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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. The seven other Arctic states are Canada, Iceland, Norway, Sweden, Finland, Denmark (by virtue of Greenland), and Russia.

The Arctic Research and Policy Act (ARPA) of 1984 (Title I of P.L. 98-373 of July 31, 1984) "provide[s] for a comprehensive national policy dealing with national research needs and objectives in the Arctic." The National Science Foundation (NSF) is the lead federal agency for implementing Arctic research policy. The Arctic Council, created in 1996, is the leading international forum for addressing issues relating to the Arctic. The United Nations Convention on the Law of the Sea (UNCLOS) sets forth a comprehensive regime of law and order in the world's oceans, including the Arctic Ocean. The United States is not a party to UNCLOS.

An array of climate changes in the Arctic is now documented by observing systems, with more expected with future greenhouse gas-driven climate change. Observed 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. A monitoring report of the Arctic Council concluded in 2019 that "the Arctic biophysical system is now clearly trending away from its previous state [in the 20th Century] and into a period of unprecedented change, with implications not only within but also beyond the Arctic."

Following the end of the Cold War, the Arctic states sought to maintain a tradition of cooperation, low tensions, peaceful resolution of disputes, and respect for international law in managing Arctic affairs. The emergence of great power competition between the United States, Russia, and China has introduced elements of competition and tension into the Arctic's geopolitical environment. Russia's invasion of Ukraine beginning in late February 2022 has substantially affected U.S., Canadian, and Nordic relations with Russia in the Arctic.

The Department of Defense (DOD) and the Coast Guard are devoting increased attention to the Arctic in their planning and operations. Whether DOD and the Coast Guard are taking sufficient actions for defending U.S. interests in the region is a topic of congressional oversight. The Coast Guard has two operational polar icebreakers and through FY2021 has received funding for procuring two of at least three planned new polar icebreakers.

The diminishment of Arctic ice could lead in coming years to increased commercial shipping on two trans-Arctic sea routes—the Northern Sea Route close to Russia, and the Northwest Passage close to Alaska and through the Canadian archipelago—though the rate of increase in the use of these routes might not be as great as sometimes anticipated in press accounts. International guidelines for ships operating in Arctic waters have been 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 for cleaning up oil spills in ice-covered waters have yet to be developed.

Large commercial fisheries exist in the Arctic. The United States is working with other countries regarding the management of Arctic fish stocks. Changes in the Arctic could result in migration of fish stocks to new waters, and could affect protected species.

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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 geopolitical competition in the region between the United States, Russia, and China; increased military operations in the region by Russia, the United States, and other Arctic countries; growth in commercial shipping through the Arctic; and oil, gas, and mineral exploration in the Arctic could cause the region in coming years to become an arena of international cooperation, tension, and/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 makes 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 of the report 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.

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

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 land and area within the Arctic Circle is about 8.14 million square miles,[2] which is about 4.1% (or between 1/24th and 1/25th) of the Earth's surface, and more than twice the land area of the United States, which is about 3.5 million square miles.

The Arctic Circle definition of the Arctic 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

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

[2] Source: Figure provided to CRS by Geography and Map Division of Library of Congress, May 12, 2020, in consultation with the National Geodetic Survey (NGS) of National Oceanic and Atmospheric Administration (NOAA).

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.

The Arctic Ocean, which is roughly at the center of the Arctic region, accounts for much of the region's total area. By one calculation, the Arctic Ocean has an area of about 6.01 million square miles, which is about 4.3% of the Earth's ocean area.[3] This figure uses boundaries for the Arctic Ocean that include some waters south of the Arctic Circle.[4] Other sources, using different boundaries for the Arctic Ocean, put the size of the Arctic Ocean at about 5.4 million square miles.[5]

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)[6] 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,[7] 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.

The U.S. Coast Guard states that "The U.S. Arctic encompasses some 2,521 miles of shoreline, an international strait adjacent to the Russian Federation, and 647 miles of land border with Canada above the Arctic Circle. The U.S. Exclusive Economic Zone (EEZ) in the Arctic contains approximately 889,000 square miles of ocean."[8] **Figure 1** 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. A definition based on a climate-related factor could circumscribe differing areas over time as a result of climate change.

[3] Source: National Oceanographic and Atmospheric Administration, "Volumes of the World's Oceans from ETOPO1," accessed February 24, 2022, at https://www.ngdc.noaa.gov/mgg/global/etopo1_ocean_volumes.html. The table presented at that source states that the Arctic Ocean has an area of 15.558 million square kilometers, which converts to about 6.007 million square miles. A footnote to the table states: "Boundaries between oceans vary depending upon agency, making comparisons with other published estimates difficult."

[4] See the map posted at National Oceanographic and Atmospheric Administration, "Volumes of the World's Oceans from ETOPO1," accessed February 24, 2022, at https://www.ngdc.noaa.gov/mgg/global/etopo1_ocean_volumes.html.

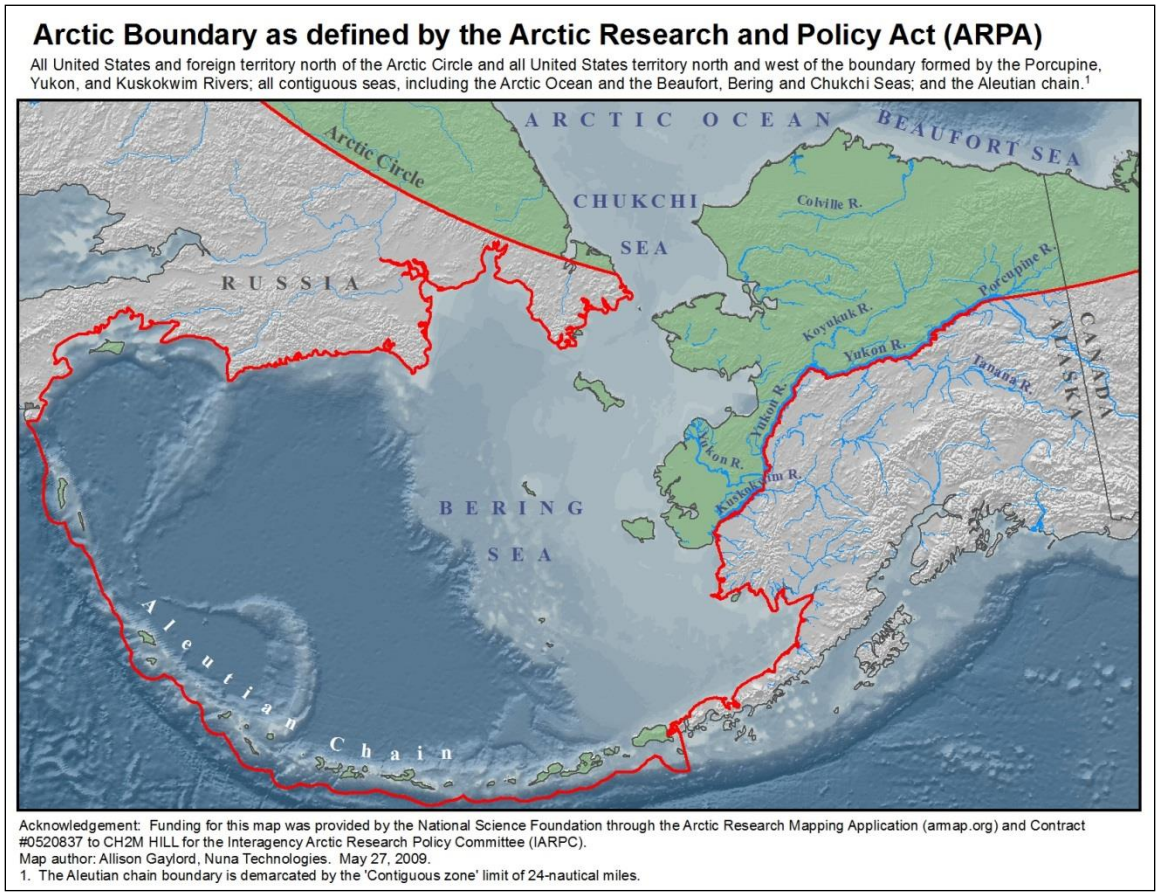
[5] See, for example, "Arctic Ocean," *Britannica (Encyclopedia Britannica)*, accessed February 24, 2022, at https://www.britannica.com/place/Arctic-Ocean; or "Arctic Ocean," *World Atl*as, accessed February 24, 2022, at https://www.worldatlas.com/seas/arctic-ocean.html.

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

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

[8] Coast Guard, *Arctic Strategic Outlook*, April 2019, p. 11.

Figure 1. Arctic Area of Alaska as Defined by ARPA

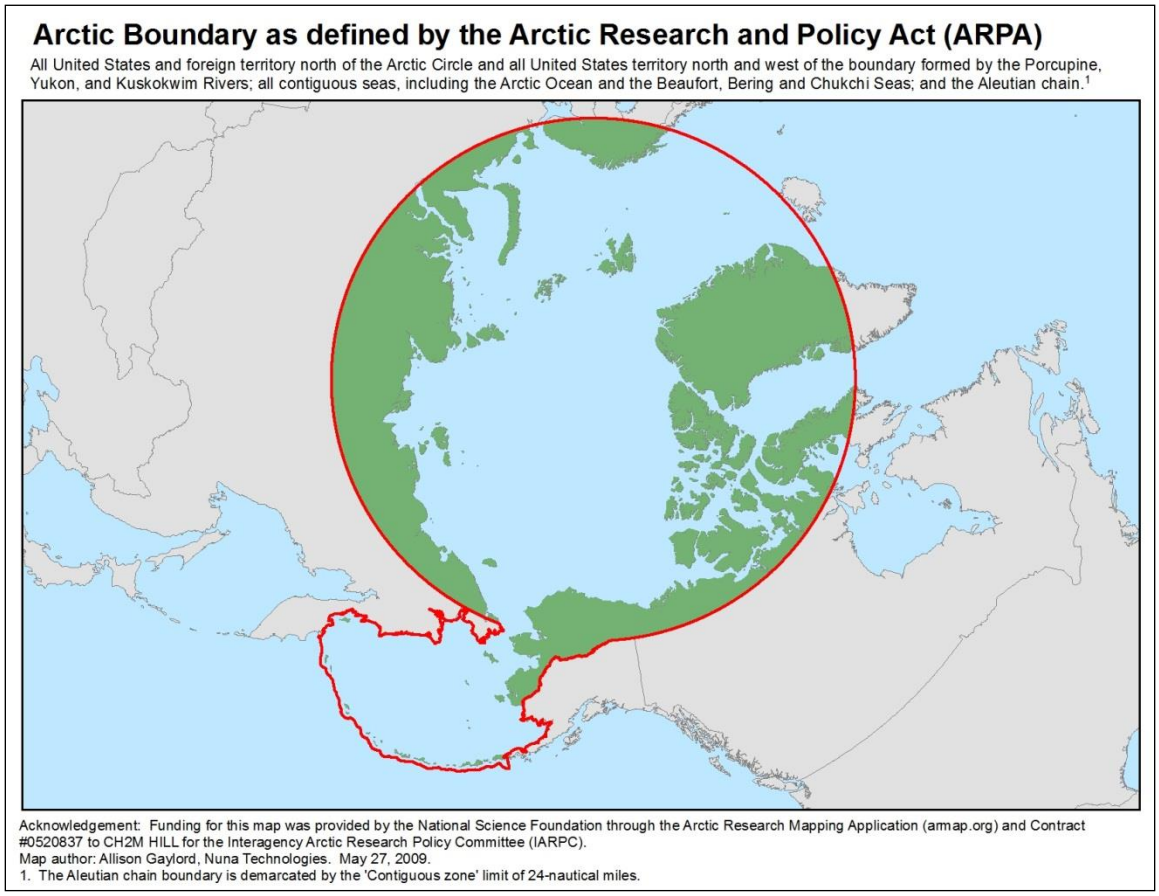


Source: U.S. Arctic Research Commission (https://www.arctic.gov/uploads/assets/ARPA_Alaska_only_150dpi.jpg, accessed February 24, 2022).

