall advance work on pollution prevention and response standards; determine basing and logistics support requirements, including necessary airlift and icebreaking capabilities; and improve plans and cooperative agreements for search and rescue;

c. Develop Arctic waterways management regimes in accordance with accepted international standards, including vessel traffic-monitoring and routing; safe navigation

standards; accurate and standardized charts; and accurate and timely environmental and navigational information; and

d. Evaluate the feasibility of using access through the Arctic for strategic sealift and humanitarian aid and disaster relief.

G. Economic Issues, Including Energy

1. Sustainable development in the Arctic region poses particular challenges. Stakeholder input will inform key decisions as the United States seeks to promote economic and energy security. Climate change and other factors are significantly affecting the lives of Arctic inhabitants, particularly indigenous communities. The United States affirms the importance to Arctic communities of adapting to climate change, given their particular vulnerabilities.

2. Energy development in the Arctic region will play an important role in meeting growing global energy demand as the area is thought to contain a substantial portion of the world's undiscovered energy resources. The United States seeks to ensure that energy development throughout the Arctic occurs in an environmentally sound manner, taking into account the interests of indigenous and local communities, as well as open and transparent market principles. The United States seeks to balance access to, and development of, energy and other natural resources with the protection of the Arctic environment by ensuring that continental shelf resources are managed in a responsible manner and by continuing to work closely with other Arctic nations.

3. The United States recognizes the value and effectiveness of existing fora, such as the Arctic Council, the International Regulators Forum, and the International Standards Organization.

4. Implementation: In carrying out this policy as it relates to economic issues, including energy, the Secretaries of State, the Interior, Commerce, and Energy, in coordination with heads of other relevant executive departments and agencies, shall:

a. Seek to increase efforts, including those in the Arctic Council, to study changing climate conditions, with a view to preserving and enhancing economic opportunity in the Arctic region. Such efforts shall include inventories and assessments of villages, indigenous communities, subsistence opportunities, public facilities, infrastructure, oil and gas development projects, alternative energy development opportunities, forestry, cultural and other sites, living marine resources, and other elements of the Arctic's socioeconomic composition;

b. Work with other Arctic nations to ensure that hydrocarbon and other development in the Arctic region is carried out in accordance with accepted best practices and internationally recognized standards and the 2006 Group of Eight (G-8) Global Energy Security Principles;

c. Consult with other Arctic nations to discuss issues related to exploration, production, environmental and socioeconomic impacts, including drilling conduct, facility sharing, the sharing of environmental data, impact assessments, compatible monitoring programs, and reservoir management in areas with potentially shared resources;

d. Protect United States interests with respect to hydrocarbon reservoirs that may overlap boundaries to mitigate adverse environmental and economic consequences related to their development;

e. Identify opportunities for international cooperation on methane hydrate issues, North Slope hydrology, and other matters;

f. Explore whether there is a need for additional fora for informing decisions on hydrocarbon leasing, exploration, development, production, and transportation, as well as shared support activities, including infrastructure projects; and

g. Continue to emphasize cooperative mechanisms with nations operating in the region to address shared concerns, recognizing that most known Arctic oil and gas resources are located outside of United States jurisdiction.

H. Environmental Protection and Conservation of Natural Resources

1. The Arctic environment is unique and changing. Increased human activity is expected to bring additional stressors to the Arctic environment, with potentially serious consequences for Arctic communities and ecosystems.

2. Despite a growing body of research, the Arctic environment remains poorly understood. Sea ice and glaciers are in retreat. Permafrost is thawing and coasts are eroding. Pollutants from within and outside the Arctic are contaminating the region. Basic data are lacking in many fields. High levels of uncertainty remain concerning the effects of climate change and increased human activity in the Arctic. Given the need for decisions to be based on sound scientific and socioeconomic information, Arctic environmental research, monitoring, and vulnerability assessments are top priorities. For example, an understanding of the probable consequences of global climate variability and change on Arctic ecosystems is essential to guide the effective long-term management of Arctic natural resources and to address socioeconomic impacts of changing patterns in the use of natural resources.