For example, the 10° C isotherm definition of the Arctic—a definition sometimes used in scientific and environmental discussions of the Arctic[9]—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.

[9] See for example, "Boundaries of the Arctic," Climate Policy Watcher, January 7, 2022, accessed March 21, 2022, at https://www.climate-policy-watcher.org/atmospheric-circulation/boundaries-of-the-arctic.html; "What is the Arctic?" National Snow & Ice Data Center, updated May 4, 2020, accessed March 21, 2022, at https://nsidc.org/cryosphere/arctic-meteorology/arctic.html; Hobart M. King, "Where is the Arctic? What is its Boundary?" Geology.com, undated, accessed March 21, 2022, at https://geology.com/maps/where-is-the-arctic/; Fabian Baur and Bruno Kothe, "Climate and climate change in the Arctic," European Organisation for the Exploitation of Meteorological Satellites (EUMETSAT), April 28, 2020, accessed March 21, 2022, at https://www.eumetsat.int/science-blog/climate-and-climate-change-arctic; "The Arctic, as Defined by Summer Temperature," GRID-Arendal, accessed March 21, 2022, at https://www.grida.no/resources/7743; *Arctic Pollution Issues: A State of the Arctic Environment Report*, Arctic Monitoring and Assessment Programme, Oslo, 1997, p. 6, accessed March 21, 2022, at https://www.amap.no/documents/download/79/inline (cover page and front section) and https://www.amap.no/documents/download/68/inline (section that includes page 6).

Figure 2. Entire Arctic Area as Defined by ARPA



Source: U.S. Arctic Research Commission (https://www.arctic.gov/uploads/assets/ARPA_Polar_150dpi.jpg, accessed February 24, 2022).

As another example, 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."[10]

[10] For examples of maps of the Arctic reflecting various definitions of the Arctic, see

- the map of the geographic areas described in Annex 1 of the May 2017 Agreement on Enhancing International Arctic Scientific Cooperation, accessed February 24, 2022, at both "Arctic Region," U.S. Department of State, https://www.state.gov/key-topics-office-of-ocean-and-polar-affairs/arctic/, and "Maps," U.S. Arctic Research Commission, https://www.arctic.gov/uploads/assets/arctic-sci-agree-150dpi-color.jpg.
- "Definitions of the Arctic," UN Environment Programme, accessed February 24, 2022, at https://www.grida.no/resources/7010;
- the collection of maps posted at "Arctic Definitions," Arctic Portal, accessed February 24, 2022, at https://arcticportal.org/maps/download/arctic-definitions;
- "Arctic Definition Map," Arctic Portal Library, accessed February 24, 2022, at http://library.arcticportal.org/1492/; and
- the maps posted by the Arctic Centre of the University of Lapland, accessed February 24, 2022, at https://www.arcticcentre.org/EN/arcticregion/Maps/definitions,

Some observers use the term "high north" as a way of referring to the Arctic, or 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.

Population of the Arctic

According to one estimate, about 4 million people, or about 0.05% of the world's population, live in the Arctic, of which roughly half (roughly 2 million) live in Russia's part of the Arctic,[11] and roughly 500,000 belong to Indigenous peoples.[12] Another source states: "Approximately two and a half million of Russia's inhabitants live in Arctic territory, accounting for nearly half of the population living in the Arctic worldwide."[13] Another source, using a broader definition of the Arctic, concluded that just over 10 million people live in the Arctic, including 7 million in Russia's Arctic.[14]

Eight Arctic States, Including Five Arctic Coastal States

Eight countries have territory north of the Arctic Circle: the United States (Alaska), Canada, Russia, Norway, Denmark (by virtue of Greenland, a self-governing part of the Kingdom of Denmark), Finland, Sweden, and Iceland. These eight countries are often referred to as the Arctic countries or Arctic States, and they are the member states of the Arctic Council, which is discussed further below.

A subset of the eight Arctic countries are the five countries that are considered Arctic coastal states because they have mainland coasts that front onto waters north of the Arctic Circle: the United States, Canada, Russia, Norway, and Denmark (by virtue of Greenland).[15]

U.S. Identity as an Arctic Nation

As mentioned earlier, the United States, by virtue of Alaska, is an Arctic country and has substantial political, economic, energy, environmental, and other interests in the region. Even so,

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https://www.arcticcentre.org/EN/arcticregion/Maps/definitions#ac-wg, and https://www.arcticcentre.org/EN/arcticregion/Maps/permafrost.

[11] Sources: "Arctic Peoples," Arctic Council, accessed February 24, 2022, at https://arctic-council.org/en/explore/topics/arctic-peoples/; National Snow & Ice Data Center, "Arctic People," accessed February 24, 2022, at https://nsidc.org/cryosphere/arctic-meteorology/arctic-people.html; United Kingdom, House of Commons, Defence Committee, On Thin Ice: UK Defence in the Arctic, Twelfth Report of Session 2017–19, August 15, 2018 (Ordered by the House of Commons to be printed 19 July 2018), p. 6; "Arctic Indigenous Peoples," Arctic Centre, accessed February 24, 2022, at https://www.arcticcentre.org/EN/arcticregion/Arctic-Indigenous-Peoples.

[12] Source: "Permanent Participants," Arctic Council, accessed February 24, 2022, at https://arctic-council.org/en/about/permanent-participants/.

[13] "The Russian Federation," Arctic Council, accessed February 24 2022, at https://arctic-council.org/en/about/states/russian-federation/.

[14] Timothy Heleniak, "The Future of Arctic Populations," *Polar Geography*, January 3, 2020. Another source states that "using more broad definition, according to the University of the Arctic Atlas, there are approximately 13.1 million people living in the area of the circumpolar North" ("Arctic Indigenous Peoples," Arctic Centre, accessed February 24, 2022, at https://www.arcticcentre.org/EN/arcticregion/Arctic-Indigenous-Peoples).

[15] The northern coast of mainland Iceland is just south of the Arctic Circle. The Arctic Circle passes through Grimsey Island, a small offshore island of Iceland that is about 25 miles north of the northern coast of mainland Iceland. See, for example, "Is Iceland in the Arctic Circle?" Iceland Unlimited, January 2017, accessed February 24, 2022, at https://icelandunlimited.is/blog/is-iceland-in-the-arctic-circle/.

Alaska is geographically separated and somewhat distant from the other 49 states, and relatively few Americans—fewer than 68,000 as of July 1, 2017—live in the Arctic part of Alaska as shown in **Figure 2**.[16] A March 6, 2020, research paper on the Arctic in U.S. national identity, based on data collected in online surveys conducted in October-December 2019, stated: "We found that Americans continue to mildly disagree with the assertion that the United States is an Arctic nation with broad and fundamental interests in the region."[17]

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)[18] "provide[s] for a comprehensive national policy dealing with national research needs and objectives in the Arctic."[19] 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;
- 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;[20] 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.

[16] Source for figure of fewer than 68,000: CRS analysis of data presented in Table 3.1, entitled Alaska Population by Region, Borough, and Census Area, 2017 to 2045, in Alaska Department of Labor and Workforce Development, Research and Analysis Section, *Alaska Population Projections: 2017 to 2045*, June 2018, p. 26. The table shows that of Alaska's estimated population as of July 1, 2017 of 737,080, a total of 589,680, of about 80%, resided in the Anchorage/Matanuska-Susitna region (401,649), the Fairbanks North Star Borough (97,738), the Kenai Peninsula Borough (58,024), and Juneau (32,269).

[17] Zachary D. Hamilla, *The Arctic in U.S. National Identity (2019)*, Arctic Studio, March 6, 2020, p. 1. See also Rodger Baker, "Remapping the American Arctic," *Stratfor*, July 28, 2020.

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

[19] 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.

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

FY2021 NSF Budget Request for Arctic Research

Office of Polar Programs (OPP)

NSF—the lead federal agency for implementing Arctic research policy—carries out Arctic research activities through its Office of Polar Programs (OPP). NSF requested a total of $506.29 million for OPP for FY2022, which represented an increase of about 4.7% from the $483.35 million estimate for FY2021.[21]

Navigating the New Arctic (NNA)

In terms of NSF-wide investments, NSF states the following in the overview of its FY2022 budget request, which includes funding for its Navigating the New Arctic (NNA) initiative:

> Arctic temperatures are rising faster than nearly everywhere else on Earth. The rapid and wide-scale changes occurring in response to this warming portend new opportunities and risks to natural systems; social and cultural systems; economic, political, and legal systems; and infrastructure and other engineered systems of the Arctic and across the globe. Gaps in scientific observations and the prevalence of interdependent social, natural, and built systems in the Arctic make it challenging to predict the region's future. Understanding and adapting to a changing Arctic will require creative new directions for Arctic-specific research and education, as well as leveraging of science, engineering, and technology advances from outside the Arctic.
>
> NNA [Navigating the New Arctic], one of NSF's Big Ideas, embodies the Foundation's forward-looking response to these profound challenges. NNA seeks innovations in Arctic observational networks and fundamental convergence research across engineering and the social, natural, environmental, and computing and information sciences, that address the interactions or connections between natural and built environments and social systems and how these connections inform our understanding of Arctic change and its local and global effects. NNA empowers new research communities; diversifies the next generation of Arctic researchers; integrates the co-production of knowledge with local and Indigenous people and organizations; and engages with interdisciplinary, interagency, and international partners to further pan-Arctic and Arctic-global perspectives.[22]

NSF requested $437.2 million for NNA for FY2022, including $30.0 million for stewardship activities and $7.2 million for foundational activities.[23]

Major U.S. Policy Documents Relating to Arctic

Overview

The executive branch has issued a number of policy documents concerning the Arctic, including those mentioned briefly below.

[21] National Science Foundation, *FY 2022 Budget Request to Congress*, May 28, 2021, p. OPP-1 (PDF page 261 of 578).

[22] National Science Foundation, *FY 2022 Budget Request to Congress*, May 28, 2021, p. NSF-Wide Investments-40 (pdf page 116 of 578).

[23] National Science Foundation, *FY 2022 Budget Request to Congress*, May 28, 2021, p. NSF-Wide Investments-40 (PDF page 116 of 578).

Specific Documents

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

On January 12, 2009 (i.e., eight days before its final day in office), 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).[24] 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.

May 2013 National Strategy for Arctic Region

On May 10, 2013, the Obama Administration released a document entitled *National Strategy for the Arctic Region*.[25] The document appears to supplement rather than supersede the January 2009 Arctic policy directive (NSPD 66/HSPD 25) discussed above.[26] The document states that the strategy is built on three lines of effort:

- advancing U.S. security interests,
- pursuing responsible Arctic region stewardship, and
- strengthening international cooperation.