3. Taking into account the limitations in existing data, United States efforts to protect the Arctic environment and to conserve its natural resources must be risk-based and proceed on the basis of the best available information.

4. The United States supports the application in the Arctic region of the general principles of international fisheries management outlined in the 1995 Agreement for the Implementation of the Provisions of the United Nations Convention on the Law of the Sea of December 10, 1982, relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks and similar instruments. The United States endorses the protection of vulnerable marine ecosystems in the Arctic from destructive fishing practices and seeks to ensure an adequate enforcement presence to safeguard Arctic living marine resources.

5. With temperature increases in the Arctic region, contaminants currently locked in the ice and soils will be released into the air, water, and land. This trend, along with increased human activity within and below the Arctic, will result in increased introduction of contaminants into the Arctic, including both persistent pollutants (e.g., persistent organic pollutants and mercury) and airborne pollutants (e.g., soot).

6. Implementation: In carrying out this policy as it relates to environmental protection and conservation of natural resources, the Secretaries of State, the Interior, Commerce, and Homeland Security and the Administrator of the Environmental Protection Agency, in coordination with heads of other relevant executive departments and agencies, shall:

a. In cooperation with other nations, respond effectively to increased pollutants and other environmental challenges;

b. Continue to identify ways to conserve, protect, and sustainably manage Arctic species and ensure adequate enforcement presence to safeguard living marine resources, taking account of the changing ranges or distribution of some species in the Arctic. For species whose range includes areas both within and beyond United States jurisdiction, the United States shall continue to collaborate with other governments to ensure effective conservation and management;

c. Seek to develop ways to address changing and expanding commercial fisheries in the Arctic, including through consideration of international agreements or organizations to govern future Arctic fisheries;

d. Pursue marine ecosystem-based management in the Arctic; and

e. Intensify efforts to develop scientific information on the adverse effects of pollutants on human health and the environment and work with other nations to reduce the introduction of key pollutants into the Arctic.

IV. Resources and Assets

A. Implementing a number of the policy elements directed above will require appropriate resources and assets. These elements shall be implemented consistent with applicable law and authorities of agencies, or heads of agencies, vested by law, and subject to the availability of appropriations. The heads of executive departments and agencies with responsibilities relating to the Arctic region shall work to identify future budget, administrative, personnel, or legislative proposal requirements to implement the elements of this directive.

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[1] These policies and authorities include Freedom of Navigation (PDD/NSC-32), the U.S. Policy on Protecting the Ocean Environment (PDD/NSC-36), Maritime Security Policy (NSPD-41/HSPD-13), and the National Strategy for Maritime Security (NSMS).[334]

[334] Source for text: http://fas.org/irp/offdocs/nspd/nspd-66.htm. The text is also available at http://www.nsf.gov/od/opp/opp_advisory/briefings/may2009/nspd66_hspd25.pdf.

Appendix D. May 2013 National Strategy for Arctic Region

On May 10, 2013, the Obama Administration released a document entitled *National Strategy for the Arctic Region*.[335] The executive summary of the document is reprinted earlier in this report (see "May 2013 National Strategy for Arctic Region" in "Background"). This appendix reprints the main text of the document. The main text states:

> **Introduction**
>
> We seek an Arctic region that is stable and free of conflict, where nations act responsibly in a spirit of trust and cooperation, and where economic and energy resources are developed in a sustainable manner that also respects the fragile environment and the interests and cultures of indigenous peoples.
>
> As the United States addresses these opportunities and challenges, we will be guided by our central interests in the Arctic region, which include providing for the security of the United States; protecting the free flow of resources and commerce; protecting the environment; addressing the needs of indigenous communities; and enabling scientific research. In protecting these interests, we draw from our long-standing policy and approach to the global maritime spaces in the 20th century, including freedom of navigation and overflight and other internationally lawful uses of the sea and airspace related to these freedoms; security on the oceans; maintaining strong relationships with allies and partners; and peaceful resolution of disputes without coercion.
>
> To achieve this vision, the United States is establishing an overarching national approach to advance national security interests, pursue responsible stewardship of this precious and unique region, and serve as a basis for cooperation with other Arctic states[336] and the international community as a whole to advance common interests.
>
> Even as we work domestically and internationally to minimize the effects of climate change, the effects are already apparent in the Arctic. Ocean resources are more readily accessible as sea ice diminishes, but thawing ground is threatening communities as well as hindering land-based activities, including access to resources. Diminishing land and sea ice is altering ecosystems and the services they provide. As an Arctic nation, the United States must be proactive and disciplined in addressing changing regional conditions and in developing adaptive strategies to protect its interests. An undisciplined approach to exploring new opportunities in this frontier could result in significant harm to the region, to our national security interests, and to the global good.
>
> When implementing this strategy, the United States will proceed in a thoughtful, responsible manner that leverages expertise, resources, and cooperation from the State of Alaska, Alaska Natives, and stakeholders across the entire nation and throughout the international community. We will encourage and use science-informed decisionmaking to aid this effort. We will endeavor to do no harm to the sensitive environment or to Alaska native communities and other indigenous populations that rely on Arctic resources. Just as a common spirit and shared vision of peaceful partnership led to the development of an

[335] *National Strategy for the Arctic Region*, May 2013, 11 pp.; accessed May 14, 2013, at http://www.whitehouse.gov/sites/default/files/docs/nat_arctic_strategy.pdf. The document includes a cover letter from President Obama dated May 10, 2013.

[336] A footnote in the document at this point states: "Arctic state is defined as one of the eight nations making up the permanent membership of the Arctic Council and includes the following nations: Canada, Denmark (including Greenland and the Faroe Islands), Finland, Iceland, Norway, Russia, Sweden, and the United States."

international space station, we believe much can be achieved in the Arctic region through collaborative international efforts, coordinated investments, and public-private partnerships.

Structure of the Strategy

Through this National Strategy for the Arctic Region, we seek to guide, prioritize, and synchronize efforts to protect U.S. national and homeland security interests, promote responsible stewardship, and foster international cooperation.

This strategy articulates three priority lines of effort. It also identifies guiding principles as a foundation for Arctic region activities. Through a deliberate emphasis on the priority lines of effort and objectives, it aims to achieve a national unity of effort that is consistent with our domestic and international legal rights, obligations, and commitments and that is well coordinated with our Arctic neighbors and the international community. These lines of effort identify common themes where specific emphasis and activities will be focused to ensure that strategic priorities are met. The three lines of effort, as well as the guiding principles are meant to be acted upon as a coherent whole.

Changing Conditions

While the Arctic region has experienced warming and cooling cycles over millennia, the current warming trend is unlike anything previously recorded. The reduction in sea ice has been dramatic, abrupt, and unrelenting. The dense, multi-year ice is giving way to thin layers of seasonal ice, making more of the region navigable year-round. Scientific estimates of technically recoverable conventional oil and gas resources north of the Arctic Circle total approximately 13 percent of the world's undiscovered oil and 30 percent of the world's undiscovered gas deposits, as well as vast quantities of mineral resources, including rare earth elements, iron ore, and nickel.[337] These estimates have inspired fresh ideas for commercial initiatives and infrastructure development in the region. As portions of the Arctic Ocean become more navigable, there is increasing interest in the viability of the Northern Sea Route and other potential routes, including the Northwest Passage, as well as in development of Arctic resources.