Actions taken under the strategy, the document states, will be informed by four guiding principles:

- safeguarding peace and stability,
- making decisions using the best available information,
- pursuing innovative arrangements, and
- consulting and coordinating with Alaska natives.

[24] The text of NSPD 66/HSPD 25 is posted at the Homeland Security Digital Library at https://www.hsdl.org/?abstract&did=750476.

[25] *National Strategy for the Arctic Region*, May 2013, 11 pp.

[26] *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.

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.[27] The plan outlines about 36 specific initiatives.

January 2015 Executive Order for Enhancing Coordination of Arctic Efforts

On January 21, 2015, then-President Obama issued Executive Order 13689, entitled "Enhancing Coordination of National Efforts in the Arctic." The order established an Arctic Executive Steering Committee is to "provide guidance to executive departments and 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."

December 2017 National Security Strategy Document

A National Security Strategy document released by the Trump Administration in December 2017 mentions the term Arctic once, stating that that "A range of international institutions establishes the rules for how states, businesses, and individuals interact with each other, across land and sea, the Arctic, outer space, and the digital realm. It is vital to U.S. prosperity and security that these institutions uphold the rules that help keep these common domains open and free."[28]

March 2021 Interim National Security Strategic Guidance Document

An Interim National Security Strategic Guidance document released by the Biden Administration in March 2021[29] does not include the term Arctic.

U.S. Coordinator for Arctic Region

On July 16, 2014, then-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.[30] Papp served as the U.S. Special Representative until January 20, 2017, the final day of the Obama Administration and the first day of the Trump Administration. The position remained unfilled from that date through July 29, 2020, when it was effectively replaced by the newly created position of the U.S. coordinator for the Arctic region. On July 29, 2020, the Trump Administration announced that career diplomat James (Jim) DeHart would be the first U.S. coordinator for the Arctic region; DeHart began his work in the position that day.[31]

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

[28] *National Security Strategy of the United States of America*, December 2017, p. 40.

[29] White House, *Interim National Security Strategic Guida*nce, March 2021, released on March 3, 2021, 23 pp.

[30] 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.

[31] See Department of State, "Appointment of U.S. Coordinator for the Arctic Region," Media Note, Office of the Spokesperson, July 29, 2020. See also Matthew Lee, "US Names New Arctic Envoy in Push to Expand Reach in Region," *Associated Press*, July 29, 2020; Timothy Gardner, "U.S. Appoints Coordinator for Arctic Policy As Mineral

In the 117th Congress, H.R. 3361, the United States Ambassador at Large for Arctic Affairs Act of 2021, and H.R. 3433, the Arctic Diplomacy Act of 2021, would each establish a position of United States Ambassador at Large for Arctic Affairs,[32] while S. 2967, the Arctic Diplomacy Act of 2021, would establish the position of Assistant Secretary of State for Arctic Affairs.[33]

Arctic Executive Steering Committee (AESC)

On September 24, 2021, the Biden Administration announced that it was "[r]eactivating the Arctic Executive Steering Committee (AESC), a mechanism to advance U.S. Arctic interests and coordinate Federal actions in the Arctic. The AESC will also facilitate the implementation of the Northern Bering Sea Climate Resilience Area, including by standing up the Northern Bering Sea Task Force and Tribal Advisory Council. These structures reinforce collaborative partnerships—particularly with Alaska Native communities—and harness science and Indigenous Knowledge to inform management and policy." The Administration also announced that it was hiring Ambassador David Balton as AESC Executive Director and Raychelle Aluaq Daniel as AESC Deputy Director.[34] The AESC was initially established by the above-mentioned Executive Order 13689 of January 21, 2015, entitled "Enhancing Coordination of National Efforts in the Arctic." A September 24, 2021, press report stated:

> The steering committee had been moribund for the past four years, not meeting at a high level, said David Balton, appointed to direct it. He said "it will step up and do more in the Arctic."
>
> The revamped committee will try to figure out what "needs to be done to get a better handle on addressing the changes in the Arctic," Balton said.[35]

Arctic Council

The Arctic Council, created in 1996, is the leading international forum for addressing issues relating to the Arctic. Its founding document is the Ottawa Declaration of September 19, 1996, a joint declaration (not a treaty) signed by representatives of the eight Arctic states. The State Department describes the council as "the preeminent intergovernmental forum for addressing issues related to the Arctic Region. …The Arctic Council is not a treaty-based international organization but rather an international forum that operates on the basis of consensus, echoing the peaceful and cooperative nature of the Arctic Region."[36]

Race Heats Up," *Reuters*, July 29, 2020; Courtney McBride, "New Cold War: U.S. Names Arctic Policy Czar to Keep Tabs on China, Russia," *Wall Street Journal*, July 29, 2020; Melody Schreiber, "The Trump Administration Appoints a New State Department Arctic Coordinator," *ArcticToday*, July 29, 2020; Levon Sevunts (Radio Canada International), "Appointment of U.S. Arctic Co-ordinator May Signal More Muscular American Policy," *CBC*, July 31, 2020.

[32] For a press report discussing legislative proposals for establishing a U.S. Ambassador at Large for Arctic Affairs, see Hilde-Gunn Bye, "Top Lawmakers Want to Establish a US Ambassador-at-Large for Arctic Affairs," *High North News*, May 28, 2021.

[33] For a press report discussing S. 2967, see Melody Schreiber, "A New Bill Aims to Create the US's First High-Level Arctic Diplomatic Office," *ArcticToday*, October 8, 2021.

[34] White House press release, "Biden-Harris Administration Brings Arctic Policy to the Forefront with Reactivated Steering Committee & New Slate of Research Commissioners," September 24, 2021.

[35] Seth Borenstein, "White House Steps Up Work on What to Do About Thawing Arctic," *Associated Press*, September 24, 2021. See also Melody Schreiber, "Biden Appoints New U.S. Arctic Research, Leadership Officials in Science-Based approach," *ArcticToday*, September 24, 2021.

[36] "Arctic Region," U.S. Department of State, accessed February 24, 2022, at https://www.state.gov/key-topics-office-of-ocean-and-polar-affairs/arctic/.

The Arctic Council's membership consists of the eight Arctic states. All decisions of the Arctic Council and its subsidiary bodies are by consensus of the eight Arctic states. In addition to the eight member states, six organizations representing Arctic indigenous peoples have status as Permanent Participants. Thirteen non-Arctic states, 13 intergovernmental and interparliamentary organizations, and 12 nongovernmental organizations have been approved as observers, making for a total of 38 observer states and organizations.[37]

The council has a two-year chairmanship that rotates among the eight member states. The United States held the chairmanship from April 24, 2015, to May 11, 2017, and is scheduled to next hold it in 2031-2033. In May 2021, the chairmanship was transferred from Iceland to Russia.

Thematic areas of work addressed by the council include environment and climate, biodiversity, oceans, Arctic peoples, and agreements on Arctic scientific cooperation, cooperation on marine oil pollution preparedness and response in the Arctic, and cooperation on aeronautical and maritime search and rescue in the Arctic. The Ottawa Declaration states explicitly that "The Arctic Council should not deal with matters related to military security."

The eight Arctic states have signed three legally binding agreements negotiated under the auspices of the Arctic Council: a May 2011 agreement on cooperation on aeronautical and maritime search and rescue (SAR) in the Arctic, a May 2013 agreement on cooperation on marine oil pollution preparedness and response in the Arctic, and a May 2017 agreement on enhancing international Arctic scientific cooperation.[38]

Arctic and U.N. Convention on Law of the Sea (UNCLOS)

The United Nations Convention on the Law of the Sea (UNCLOS) "lays down a comprehensive regime of law and order in the world's oceans and seas[,] establishing rules governing all uses of the oceans and their resources."[39] UNCLOS was adopted in 1982, and modified in 1994 by an agreement relating to the implementation of Part XI of the treaty, which relates to the seabed and ocean floor and subsoil thereof that are beyond the limits of national jurisdiction. UNCLOS entered into force in November 1994. As of May 28, 2021 168 parties (167 states and the European Union) were party to the treaty.[40]

The United States is not a party to UNCLOS.[41] The 1982 treaty and the 1994 agreement were transmitted to the Senate on October 6, 1994, during the 103rd Congress, becoming Treaty

[37] For list of the 38 observers and when they were approved for observer status, see "Who We Are" in Arctic Council, "Arctic Council," accessed February 24, 2022, at https://arctic-council.org/en/. For a discussion of the non-Arctic observer states, see Evan T. Bloom, "The Rising Importance of Non-Arctic States in the Arctic," *Wilson Quarterly*, Winter 2022.

[38] For brief summaries of these three agreements and links to the texts of these agreements, see "Arctic Region," U.S. Department of State, accessed February 24, 2022, at https://www.state.gov/key-topics-office-of-ocean-and-polar-affairs/arctic/. For additional information on the Arctic Council's organization and operations, see the Arctic Council's website at https://arctic-council.org/.

[39] United Nations, "United Nations Convention on the Law of the Sea of 10 December 1982, Overview and full text," updated February 11, 2020, accessed February 24, 2022, at https://www.un.org/depts/los/convention_agreements/convention_overview_convention.htm.

[40] Chronological lists of ratifications of, accessions and successions to the Convention and the related Agreements as of May 28, 2021, accessed February 24, 2022, at http://www.un.org/Depts/los/reference_files/chronological_lists_of_ratifications.htm. The list shows that most recent state to become a party to the treaty is Azerbaijan, which became a party on June 16, 2016.

[41] The United States is not a signatory to the treaty. On July 29, 1994, the United States became a signatory to the 1994 agreement relating to the implementation of Part XI of the treaty. The United States has not ratified either the treaty or

Document 103-39. The full Senate to date has not voted on the question of whether to give its advice and consent to ratification of Treaty Document 103-39. Although the United States is not a party to UNCLOS, the United States accepts and acts in accordance with the nonseabed mining provisions of the treaty, such as those relating to navigation and overflight, which the United States views as reflecting customary international law of the sea.[42]

Part VI of UNCLOS (consisting of Articles 76 through 85), which covers the continental shelf, and Annex II to the treaty, which established a Commission on the Limits of the Continental Shelf, are particularly pertinent to the Arctic, because Article 77 states that "The coastal State exercises over the continental shelf sovereign rights for the purpose of exploring it and exploiting its natural resources," and that these natural resources include, among other things, "mineral and other nonliving resources of the seabed and subsoil," including oil and gas deposits.[43]

Article 76 states that "the coastal State shall establish the outer edge of the continental margin wherever the margin extends beyond 200 nautical miles," and that "Information on the limits of the continental shelf beyond 200 nautical miles... shall be submitted by the coastal State to the Commission on the Limits of the Continental Shelf set up under Annex II.... The Commission shall make recommendations to coastal States on matters related to the establishment of the outer limits of their continental shelf. The limits of the shelf established by a coastal State on the basis of these recommendations shall be final and binding."

House and Senate Arctic Member Organizations

In the House, a congressional Arctic Working Group Caucus has been co-chaired by Representative Rick Larsen and until recently by the late Representative Don Young.[44] In the Senate, Senator Lisa Murkowski and Senator Angus King announced on March 4 and 5, 2015, the formation of a Senate Arctic Caucus.[45]

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the 1994 agreement.