For all of the opportunities emerging with the increasing accessibility and economic and strategic interests in the Arctic, the opening and rapid development of the Arctic region presents very real challenges. On the environmental front, reduced sea ice is having an immediate impact on indigenous populations as well as on fish and wildlife. Moreover, there may be potentially profound environmental consequences of continued ocean warming and Arctic ice melt. These consequences include altering the climate of lower latitudes, risking the stability of Greenland's ice sheet, and accelerating the thawing of the Arctic permafrost in which large quantities of methane – a potent driver of climate change – as well as pollutants such as mercury are stored. Uncoordinated development – and the consequent increase in pollution such as emissions of black carbon or other substances from fossil fuel combustion – could have unintended consequences on climate trends, fragile ecosystems, and Arctic communities. It is imperative that the United States proactively establish national priorities and objectives for the Arctic region.

Lines of Effort

To meet the challenges and opportunities in the Arctic region, and in furtherance of established Arctic Region Policy,[338] we will pursue the following lines of effort and

[337] A footnote in the document at this point states: "U.S. Geological Survey, "Circum-Arctic Resource Appraisal: Estimates of Undiscovered Oil and Gas North of the Arctic Circle," fact sheet, 2008, http://pubs.usgs.gov/fs/2008/3049/fs2008-3049.pdf."

[338] A footnote in the document at this point states: "National Security Presidential Directive-66/Homeland Security Presidential Directive-25, January 2009."

supporting objectives in a mutually reinforcing manner that incorporates the broad range of U.S. current activities and interests in the Arctic region.

1. Advance United States Security Interests

Our highest priority is to protect the American people, our sovereign territory and rights, natural resources, and interests of the United States. To this end, the United States will identify, develop, and maintain the capacity and capabilities necessary to promote safety, security, and stability in the region through a combination of independent action, bilateral initiatives, and multilateral cooperation. We acknowledge that the protection of our national security interests in the Arctic region must be undertaken with attention to environmental, cultural, and international considerations outlined throughout this strategy. As many nations across the world aspire to expand their role in the Arctic, we encourage Arctic and non-Arctic states to work collaboratively through appropriate fora to address the emerging challenges and opportunities in the Arctic region, while we remain vigilant to protect the security interests of the United States and our allies.

To accomplish this line of effort, the United States Government will seek to:

• **Evolve Arctic Infrastructure and Strategic Capabilities** – Working cooperatively with the State of Alaska, local, and tribal authorities, as well as public and private sector partners, we will develop, maintain, and exercise the capacity to execute Federal responsibilities in our Arctic waters, airspace, and coastal regions, including the capacity to respond to natural or man-made disasters. We will carefully tailor this regional infrastructure, as well as our response capacity, to the evolving human and commercial activity in the Arctic region.

• **Enhance Arctic Domain Awareness** – We seek to improve our awareness of activities, conditions, and trends in the Arctic region that may affect our safety, security, environmental, or commercial interests. The United States will endeavor to appropriately enhance sea, air, and space capabilities as Arctic conditions change, and to promote maritime-related information sharing with international, public, and private sector partners, to support implementation of activities such as the search-and-rescue agreement signed by Arctic states.

• **Preserve Arctic Region Freedom of the Seas** – The United States has a national interest in preserving all of the rights, freedoms, and uses of the sea and airspace recognized under international law. We will enable prosperity and safe transit by developing and maintaining sea, under-sea, and air assets and necessary infrastructure. In addition, the United States will support the enhancement of national defense, law enforcement, navigation safety, marine environment response, and search-and-rescue capabilities. Existing international law provides a comprehensive set of rules governing the rights, freedoms, and uses of the world's oceans and airspace, including the Arctic. The law recognizes these rights, freedoms, and uses for commercial and military vessels and aircraft. Within this framework, we shall further develop Arctic waterways management regimes, including traffic separation schemes, vessel tracking, and ship routing, in collaboration with partners. We will also encourage other nations to adhere to internationally accepted principles. This cooperation will facilitate strategic partnerships that promote innovative, low-cost solutions that enhance the Arctic marine transportation system and the safe, secure, efficient and free flow of trade.