[42] In a March 10, 1983, statement on U.S. oceans policy, President Reagan stated that "the United States is prepared to accept and act in accordance with the [treaty's] balance of interests relating to traditional uses of the oceans—such as navigation and overflight. In this respect, the United States will recognize the rights of other states in the waters off their coasts, as reflected in the Convention, so long as the rights and freedoms of the United States and others under international law are recognized by such coastal states." (Ronald Reagan Presidential Library & Museum, "Statement on United States Oceans Policy," undated, accessed February 24, 2022, at https://www.reaganlibrary.gov/research/speeches/31083c.)

[43] Other parts of UNCLOS relevant to the Arctic include those relating to navigation and high-seas freedoms, fisheries, and exclusive economic zones.

[44] Source: United States House of Representatives, Committee on House Administration, *Congressional Member Organizations (CMOs)*, 117th Cong., revised March 2021, p. 5, accessed February 24, 2022, at https://cha.house.gov/sites/democrats.cha.house.gov/files/2021_117th%20CMOs_3-22.pdf. See also 'Congressional Arctic Working Group," accessed February 24, 2022, at https://congressionalarcticworkinggroup-larsen.house.gov/.

[45] Press release from the office of Senator Angus King, "King, Murkowski Announce U.S. Senate Arctic Caucus," March 4, 2015, accessed February 24, 2022, 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 February 24, 2022, at http://www.murkowski.senate.gov/public/index.cfm/pressreleases?ID=1ce5edcb-540d-4c43-b264-56bdbb570755, which includes a similar phrase.

Issues for Congress

Climate Change, with Biophysical and Economic Impacts[46]

An array of climate changes in the Arctic is now documented by observing systems, with more expected with future greenhouse gas-driven climate change. Observed 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. These changes continue to affect traditional livelihoods and cultures in the region, infrastructure, and the economy, as well as the distribution and health of animal populations and vegetation. The changes raise risks of pollution, food supply, safety, cultural losses, and national security. The state government of Alaska concluded that observed climate changes "have resulted in a reduction of subsistence harvests, an increase in flooding and erosion, concerns about water and food safety and major impacts to infrastructure: including damage to buildings, roads and airports."[47]

A monitoring report of the Arctic Council concluded in 2019 that

> the Arctic biophysical system is now clearly trending away from its previous state [in the 20th Century] and into a period of unprecedented change, with implications not only within but also beyond the Arctic.[48]

A few broad points raise particular concerns about changes in the Arctic:

- Long lag times between cause and full effects: Changes once set in motion prompt further and often slow effects in different components of the Arctic system, such as the influence of rising atmospheric temperatures on ocean and permafrost temperatures. Scientists expect the full effects of near-term climate changes to play out over a period of decades to many centuries.
- Feedbacks that mostly further increase warming: GHG-induced warming leads to positive (enhancing) and some negative (dampening) feedbacks within the Arctic system, which scientists expect in net to amplify warming and pursuant effects. For example, temperature-driven melting sea ice reduces reflection of incoming solar energy, leading to absorption by the Arctic Ocean and further warming of the ocean and the planet.
- Abrupt change risks: The freezing point for water, including permafrost, is one example of thresholds that certain Arctic systems may cross, leading to rapid state changes.
- Risks of irreversibilities: Some Arctic climate impacts, such as loss of sea ice and glaciers, may lead to system changes that scientists expect would be irreversible on a human timescale, even if temperatures stabilize (at a higher level than today).

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

[47] Department of Commerce, Community, and Economic Development, "Climate Change in Alaska." The Great State of Alaska. Accessed February 2, 2022. https://www.commerce.alaska.gov/web/dcra/ClimateChange.aspx.

[48] Jason E Box et al., "Key Indicators of Arctic Climate Change: 1971–2017," *Environmental Research Letters* 14, no. 4, April 2019.

Understanding remains incomplete regarding future Arctic climate changes and their implications for human and natural systems. With current knowledge, projections point to growing risks, as well as some opportunities.

The Arctic is interconnected to the rest of the globe through circulation of water, energy (e.g., heat), and carbon, including through the atmosphere and oceans. It is also connected through human systems of transport, energy and mineral production, tourism, and security. Consequently, Arctic changes are of import to both Arctic and non-Arctic regions of United States and the rest of the globe.

This section summarizes a variety of observed and projected climate changes in the Arctic and identifies some of their impacts on human and ecological systems.[49] Other sections in this report provide further discussion of implications for, for example, national security and energy production.

Warming Temperatures and a More Intense Water Cycle

The Arctic warmed at approximately three times the global average rate from 1971 to 2019, with the region's surface temperature increasing by more than 3°C (5.5°F).[50] Summers have warmed more than winters. In tandem are trends of fewer cold days, cold nights, frost days, and ice days in the North American Arctic.[51] Researchers found that warming trends as well as climate cycles, including the North Atlantic Oscillation and the Arctic Oscillation, influence observed extreme temperatures, ice distribution, and other facets of the Arctic system.[52] In addition, positive feedbacks from the loss of summer sea ice and spring snow cover on land have amplified warming in the Arctic.[53]

With warming, the water cycle has become more intense. The Arctic has experienced increasing precipitation and an increasing share of precipitation falling as rain. The first recorded rainfall at Greenland's 10,500-foot Summit Station was on August 14, 2021.[54]

Warming and increasing rainfall have led to permafrost thaw, glacier melt, and sea ice decline, leading to greater flows of organic matter and nutrients to Arctic near-coastal zones, with implications for algae, ecosystems, fisheries and other systems.

[49] Although much of Greenland is above the Arctic Circle, and many of the changes and implications apply also to Greenland, this section emphasizes other parts of the Arctic and does not attempt to summarize the often large and complex change in Greenland.

[50] T.J. Ballinger et al., "Surface Air Temperature," Arctic Program, Arctic Report Card 2021.

[51] Alvaro Avila-Diaz et al., "Climate Extremes across the North American Arctic in Modern Reanalyses," *Journal of Climate* 34, no. 7, April 1, 2021.

[52] Ibid.

[53] Intergovernmental Panel on Climate Change, "Summary for Policymakers," *Special Report on the Ocean and Cryosphere in a Changing Climate*, 2019, https://www.ipcc.ch/srocc/chapter/summary-for-policymakers/. (Hereinafter, SROCC SPM 2019.)

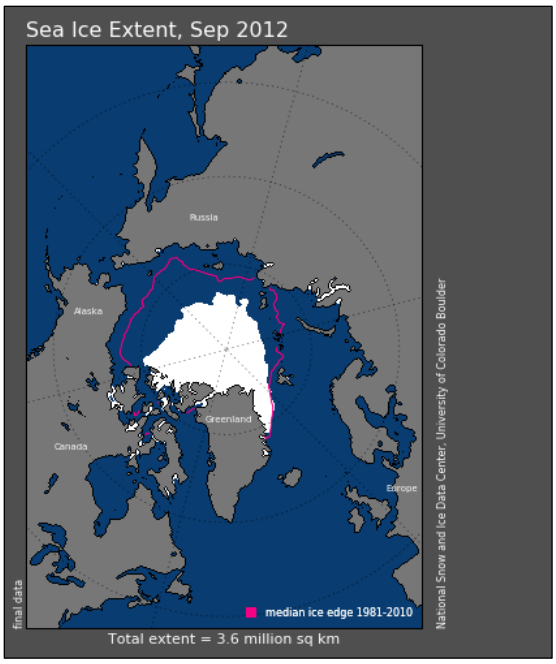
[54] National Snow and Ice Data Center, "Rain at the Summit of Greenland," August 18, 2021.

Sea Ice Decline and Mobility

Arctic sea ice has declined in extent, area, and thickness over recent decades; it has become more mobile and its spatial distribution has shifted. The record low extents of Arctic sea ice in 2012 and 2007 (**Figure 3** and **Figure 4**), as recorded by U.S. National Snow and Ice Data Center, increased scientific and policy attention on climate changes in the high north, and on the implications of projected ice-free[55] seasons in the Arctic Ocean within decades. Recent late summer minima may be unprecedented over the past 1,000 years.[56] (Some implications are discussed in sections of this report on Commercial Sea Transportation; Oil, Gas, and Mineral Exploration; and others.) The 2021 Sixth Assessment Report (AR6) of the Intergovernmental Panel on Climate Change (IPCC) concluded that "human influence is *very likely* the main driver of ... the decrease in Arctic sea ice area between 1979–1988 and 2010–2019 (about 40% in September and about 10% in March)."[57]

Figure 3. 2012 Record-Low Sea Ice Extent

compared with long-term median



Source: National Snow and Ice Data Center, Sea Ice Index, accessed February 28, 2022.

Simulations under a wide range of future climate change scenarios indicate that the Arctic could be ice-free in late summers in the second half of this century in model simulations of low to very high greenhouse gas scenarios (**Figure 4**).[58] The first instances of an ice-free Arctic in late summers could occur by mid-century in all scenarios, although model simulations provide a wide range of results.[59] The mean results of model simulations reach ice-free seasons in the 2070s in the highest and low warming scenarios, and later in the very low scenarios. In an analysis of the most recent modeling, a selection of those models that "reasonably" simulate historical sea ice extent indicated that practically ice-free

[55] 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 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.

[56] SROCC SPM 2019.

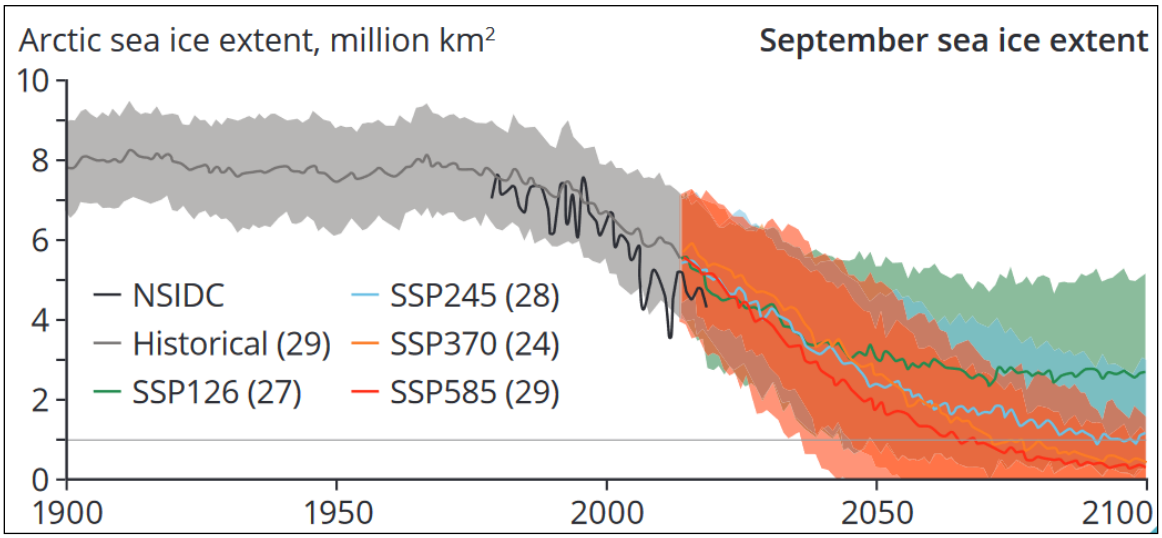
[57] Intergovernmental Panel on Climate Change, "AR6 Climate Change 2021: The Physical Science Basis - Summary for Policy Makers," August 9, 2021. https://www.ipcc.ch/report/ar6/wg1/.