• **Provide for Future United States Energy Security** – The Arctic region's energy resources factor into a core component of our national security strategy: energy security. The region holds sizable proved and potential oil and natural gas resources that will likely continue to provide valuable supplies to meet U.S. energy needs. Continuing to responsibly develop Arctic oil and gas resources aligns with the United States "all of the above" approach to developing new domestic energy sources, including renewables, expanding oil and gas production, and increasing efficiency and conservation efforts to

reduce our reliance on imported oil and strengthen our nation's energy security. Within the context of this broader energy security strategy, including our economic, environmental and climate policy objectives, we are committed to working with stakeholders, industry, and other Arctic states to explore the energy resource base, develop and implement best practices, and share experiences to enable the environmentally responsible production of oil and natural gas as well as renewable energy.

2. Pursue Responsible Arctic Region Stewardship

Responsible stewardship requires active conservation of resources, balanced management, and the application of scientific and traditional knowledge of physical and living environments. As Arctic environments change, increased human activity demands precaution, as well as greater knowledge to inform responsible decisions. Together, Arctic nations can responsibly meet new demands – including maintaining open sea lanes for global commerce and scientific research, charting and mapping, providing search-and-rescue services, and developing capabilities to prevent, contain, and respond to oil spills and accidents – by increasing knowledge and integrating Arctic management.[339] We must improve our ability to forecast future conditions in the Arctic while being mindful of the potential for unexpected developments.

To realize this line of effort, we will pursue the specific objectives outlined below:

• **Protect the Arctic Environment and Conserve Arctic Natural Resources** – Protecting the unique and changing environment of the Arctic is a central goal of U.S. policy. Supporting actions will promote healthy, sustainable, and resilient ecosystems over the long term, supporting a full range of ecosystem services. This effort will be risk-based and proceed on the basis of best available information. The United States in the Arctic will assess and monitor the status of ecosystems and the risks of climate change and other stressors to prepare for and respond effectively to environmental challenges.

• **Use Integrated Arctic Management to Balance Economic Development, Environmental Protection, and Cultural Values** – Natural resource management will be based on a comprehensive understanding of environmental and cultural sensitivities in the region, and address expectations for future infrastructure needs and other development-related trends. This endeavor can promote unity of effort and provide the basis for sensible infrastructure and other resource management decisions in the Arctic. We will emphasize science-informed decisionmaking and integration of economic, environmental, and cultural values. We will also advance coordination among Federal departments and agencies and collaboration with partners engaged in Arctic stewardship activities.

• **Increase Understanding of the Arctic through Scientific Research and Traditional Knowledge** – Proper stewardship of the Arctic requires understanding of how the environment is changing, and such understanding will be based on a holistic earth system approach. Vast areas of the Arctic Ocean are unexplored, and we lack much of the basic

[339] A footnote in the document at this point states: "Much of this work is already underway including efforts under Executive Order 12501 (Arctic Research), Executive Order 13547 (Stewardship of the Ocean, Our Coasts, and the Great Lakes), and Executive Order 13580 (Interagency Working Group on Coordination of Domestic Energy Development and Permitting in Alaska). Entities under these Executive Orders are developing partnerships with Federal, state, local, tribal, territorial, public and private sector partners to ensure that natural resource decisions in the Arctic integrate economic, environmental, and cultural interests of the Nation."

The above-mentioned Executive Order 12501, which was issued January 28, 1985, implements The Arctic Research and Policy Act (ARPA) of 1984 (Title I of P.L. 98-373 of July 31, 1984) by, among other things, establishing the Arctic Research Commission and the Interagency Arctic Research Policy Committee. The text of Executive Order 12501 is available at http://www.archives.gov/federal-register/codification/executive-order/12501.html.

knowledge necessary to understand and address Arctic issues. The changes in the Arctic cannot be understood in isolation and must be viewed in a global context. As we learn more about the region, we have identified several key subcomponents of the Arctic that require urgent attention: land ice and its role in changing sea level; sea-ice and its role in global climate, fostering biodiversity, and supporting Arctic peoples; and, the warming permafrost and its effects on infrastructure and climate. Better earth system-level knowledge will also help us meet operational needs such as weather and ice forecasting. We can make faster progress through a well-coordinated and transparent national and international exploration and research agenda that reduces the potential for duplication of effort and leads to better leveraging of resources.

• **Chart the Arctic region** – We will continue to make progress in charting and mapping the Arctic region's ocean and waterways, so long obscured by perennial ice, and mapping its coastal and interior lands according to reliable, modern standards. Given the vast expanse of territory and water to be charted and mapped, we will need to prioritize and synchronize charting efforts to make more effective use of resources and attain faster progress. In so doing, we will make navigation safer and contribute to the identification of ecologically sensitive areas and reserves of natural resources.

3. Strengthen International Cooperation

What happens in one part of the Arctic region can have significant implications for the interests of other Arctic states and the international community as a whole. The remote and complex operating conditions in the Arctic environment make the region well-suited for collaborative efforts by nations seeking to explore emerging opportunities while emphasizing ecological awareness and preservation. We will seek to strengthen partnerships through existing multilateral fora and legal frameworks dedicated to common Arctic issues. We will also pursue new arrangements for cooperating on issues of mutual interest or concern and addressing unique and unprecedented challenges, as appropriate.

U.S. efforts to strengthen international cooperation and partnerships will be pursued through four objectives:

• **Pursue Arrangements that Promote Shared Arctic State Prosperity, Protect the Arctic Environment, and Enhance Security** – We will seek opportunities to pursue efficient and effective joint ventures, based on shared values that leverage each Arctic state's strengths. This collaboration will assist in guiding investments and regional activities, addressing dynamic trends, and promoting sustainable development in the Arctic region.

Arctic nations have varied commercial, cultural, environmental, safety, and security concerns in the Arctic region. Nevertheless, our common interests make these nations ideal partners in the region. We seek new opportunities to advance our interests by proactive engagement with other Arctic nations through bilateral and multilateral efforts using of a wide array of existing multilateral mechanisms that have responsibilities relating to the Arctic region.

As appropriate, we will work with other Arctic nations to develop new coordination mechanisms to keep the Arctic region prosperous, environmentally sustainable, operationally safe, secure, and free of conflict, and will protect U.S., allied, and regional security and economic interests.

• **Work through the Arctic Council to Advance U.S. Interests in the Arctic Region** – In recent years, the Arctic Council has facilitated notable achievements in the promotion of cooperation, coordination, and interaction among Arctic states and Arctic indigenous peoples. Recent successes of the Council include its advancement of public safety and environmental protection issues, as evidenced by the 2011 Arctic Search-and-Rescue Agreement and by the 2013 Arctic Marine Oil Pollution Preparedness and Response

Agreement. The United States will continue to emphasize the Arctic Council as a forum for facilitating Arctic states' cooperation on myriad issues of mutual interest within its current mandate.

• **Accede to the Law of the Sea Convention** – Accession to the Convention would protect U.S. rights, freedoms, and uses of the sea and airspace throughout the Arctic region, and strengthen our arguments for freedom of navigation and overflight through the Northwest Passage and the Northern Sea Route. The United States is the only Arctic state that is not party to the Convention. Only by joining the Convention can we maximize legal certainty and best secure international recognition of our sovereign rights with respect to the U.S. extended continental shelf in the Arctic and elsewhere, which may hold vast oil, gas, and other resources. Our extended continental shelf claim in the Arctic region could extend more than 600 nautical miles from the north coast of Alaska.