[58] Arctic Monitoring and Assessment Programme (AMAP), "Arctic Climate Change Update 2021: Key Trends and Impacts. Summary for Policy-Makers," Arctic Council, May 21, 2021; 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.

[59] Global climate models do not, in general, simulate past sea ice change realistically and tend to produce less decline in sea ice extent than the latest 15-year trend.

conditions may occur at global temperature increases of 1.3°C to 2.9°C above preindustrial levels.[60] Although sea ice would remain variable in extent and distribution, modeling of future sea ice conditions indicate opportunities for transport through the Northwest Passage and the Northern Sea Route, extraction of potential oil and gas resources, and expanded fishing and tourism, though also increasing competition and potential security risks and of oil spills and maritime accidents.

Figure 4. Estimated Historical, Observed, and Projected September Arctic Sea Ice Extent



Source: Arctic Monitoring and Assessment Programme (AMAP), "Arctic Climate Change Update 2021: Key Trends and Impacts. Summary for Policy-Makers," Arctic Council, May 21, 2021.

Notes: NSIDC is the U.S. National Snow and Ice Data Center, the source that synthesized the satellite observation data (the bold black line) in this figure. The "historical" values result from model simulations, showing the modeled mean and the ranges. The projections (in colors) are for a range of greenhouse gas scenarios and associated climate changes, with the means of results represented by lines. SSP means "Shared Socioeconomic Pathway" scenarios produced in support of the International Panel on Climate Change depicting high (SSP585), medium high (SSP30), low (SSP245) and very low (SSP126) scenarios. The shaded areas represent the ranges of numerical model estimates (number), either historical and projected. The horizontal line represents sea-ice areal extent of 1 million square kilometers, below which scientists consider the Arctic to be practically ice-free.

The U.S. Arctic Report Card 2021 noted, in addition, the importance of melting of Arctic land-based ice to experienced sea level rise globally:

> In the 47-year period (1971–2017), the Arctic was the largest global source of sea-level rise contribution, 48% of the global land ice contribution 2003–2010 and 30% of the total sea-level rise since 1992. Temperature effects are dominant in land ice mass balance.

A special report of the IPCC stated that "for Arctic glaciers, different regional studies consistently indicate that in many places glaciers are now smaller than they have been in millennia."[61]

[60] The current temperature increase above the 1850-1900 average is about 1.1ºC.

[61] SROCC SPM 2019.

The Arctic Ocean has been undergoing additional changes: It has been acidifying—with some parts acidifying more rapidly than the Atlantic or Pacific Oceans.[62] Some scientists estimate that acidification of the Arctic Ocean may increase enough by the 2030s to significantly influence coastal ecosystems.[63] Primary production in the ocean has increased, due to decreases in sea ice and increases in nutrient supply.

Land-Based changes

Climate changes in the Arctic have important implications for human and natural land-based systems, through permafrost thawing, erosion, instability, and ecosystem shifts.

The U.S. Geological Survey (USGS) concluded that an increase in coastal erosion on the North Slope of Alaska was "likely the result of several changing Arctic conditions, including declining sea-ice extent, increasing summertime sea-surface temperature, rising sea level, and possible increases in storm power and corresponding wave action."[64] The USGS found that erosion has been occurring at an average rate of 1.4 meters annually and that, while some areas are accreting, others are eroding at rates as high as 20 meters per year. Coastal erosion poses risks for native communities, oil and gas infrastructure, and wildlife; adaptations to mitigate and manage adverse impacts can be costly and risky.

Warming temperatures have increased thawing of near-surface permafrost. "The majority of Arctic infrastructure is located in regions where permafrost thaw is projected to intensify by mid-century," according to the IPCC special report on the cryosphere.[65] Existing infrastructure was not generally placed or engineered for the instability, posing risks to human safety and property, and potentially disruption. The IPCC report assessed that "about 20% of Arctic land permafrost is vulnerable to *abrupt* permafrost thaw and ground subsidence,"[66] increasing risks of sudden failures. According to one study, 30%–50% of critical circumpolar infrastructure may be at high risk by 2050. "Accordingly, permafrost degradation-related infrastructure costs could rise to tens of billions of U.S. dollars by the second half of the century."[67] Other costs could be incurred for relocation of infrastructure and villages, and to manage habitat for subsistence wildlife and endangered and threatened species.

Impacts of climate change on species have been positive and negative. Longer growing seasons have resulted in vegetation growth around the Arctic with overall "greening," though also some "browning" in some regions in some years. Woody shrubs and trees are projected to expand to cover 24%–52% of Arctic tundra by 2050.[68] Vegetation changes can provide amplifying feedbacks that increase temperature and permafrost instability. In particular, scientists have assessed significant methane emissions from some thawing peat bogs.

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[62] Di Qi et al., "Increase in Acidifying Water in the Western Arctic Ocean," *Nature Climate Change* 7, no. 3, March 2017.

[63] U.S. Global Change Research Program, "Climate Science Special Report," Fourth National Climate Assessment, Volume 1, October 2017, https://science2017.globalchange.gov/.

[64] Pacific Coastal and Marine Science Center, "Climate Impacts to Arctic Coasts," U.S. Geological Survey, October 15, 2021.

[65] SROCC SPM 2019.

[66] SROCC SPM 2019.

[67] Hjort, Jan, Dmitry Streletskiy, Guy Doré, Qingbai Wu, Kevin Bjella, and Miska Luoto, "Impacts of Permafrost Degradation on Infrastructure," *Nature Reviews Earth & Environment* 3, no. 1 (January 2022): 24–38, https://doi.org/10.1038/s43017-021-00247-8.

[68] SROCC SPM 2019.

Potential area burned by wildfire could increase by 25% to 53% by 2100. This could affect, for example, forage for caribou and shifting competition between caribou and moose, with likely detriments to subsistence users of caribou.[69]

The IPCC special report on the cryosphere also found that

> On Arctic land, a loss of globally unique biodiversity is projected as limited refugia exist for some High-Arctic species and hence they are outcompeted by more temperate species (medium confidence).[70]

It identified negative impacts also on food and water security in the Arctic, "disrupt[ing] access to, and food availability within, herding, hunting, fishing, and gathering areas, harming the livelihoods and cultural identity of Arctic residents including Indigenous populations."[71] More broadly, warming and ecosystem shifts have "increased risk of food- and waterborne diseases, malnutrition, injury, and mental health challenges especially among Indigenous peoples."[72]

Few studies have investigated the potential economic effects of the array of physical impacts. A report for the state of Alaska on the economic effects of climate change

> estimated that five relatively certain, large effects that could be readily quantified would impose an annual net cost of $340–$700 million, or 0.6%–1.3% of Alaska's GDP. This significant, but relatively modest, net economic effect for Alaska as a whole obscures large regional disparities, as rural communities face large projected costs while more southerly urban residents experience net gains.[73]

The research did not consider "nonuse" impacts, such as on culture, subsistence harvests, or other nonmarket values, as well as additional sectors, such as military installations, housing, and others.

Another study estimating the effects of climate change on Alaskan infrastructure found "cumulative estimated expenses from climate-related damage to infrastructure without adaptation measures (hereafter damages) from 2015 to 2099 totaled $5.5 billion (2015 dollars, 3% discount) for RCP8.5 [a high climate scenario] and $4.2 billion for RCP4.5 [a moderate climate scenario], suggesting that reducing greenhouse gas emissions could lessen damages by $1.3 billion this century."[74] Costs were mostly due to road flooding and permafrost instability, and mostly in the interior and southcentral Alaska. It also concluded that adaptation measures could mostly reduce or entirely avoid the estimated economic losses for this land-based infrastructure.

[69] SROCC SPM 2019.

[70] SROCC SPM 2019.

[71] SROCC SPM 2019.

[72] SROCC SPM 2019.

[73] Berman, Matthew, and Jennifer I. Schmidt, "Economic Effects of Climate Change in Alaska." *Weather, Climate, and Society* 11, no. 2 (April 1, 2019): 245–58, https://doi.org/10.1175/WCAS-D-18-0056.1. The five effects evaluated were change in value added in Alaska (value of shipments less cost of inputs purchased from outside Alaska) for specific industries; change in household cost of living; change in purchased input costs for businesses and governments; change in nonwage benefit flows to households, including subsistence benefits; and change in value of buildings and infrastructure.

[74] Melvin, April M., Peter Larsen, Brent Boehlert, James E. Neumann, Paul Chinowsky, Xavier Espinet, Jeremy Martinich, et al., "Climate Change Damages to Alaska Public Infrastructure and the Economics of Proactive Adaptation," *Proceedings of the National Academy of Sciences* 114, no. 2 (January 10, 2017): E122–31, https://doi.org/10.1073/pnas.1611056113.

Geopolitical Environment[75]

Overview

Following the end of the Cold War in the late 1980s and early 1990s, and particularly since the founding of the Arctic Council in 1996, the Arctic states have sought to maintain the Arctic as a region of cooperation, low tensions, peaceful resolution of disputes, and respect for international law—a tradition some observers refer to as the "Arctic spirit" or "Rovaniemi Arctic spirit" after a city in northern Finland associated with the origins of the Arctic Council.[76] The Nordic countries in particular have been committed to this goal.

While there continues to be significant international cooperation on Arctic issues, the emergence of great power competition (also called strategic competition) between the United States, Russia, and China, combined with the increase in human activities in the Arctic resulting from the diminishment of Arctic ice, has introduced elements of competition and tension into the Arctic's geopolitical environment,[77] and the Arctic is viewed by some observers as an arena for geopolitical competition among the three countries.[78]

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[75] This section was prepared by Ronald O'Rourke, Specialist in Naval Affairs, Foreign Affairs, Defense, and Trade Division. It incorporates material prepared by Kristin Archick, Specialist in European Affairs, Foreign Affairs, Defense, and Trade Division, and Derek E. Mix, Analyst in European Affairs, Foreign Affairs, Defense, and Trade Division.

[76] One observer, for example, states:

> For a long time, many of us observing Arctic affairs have been using the term 'Rovaniemi Arctic spirit'1 when we refer to Arctic international cooperation. It aims to capture the sentiment that it is in this region that Arctic states can foster peace and international cooperation, even if there are tensions between their overall relations. The name derives from the fact that Arctic intergovernmental cooperation between the eight Arctic states commenced in Rovaniemi with the signing of the Arctic Environmental Protection Strategy.
>
> (Timo Koivurova, "Lessons from the Finland's Chairmanship of the Arctic Council: What Will Happen with the Arctic Council and in General Arctic Governance," *Yearbook of Polar Law XII (2020)*: 197

See also Timo Koivurova, "Is This the End of the Arctic Council and Arctic Governance as We Know It?" *High North News*, December 12, 2019; Brian Johnson, "Arctic Spirit," *Parliament Magazine*, July 8, 2019.

[77] See, for example, Diana Stancy Correll, "Arctic Will Become 'Contested' Without US Presence and Partnerships, 2nd Fleet CO Warns," *Navy Times*, August 2, 2021; Joshua Tallis, "As 'Arctic Exceptionalism' Melts Away, the US Isn't Sure What It Wants Next," *Defense One*, January 22, 2020; Timo Koivurova, "How US Policy Threatens Existing Arctic Governance," *ArcticToday*, January 17, 2020; Melody Schreiber, "As the Arctic Changes, International Cooperation May Be Put to the Test," *ArcticToday*, July 25, 2018; Stephanie Pezard, Abbie Tingstad, and Alexandria Hall, *The Future of Arctic Cooperation in a Changing Strategic Environment*, RAND Europe (PE-268RC), 2018, 18 pp.; Geoff Ziezulewicz, "As Arctic Waters Open, Nations Plant Their Flags," *Navy Times*, April 8, 2018; James Stavridis, "Avoiding a Cold War in the High North," *Bloomberg*, May 4, 2018; Kristina Spohr, "The Race to Conquer the Arctic—the World's Final Frontier," *New Statesman*, March 12, 2018.

[78] See, for example, Jeremy Dasilva, "Renewable Energy as a National Security Strategy in the Arctic," American Security Project, December 15, 2021; Haley Zaremba, "A New Geopolitical Conflict Is Looming Over The Arctic," *OilPrice.com*, September 2, 2021; June Teufel Dreyer, "The Arctic: Global Warming and Heated Politics," Foreign Policy Research Institute, August 17, 2021; Jonathan Jordan, "Russia's Coercive Diplomacy in the Arctic," Arctic Institute, July 6, 2021; Kazunari Hanawa, "Unfrozen World: Arctic Thaw Becomes Major Source of Global Risk," *Nikkei Asia*, June 28, 2021; Thomas Grove, "Melting Arctic Ice Pits Russia Against U.S. and China for Control of New Shipping Route," *Wall Street Journal*, June 23, 2021; Atle Staalesen, "National Security Chief Says Russia Must Bolster its Arctic Military," *Barents Observer*, June 23, 2021; K. M. Seethi, "Russia, US And The Churning Arctic Geopolitics – Analysis," *Eurasia Review*, June 18, 2021; Economist, "Who Controls the North,?" *Economist*, June 14, 2021.

Russia's increased military presence and operations in the Arctic—and responding actions by the militaries of the other Arctic states—are one source of competition and tension in the region. China's growing diplomatic and economic activities in the Arctic are another. Some observers have argued that the diminishment of Arctic ice and potentially increased maritime access to the region's resources has prompted or could prompt a race for Arctic resources (or words to that effect) among Russia, China, the United States, and other countries, setting the stage for increased international tensions and competition in the region.[79] Other observers have argued that the potential for such a race has been exaggerated, particularly given the high costs and technical challenges of Arctic oil and gas operations.[80] Viewing a situation that mixes a tradition of cooperation and low tension with newer elements of competition and tension, some U.S. officials have stated that the United States should aim in the Arctic to cooperate where it can, but compete where it must.[81]

An October 2021 National Intelligence Estimate by the National Intelligence Council on climate change and international responses that are increasing challenges to U.S. national security states the following about the Arctic (emphasis as in original):

> ***Key Judgment 2*: The increasing physical effects of climate change are likely to exacerbate cross-border geopolitical flashpoints as states take steps to secure their interests.** The reduction in sea ice already is amplifying strategic competition in the Arctic over access to its natural resources....
>
> **We assess that Arctic and non-Arctic states almost certainly will increase their competitive activities as the region becomes more accessible because of warming temperatures and reduced ice. Competition will be largely economic but the risk of miscalculation will increase modestly by 2040 as commercial and military activity grows and opportunities are more contested.**
>
> • Diminishing sea ice probably will increase access to shipping routes that can reduce trade times between Europe and Asia by about 40 percent for some vessels. In addition, onshore oil and natural gas deposits, as well as an estimated $1 trillion worth of precious metals

[79] For recent examples, see Haley Zaremba, "A New Geopolitical Conflict Is Looming Over The Arctic," *OilPrice.com*, September 2, 2021; June Teufel Dreyer, "The Arctic: Global Warming and Heated Politics," Foreign Policy Research Institute, August 17, 2021; Kazunari Hanawa, "Unfrozen World: Arctic Thaw Becomes Major Source of Global Risk," *Nikkei Asia*, June 28, 2021; Thomas Grove, "Melting Arctic Ice Pits Russia Against U.S. and China for Control of New Shipping Route," *Wall Street Journal*, June 23, 2021; "Arctic Resources Race," *Wikipedia*, updated February 14, 2022 (accessed February 24, 2022); Economist, "Who Controls the North,?" *Economist*, June 14, 2021; Laura Millan Lombrana, "Tensions Over Arctic Resource Rights Grow as Russia Takes Leadership Role," *World Oil*, May 23, 2021; Tony Barber, "Arctic Rivalry Heats Up among the Great Powers," *Financial Times*, May 19, 2021; Jariel Arvin, "The Latest Consequence of Climate Change: The Arctic Is Now Open for Business Year-Round, Global Competition in the Arctic Is Heating Up as the Year-Round Sea Ice Retreats," *Vox*, February 22, 2021.

[80] See, for example, Erica Dingman, "Is There Really a Race for the Arctic?" *Al Jazeera*, March 31, 2017; Irina Slav, "The Arctic Resource Race Is On And It Will Be Peaceful," *OilPrice.com*, January 29, 2017; Michael John Laiho, "Four Myths about the Supposed Oil and Gas Bonanza in the Arctic," *The Conversation*, November 218, 2016; Victoria Herrmann, "The Gap Between Arctic Oil's Rhetoric and Reality," Gates Cambridge Trust, September 29, 2015; Andre Mayer, "Race to Claim High Arctic's Oil Resources May Be a Fool's Mission," *CBC*, December 12, 2013; Clive Schofield, "Cold Rush: Exploring Arctic Myths And Misconceptions," Thesigers, March 27, 2013; Geoffrey Kemp, Tim Boersma, and Nicholas Siegel, "Is Geopolitical Competition Over the Arctic Exaggerated?" *RealClear World*, January 5, 2012.

[81] Referring to the Coast Guard's April 2019 Arctic strategy document, for example, one observer stated: "The way the Arctic is defined in the new strategy is, cooperate where we can but compete where we must." (Sherri Goodman, as quoted in Melody Schreiber, "The US Coast Guard's New Arctic Strategy Highlights Geopolitics and Security," *ArcticToday*, April 23, 2019.) DOD's June 2019 Arctic strategy document states that DOD will "compete when necessary to maintain favorable regional balances of power" in the Arctic. See also Nick Childs, Security and the Arctic: Navigating Between Cooperation and Competition," International Institute for Strategic Studies (IISS), December 2021, 21 pp.

and minerals will become more available, but some high-cost offshore oil and gas projects could become unprofitable if the energy transition speeds up.

• Warming ocean temperatures probably will push Bering Sea fish stocks northward into the Arctic Ocean, according to a NOAA study, which could increase commercial and illegal fishing activity in the region and exacerbate regional disputes between Arctic and non-Arctic states over fishing rights.

• Coastal erosion and thawing permafrost will damage critical infrastructure. Massive investment in infrastructure would be needed to maximize the economic potential of the region, ranging from new ports to mining, offering foreign powers an opportunity to gain a foothold by investing in new infrastructure and rebuilding and hardening existing infrastructure.

Military activity is likely to increase as Arctic and non-Arctic states seek to protect their investments, exploit new maritime routes, and gain strategic advantages over rivals.

The increased presence of China and other non-Arctic states very likely will amplify concerns among Arctic states as they perceive a challenge to their respective security and economic interests. China, France, India, Japan, South Korea, and the United Kingdom have released Arctic strategies mostly focused on economic opportunities, but some address security issues, which has prompted Russian policymakers to repeatedly state since 2018 that non-Arctic countries do not have a military role in the region.

Contested economic and military activities will increase the risk of miscalculation, and deescalating tensions is likely to require the adaptation of existing or creation of new forums to address bilateral or multilateral security concerns among Arctic states. Although the scope of the Arctic Council—the leading intergovernmental forum promoting cooperation among Arctic states—specifically excludes military security, Russia intends to broach security concerns with the other Arctic states while chairing the council from 2021 to 2023, according to Russian officials' public statements, and may propose alternate forums to discuss those issues....

Overt military action, especially by a non-Arctic state, that significantly escalates tension in the region and results in a sidelining of Arctic diplomacy *would challenge our judgment that increased activity in the Arctic, while raising the possibility of miscalculation, is unlikely to result in outright conflict because of the harsh operating environment and existing mechanisms for cooperation.* Persistent challenges to Russia's supremacy of the Northern Sea Route [NSR][82] by a non-Arctic state's military could result in armed conflict with Russia if diplomatic negotiations had stalled and foreign militaries continued to operate in what Moscow views as its territorial waters. Alternatively, if a non-Arctic state, especially China, were to begin regular, large-scale military operations in the area to protect an economic foothold in the region, the risk of conflict with Arctic states could increase and contribute to a buildup of forces.[83]

[82] The NSR is an Arctic sea route connecting Europe to East Asia that runs generally along Russia's Arctic coast.

[83] Office of the Director of National Intelligence, National Intelligence Council, *Climate Change and International Responses Increasing Challenges to US National Security Through 2040*, National Intelligence Estimate, NIC-NIE-2021-10030-A, pp. 7, 8, 16 (hereafter cited as *2021 NIC NIE*). See also Mark Hosenball (Reuters), "U.S. Spy Agencies Say Climate Change Means Growing Security Concerns in the Arctic," *ArcticToday*, October 21, 2021. See also Department of Homeland Security, *DHS Strategic Framework for Addressing Climate Change*, October 21, 2021, pp. 9, 14; Sharon E. Burke, "The Arctic Threat that Must Not Be Named," *War on the Rocks*, January 28, 2021; Andrew Latham, "How Efforts to Combat Climate Change Created New Security Challenges in the Arctic," *The Hill*, October 21, 2021.

In addition to how the geopolitical environment in the Arctic might be affected by developments within the Arctic itself, another question—one that has been underscored by Russia's invasion of Ukraine beginning in late February 2022—is how the geopolitical environment in the Arctic might be affected by developments in other regions.

One possible perspective on this question would be to argue that the Arctic states and other Arctic stakeholders should work to prevent great power competition and tension in other regions from crossing over into the Arctic, on the grounds that the Arctic tradition of cooperation and low tensions has proven successful in promoting the interests of the Arctic states and other Arctic stakeholders on a range of issues, that it has served as a useful model for other parts of the world to follow, and that given competition and tension in other regions, it is needed as model more now than ever.[84]

Another possible perspective on this question would be to argue that a policy of attempting to insulate the Arctic from great power competition and tensions in other regions, though well-intentioned, could help encourage aggressive Russian of Chinese actions in other regions by giving those two countries confidence that aggressive actions they might take in other regions would not result in punitive costs being imposed on them in the Arctic. In this view, attempting to insulate the Arctic from great power competition and tensions in other regions could help legitimize aggressive Russian or Chinse actions in other regions, provide little support to peaceful countries attempting to resist such actions, and facilitate a divide-and-conquer strategy by Russia or China in their relations with other countries that could leave the Arctic states themselves in the long run with fewer allies and partners in other regions for resisting unwanted Russian or Chinese actions in the Arctic.