In instances where the maritime zones of coastal nations overlap, Arctic states have already begun the process of negotiating and concluding maritime boundary agreements, consistent with the Law of the Sea Convention and other relevant international law. The United States supports peaceful management and resolution of disputes, in a manner free from coercion. While the United States is not currently a party to the Convention, we will continue to support and observe principles of established customary international law reflected in the Convention.

• **Cooperate with other Interested Parties** – A growing number of non-Arctic states and numerous non-state actors have expressed increased interest in the Arctic region. The United States and other Arctic nations should seek to work with other states and entities to advance common objectives in the Arctic region in a manner that protects Arctic states' national interests and resources. One key example relates to the promotion of safe, secure, and reliable Arctic shipping, a goal that is best pursued through the International Maritime Organization in coordination with other Arctic states, major shipping states, the shipping industry and other relevant interests.

Guiding Principles

The U.S. approach to the Arctic region must reflect our values as a nation and as a member of the global community. We will approach holistically our interests in promoting safety and security, advancing economic and energy development, protecting the environment, addressing climate change and respecting the needs of indigenous communities and Arctic state interests. To guide our efforts, we have identified the following principles to serve as the foundation for U.S. Arctic engagement and activities.

• **Safeguard Peace and Stability** by working to maintain and preserve the Arctic region as an area free of conflict, acting in concert with allies, partners, and other interested parties. This principle will include United States action, and the actions of other interested countries, in supporting and preserving international legal principles of freedom of navigation and overflight and other uses of the sea related to these freedoms, unimpeded lawful commerce, and the peaceful resolution of disputes. The United States will rely on existing international law, which provides a comprehensive set of rules governing the rights, freedoms, and uses of the world's oceans and airspace, including the Arctic.

• **Make Decisions Using the Best Available Information** by promptly sharing – nationally and internationally – the most current understanding and forecasts based on up-to-date science and traditional knowledge.

• **Pursue Innovative Arrangements** to support the investments in scientific research, marine transportation infrastructure requirements, and other support capability and capacity needs in this region. The harshness of the Arctic climate and the complexity associated with developing, maintaining, and operating infrastructure and capabilities in the region necessitate new thinking on public-private and multinational partnerships.

• **Consult and Coordinate with Alaska Natives** consistent with tribal consultation policy established by Executive Order.[340] This policy emphasizes trust, respect, and shared responsibility. It articulates that tribal governments have a unique legal relationship with the United States and requires Federal departments and agencies to provide for meaningful and timely input by tribal officials in development of regulatory policies that have tribal implications. This guiding principle is also consistent with the Alaska Federation of Natives Guidelines for Research.[341]

Conclusion

We seek a collaborative and innovative approach to manage a rapidly changing region. We must advance U.S. national security interests, pursue responsible stewardship, and strengthen international collaboration and cooperation, as we work to meet the challenges of rapid climate-driven environmental change. The melting of Arctic ice has the potential to transform global climate and ecosystems as well as global shipping, energy markets, and other commercial interests. To address these challenges and opportunities, we will align Federal activities in accordance with this strategy; partner with the State of Alaska, local, and tribal entities; and work with other Arctic nations to develop complementary approaches to shared challenges. We will proactively coordinate regional development. Our economic development and environmental stewardship must go hand-in-hand. The unique Arctic environment will require a commitment by the United States to make judicious, coordinated infrastructure investment decisions, informed by science. To meet this challenge, we will need bold, innovative thinking that embraces and generates new and creative public-private and multinational cooperative models.[342]

[340] A footnote in the document at this point states: "See Executive Order 13175 – Consultation and Coordination with Indian Tribal Governments, November 2000."

[341] A footnote in the document at this point states: "Alaska Federation of Natives (AFN) (1996) *AFN Board Adopts Policy Guidelines for Research*. AFN, Anchorage. Alaska Natives Knowledge Network. Policy adopted in 1993, http://ankn.uaf.edu/IKS/afnguide.html."

[342] *National Strategy for the Arctic Region*, May 2013, pp. 4-11.

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