Arctic Governance

Great power competition and the increase in human activities in the Arctic resulting from the diminishment of Arctic ice have put a spotlight on the issue of Arctic governance and the limits of the Arctic Council as a governing body.[85] For some observers, Russia's invasion of Ukraine

[84] See, for example, Tatiana Belousova, "Climate Change, a Catalyst for Arctic Cooperation," *The Hindu*, August 25, 2021; Lawson W. Brigham, "Reflections on the Arctic Council's Recent Message to the Globe: Peace, Stability and Cooperation," *Polar Points* (Wilson Center), July 23, 2021; Luke Patey, "Managing US-China Rivalry in the Arctic, Small States Can Be Players in Great Power Competition," Dansk Institut for Internationale Studier, October 9, 2020; Editorial, "Arctic Science Cannot Afford a New Cold War," *Nature*, September 30, 2020; Eilís Quinn, "Are Potential Arctic Security Threats Eclipsing Urgent Action on Climate? A New Study Makes Its Case," *Eye on the Arctic (Radio Canada International)*, September 10, 2020; Paul Taylor, *After the Ice, The Arctic and European Security*, Friends of Europe, Autumn 2020 (September 2020), 113 pp.; Agence France-Presse, "Iceland Wants To Preserve Arctic From US-China Tensions: PM," *Barrons*, July 30, 2020; Thomas Graham and Amy Myers Jaffe, "There Is No Scramble for the Arctic, Climate Change Demands Cooperation, Not Competition, in the Far North," *Foreign Affairs*, July 27, 2020; Jeremy Tasch, "Why the Talk of an 'Artic Cold War' Is Exaggeration," Valdai Discussion Club, July 7, 2020.

[85] See, for example, Benjamin J. Sacks et al., *Exploring Gaps in Arctic Governance, Identifying Potential Sources of Conflict and Mitigating Measures*, RAND, 2021, 29 pp. (report RRA1007.1); Clara Ferreira Marques, "As the Arctic Heats Up, How to Keep the Peace," *Bloomberg*, May 22, 2021; James Foggo and Rachael A. Gosnell, "Building a Trans-Polar Bridge," Center for European Policy Analysis (CEPA), May 21, 2021; Ebru Caymaz, "Rethinking Governance in Time of Pandemics in the Arctic," Arctic Institute, January 14, 2021; Ian Birdwell, "Arctic Governance: Keeping The Arctic Council On Target," Center for International Maritime Security (CIMSEC), July 29, 2020; Benjamin Chiacchia, "The Case for an Arctic Treaty," *U.S. Naval Institute Proceedings*, May 2020; Rashmi Ramesh, "Changing Geopolitics of the Arctic: Challenges for Governance," *IndraStra*, April 9, 2020; Angus Parker, "Looking North: How Should the Arctic Be Governed?" *Geographical (UK)*, March 17, 2020; Kevin McGwin, "An Arctic Treaty Has Been Rejected by the Region's Leaders. Again; Academics Will Tell You the Idea of an Arctic Treaty Sounds Terribly Exciting. Diplomats Think It Is Just Terrible," *ArcticToday*, February 12, 2020; Marc Lanteigne, "So You Want to Write an Arctic Treaty?" *Over the Circle*, February 10, 2020; Heather Exner-Pirot et al., "Form and

beginning in late February 2022 has underscored the issue of Arctic governance.[86] Regarding the limits of the council as a governing body, the council states that it "does not and cannot implement or enforce its guidelines, assessments or recommendations. That responsibility belongs to each individual Arctic State. [In addition,] The Arctic Council's mandate, as articulated in the Ottawa Declaration, explicitly excludes military security."[87]

For observers who are concerned that the limits of the Arctic Council as a governing body are becoming more evident or problematic, potential options include but are not necessarily limited to amending the council's rules to provide a mechanism for enforcing its guidelines, assessments or recommendations, or expanding the council's mandate to include an ability to address military security issues.[88] Supporters of such options might argue that changes such as these could help the council adapt to the Arctic's changed geopolitical environment and thereby help maintain the council's continued relevance in coming years. Continuing to exclude military security from the council's mandate, they might argue, could result in Arctic military security issues remaining unaddressed or being addressed in different fora that might have traditions weaker than those of the Arctic Council for resolving disputes peacefully and with respect for international law.

Observers who are less convinced that the limits of the Arctic Council as a governing body are becoming more evident or problematic might argue that such options could put at risk council's ability to continue addressing successfully nonmilitary issues in the Arctic, and that in light of the council's successes since its founding, the council should be viewed as an example of the admonition, "if it isn't broke, don't fix it."[89] Arctic security issues, they might argue, can or are being addressed through existing mechanisms, such as the Arctic Security Forces Roundtable (ASFR) and the Arctic Chiefs of Defense (ACHOD) Forum.[90]

Function: The Future of the Arctic Council," *Arctic Institute*, February 5, 2019.

[86] Alice Rogoff, "It's Time for an Arctic Council 2.0, Russia's Threat to Finland and Sweden Renders the Existing Paradigm for Arctic Cooperation Inoperable," *ArcticToday*, March 5, 2022.

[87] Arctic Council, "About the Arctic Council," accessed February 24, 2022, at https://arctic-council.org/en/about/.

[88] See, for example, Nima Khorrami, "Time for Expansion: The Arctic Council at the Crossroad of Heightened Strategic Tensions and Climate Change," Arctic Institute, October 12, 2021.

[89] See, for example, Trine Jonassen, "Researcher Refutes Myth about the Wild North, Despite Increased Military Activity," *High North News*, August 20, 2021.

[90] Regarding the question of how to address security issues, see Jeremy Greenwood, "Lessons from Ukraine About the Arctic: Russian 'Dialogue' Isn't Always What It Seems," *High North News*, January 27, 2022; Carter Boone, "Arctic Council: Should Russia Push for Including Security Issues During its Chairmanship?" *Modern Diplomacy*, June 29, 2021; Jane George, "Russia Wants to Revive Military Meetings Among Arctic Council Members," *Nunatsiaq News*, May 20, 2021; Jacob Gronholt-Pedersen, "Russia Calls for Military Meetings between Arctic States as Tensions Rise," *Reuters*, May 20, 2021; Trine Jonassen, "Russia on Arctic Council Chairmanship: Wants to Revive the Military Dialogue Between Arctic States," *High North News*, May 20 (updated May 21), 2021; Matthew Lee, "US, Russia At Odds over Military Activity in the Arctic," *Associated Press*, May 20, 2021; Radio Free Europe/Radio Liberty, "Washington Rallies Support Over Arctic Buildup; Moscow Worried Over Deployments In Norway," *Radio Free Europe/Radio Liberty*, May 20, 2021; Hilde-Gunn Bye, "Arctic Council, EU, NATO on Agenda as Military Leaders Addressed Arctic Security Issues," *High North News*, May 12 (updated May 14), 2021; EU Reporter Correspondent, "Military Leaders Address Collective Arctic Security Issues," *Eureporter*, May 11, 2021; Anita Parlow, "Trust and Paradox: The United States and Russia in the Arctic," *Barents Observer*, May 11, 2021; Sherri Goodman, Marisol Maddox, and Kate Guy, "We Need Renewed Dialogue Among Security Forces in the Arctic," *ArcticToday*, March 11, 2021; Mathieu Boulègue and Duncan Depledge, *Arctic Hard Security Taskforce: Summary of the 10 December Expert Workshop*, North American and Arctic Defence and Security Network, Activity Report, March 10, 2021, 8 pp.; Walter Berbrick, Rachael Gosnell, Lars Saunes, and Mary Thompson-Jones, "Preventing Conflict in the Arctic with Russia Starts with Dialogue," *National Interest*, March 8, 2021; Hilde-Gunn Bye, "Russia Should Be Invited Back to Arctic Security Forums, New Report Suggests," *High North News*, January 26 (updated January 27), 2021. See also Depledge and P. Whitney Lackenbauer, editors, *On Thin Ice? Perspectives on Arctic Security*, North American and Arctic Defence and Security Network (NAADSN), Trent University, Peterborough, Ontario, Canada, 2021, 201 pp.; Andreas

China—which is not one of the eight Arctic states and consequently does not have a decisionmaking role in the Arctic Council—has raised questions as to whether the Arctic Council as currently constituted and the current broader legal framework for the Arctic should continue to be the principal means for addressing issues relating to the Arctic, and has begun to use other approaches for influencing Arctic governance.[91]

Relative Priority of Arctic in U.S. Policymaking

In light of great power competition and the increase in human activities in the Arctic resulting from the diminishment of Arctic ice, some observers argue that there is a need to devote more U.S. attention and resources to the region.[92] In August 2020, James DeHart, the U.S. Coordinator for the Arctic, stated that "if you look at what is happening in our system over the last couple of months, you will see that we are launching a comprehensive and an integrated diplomatic approach and engagement in the Arctic region," and that "in a few years, people will look back at this summer [of 2020] and see it as an important pivot point, a turning point, with a more sustained and enduring attention by the United States to the Arctic region."[93]

On the other hand, great power competition is also being expressed in Europe, the Middle East, the Indo-Pacific, Africa, and Latin America. As a consequence, it might be argued, some or all these other regions might similarly be in need of increased U.S. attention and resources. In a situation of finite U.S. resources, the Arctic competes for attention and resources against these other regions. Some observers argue that the United States is not allocating sufficient attention or resources to defend and promote its interests in the Arctic.[94]

Østhagen, "The Arctic Security Region: Misconceptions and Contradictions," *Polar Geography*, vol. 44, no. 1 (2021), published online February 28, 2021: 55-74.

[91] See, for example, Pan Yixuan, "Global Governance Needed for Arctic Affairs," *China Daily*, May 10, 2019; Zhang Yao, "Ice Silk Road Framework Welcomed by Countries, Sets New Direction for Arctic Cooperation," *Global Times*, April 7, 2019; Liu Caiyu, "China's Role in Arctic Governance 'Cannot Be Ignored,'" *Global Times*, November 22, 2018; Harriet Moynihan, "China Expands Its Global Governance Ambitions in the Arctic," Chatham House, October 15, 2018; Sydney J. Freedberg Jr., "China & Russia In The Arctic: Axis Of Ambivalence," *Breaking Defense*, July 6, 2018; Nengye Liu and Michelle Lim, "How Arctic Governance Could Become a Testing Ground for Sino-US Relations," *The Conversation*, March 29, 2017.

[92] See for example, Heather A. Conley and Matthew Melino, *The Implications of U.S. Policy Stagnation toward the Arctic Region*, Center for Strategic and International Studies (CSIS), May 2019, 5 pp.; Daniel Kochis and Johnathan Little, "As Russia Invests in Arctic, America Falls Behind," Heritage Foundation, November 3, 2021.

[93] As quoted in Hilde-Gunn Bye, "The U.S. Is Launching a Comprehensive Diplomatic Approach in the Arctic Region, Says Top-Level Official," *High North News*, August 6 (updated August 7), 2020. See also Hilde-Gunn Bye, "USA Steps Up Diplomatic Efforts in the Arctic," *High North News*, September 29 (updated September 30), 2020; Levon Sevunts, "U.S. Wants to Keep the Arctic An Area of Low Tensions, [Says] Top Official," *Barents Observer*, August 6, 2020.

[94] See, for example, Mir Sadat, "The US Is Unprepared to Face the Challenge in the Arctic. Here's What It Should Do," Atlantic Council, January 31, 2022; Tyler Olson, "Biden Admin Faces Lack of Icebreakers, Increasing Russian and Chinese Threats in Arctic," *Fox News*, May 9, 2021; Rockford Weitz, "Competition Heats Up in the Melting Arctic, and the US Isn't Prepared to Counter Russia," *The Conversation*, April 19, 2021; John Rossomando, "Will Joe Biden Lose the Arctic to Russia or China?" *National Interest*, April 18, 2021; The Wallace Institute, "It's Bigger Than Icebreakers: America's Path Forward in the Arctic," *Defense Post*, October 23, 2020.

U.S., Canadian, and Nordic Relations with Russia in the Arctic

Overview

A key issue for U.S., Canadian, and Nordic policymakers—one that has been affected by Russia's invasion of Ukraine starting in late February 2022—concerns the mix of cooperation and competition to pursue (or expect to experience) with Russia in the Arctic.[95] In considering this question, points that can be noted include the following:

- Russia has identified the Arctic as a high-priority region critical to the country's prosperity and security. Starting in 2008, and most recently in 2020, the Russian government has adopted a series of strategy documents outlining plans to bolster the country's Arctic military capabilities, strengthen territorial sovereignty, and develop the region's resources and infrastructure.[96] Over the past several years, Russia has invested in the construction of ports and search-and-rescue facilities, some of which are referred to as dual use (civilian-military) facilities. Russia also has reactivated and modernized Arctic military bases that fell into disuse with the end of the Cold War, assigned upgraded forces to those bases, and increased military exercises and training operations in the Arctic.
- Geographically, Russia is the most prominent of the eight Arctic states. According to one assessment, Russia "has at least half of the Arctic in terms of area, coastline, population and probably mineral wealth."[97] About 20% of Russia's land mass is north of the Arctic Circle.[98] Russia has numerous cities and towns in its Arctic, uses its coastal Arctic waters as a maritime highway for supporting its Arctic communities, is promoting the Northern Sea Route that runs along Russia's Arctic coast for use by others, and is keen to capitalize on natural resource development in the region, both onshore and offshore. A substantial fraction of Russia's oil and gas production and reserves are in the Arctic. In this

[95] See, for example, Robin Allers, András Rácz, and Tobias Sæther, *Dealing with Russia in the Arctic, Between Exceptionalism and Militarization*, German Council on Foreign Relations (Deutsche Gesellschaft für Auswärtige Politik [DGAP]), October 2021, 19 pp.

[96] Regarding the 2020 document, see, for example, Atle Staalesen, "Behind Putin's New Arctic Strategy Lies a Rude Quest for Natural Resources," *Barents Observer*, October 20, 2020; Elizabeth Buchanan, "Russia's Updated Arctic Strategy: New Strategic Planning Document Approved," *High North News*, October 28, 2020; Hilde-Gunn Bye, "Putin Approves Russia's Updated Arctic Development Strategy," *ArcticToday*, October 28, 2020; Elizabeth Buchanan, "Putin's Real Arctic Playbook: Demography, Development, and Defense," *National Interest*, October 27, 2020. See also Michael Paul and Göran Swistek, "Russia in the Arctic, Development Plans, Military Potential, and Conflict Prevention," Stiftung Wissenschaft und Politik (SWP) (German Institute for International and Security Affairs), SWP Research Paper 3, February 2022, 42 pp.; John Grady, "Russia Wants to Keep Status as Arctic Superpower, Says Expert," *USNI News*, November 5, 2021; Nazrin Mehdiyeva, *Russia's Arctic Papers: The Evolution of Strategic Thinking on the High North*, NATO Defense College, November 19, 2018.

[97] "The Arctic: Special Report," *The Economist*, June 16, 2012, p. 11. The Arctic Council states that "Russia stretches over 53 percent of the Arctic Ocean coastline. Approximately two and a half million of Russia's inhabitants live in Arctic territory, accounting for nearly half of the population living in the Arctic worldwide." ("The Russian Federation," Arctic Council, accessed February 24, 2022, at https://arctic-council.org/en/about/states/russian-federation/.)

[98] Testimony of Admiral Charles W. Ray, Coast Guard Vice Commandant, on "Expanding Opportunities, Challenges, and Threats in the Arctic: a Focus on the U.S. Coast Guard Arctic Strategic Outlook" before the Senate Commerce, Science, & Transportation Security Subcommittee, December 12, 2019, p. 3.

sense, of all the Arctic states, Russia might have the most at stake in the Arctic in absolute terms.[99]

- As noted earlier in this report, Russia in May 2021 assumed the chairmanship of the Arctic Council. Russian officials have stated that sustainable development, economic growth, and national security concerns will be a priority for Russia during its two-year chairmanship period.[100]
- As noted later in this report (see "Commercial Sea Transportation"), the Northern Sea Route (NSR) along Russia's coast accounts for the vast majority of large cargo ship transits in the Arctic.

Cooperation with Russia

On one hand, the United States, Canada, and the Nordic countries have cooperated with Russia on a range of issues in the Arctic. One example is cooperation on Arctic search and rescue (SAR) under the May 2011 Arctic Council agreement on Arctic SAR that is discussed later in this report. The United States, Canada, and the Nordic countries also cooperate with Russia through the Arctic Coast Guard Forum (ACGF), an organization intended to "foster safe, secure, and environmentally responsible maritime activity in the Arctic."[101] The United States and Russia in 2018 cooperated in creating a scheme for managing two-way shipping traffic through the Bering Strait and Bering Sea,[102] and in February 2021, the U.S. Coast Guard and Russia's Marine Rescue

[99] See also Heather A. Conley et al., *Russia's Climate Gamble, The Pursuit and Contradiction of Its Arctic Ambitions*, Center for Strategic and International Studies (CSIS), September 2021, 58 pp.; Sergey Sukhankin, "Russia's LNG Strategy: Foreign Competition and the Role of the Arctic Region," *Eurasia Daily Monitor*, July 21, 2021; Eugene Rumer, Richard Sokolsky, and Paul Stronski, *Russia in the Arctic—A Critical Examination*, Carnegie Endowment for International Peace, March 2021, 23 pp.; Gabriella Gricius, "Russian Ambitions In The Arctic: What To Expect," *Global Security Review*, October 4, 2020; Stephanie Pezard, *The New Geopolitics of the Arctic, Russia's and China's Evolving Role in the Region*, RAND (Testimony presented before the Standing Committee on Foreign Affairs and International Development of the Canadian House of Commons on November 26, 2018), pp. 1-2.

[100] Alina Bykova, "Russian Arctic Council Chairmanship: 'Will Welcome More Active Engagement of the Observer States,'" *High North News*, March 8 (updated March 12), 2021; Atle Staalesen, "Moscow Signals It Will Make National Security a Priority as Russia Prepares to Chair the Arctic Council," *ArcticToday*, October 15, 2020. See also Paul Goble, "As Arctic Warms, Moscow Increasingly Shifts Focus There From Trade to Security," *Eurasia Daily Monitor*, October 20, 2020.

[101] The ACGF states at its website (https://www.arcticcoastguardforum.com/about-acgf) that it "is an independent, informal, operationally-driven organization, not bound by treaty, to foster safe, secure, and environmentally responsible maritime activity in the Arctic. All Arctic countries, Canada, Denmark, Finland, Island, Norway, Russia, Sweden and the United States are members of the forum. Chairmanship duties of the ACGF rotate every two years in concert with the Chairmanship of the Arctic Council." The ACGF holds two meetings each year.

The work of the ACGF is headed by the ACGF Chair and supported by the Secretariat and Working Groups. The Secretariat is responsible for implementing strategic direction and the smooth operation of the ACGF and its Working Groups. Working Groups are subordinate to the Secretariat. The Secretariat and Working Groups are organized at the direction of the Principals and reflect issues relevant to member countries of the Arctic.

[102] See, for example, U.S. Coast Guard, "U.S., Russia Propose Bering Strait Ship Traffic Routing Measures," January 25, 2018; Amy Midgett, "U.S., Russia Jointly Propose Bering Strait Routing Measures," *Coast Guard Maritime Commons*, January 25, 2018; Amy Midgett, "IMO Approves U.S.-Russian Federation Proposal for Bering Strait Routing Measures," *Coast Guard Maritime Commons*, May 25, 2018; Yereth Rosen, "With Marine Traffic Growing, International Shipping Agency Approves US-Russia Plan for Bering Strait Shipping Lanes," *ArcticToday*, May 26, 2018; Associated Press, "Maritime Organization Approves Two-Way Shipping Routes in Bering Strait," *CBC*, May 27, 2018; "U.S., Russia Propose Bering Strait Traffic Routing," *Maritime Executive*, May 27, 2018; Margaret Kriz Hobson, "Amid Ice Melt, New Shipping Lanes Are Drawn Up off Alaska," *E&E News (Scientific American)*, May 29, 2018.

Service signed an agreement updating a 1989 bilateral joint contingency plan for responding to transboundary maritime pollution incidents.[103]

An August 2021 press report stated that "the U.S., China, Japan and Russia are among the countries planning to conduct joint research in the Arctic Ocean in a step toward preventing overfishing in the region.… Representatives from nine countries and the European Union aim to meet in South Korea early next year to discuss exploratory fishing based on similar treaties covering other regions."[104] Some observers see possibilities for further U.S., Canadian, and Nordic cooperation with Russia in the Arctic.[105] One observer stated in 2021 that "Russian wariness of China's Arctic ambitions could provide novel opportunities for warming ties between Moscow and Washington."[106]

Tension and Competition

On the other hand, as discussed later in this report, the increase in Russian military presence and operations in the Arctic has prompted growing concerns among U.S., Canadian, and Nordic observers that the Arctic might once again become a region of military tension and competition, as well as concerns about whether the United States, Canada, and the Nordic countries are adequately prepared militarily to defend their interests in the region.

In February 2020, a disagreement arose between Norway and Russia regarding Russia's access to the Norwegian archipelago of Svalbard under the terms of the Svalbard Treaty of 1920.[107] Russia

[103] See Melody Schreiber, "U.S. and Russia Sign New Maritime Pollution Agreement, Conduct Joint Bering Sea Patrol," *ArcticToday*, February 10, 2021.

[104] Miki Okuyama, "International Research Planned to Manage Arctic Fish Stocks," *Nikkei Asia*, August 1, 2021. See also Peter B. Danilov, "US, China and Russia Plan Joint Research in Order to Regulate Arctic Fishing," *High North News*, August 2, 2021.

[105] See, for example, Nick Lokker, "Polar Bear in the Room: America Must Talk to Russia About the Arctic," *National Interest*, November 21, 2021; Mark Piesing, "International Competition is Heating Up in the Arctic. These Norwegian Islands Show How It Can Be Managed.," *Barron's*, August 26, 2021; Kari Roberts, "How Canada Should Deal with Russia in the Arctic," *iPolitics*, August 23, 2021; Autumn Gonzales, "Towards a US-Russia Partnership in the Arctic," *Modern Diplomacy*, August 11, 2021; Melody Schreiber and Krestia DeGeorge, "What the Biden-Putin Summit Means—and Doesn't Mean—for Arctic Cooperation," *ArcticToday*, June 18, 2021; Hilde-Gunn Bye, "Plenty of Ground for Cooperation in the Arctic, Putin Says," *High North News*, June 17 (updated June 18), 2021; Malgorzata (Gosia) Smieszek, "US-Russia Cooperation on an Arctic Methane Agreement Could Improve Relations—and Slow Climate Change," *ArcticToday*, June 14, 2021; Paul Arthur Berkman, "Cooperation in the Arctic Offers a Model for US-Russia Cooperation Elsewhere," *ArcticToday*, June 11, 2021; Thomas Rotnem, "The Arctic Council Power Flex that Could Prove Prosperous—for America," *National Interest*, May 31, 2021; Tom Balmforth and Humeyra Pamuk, "Russia, U.S. Tout Cooperation Ahead of Arctic Council Meeting," *Reuters*, May 18, 2021.

[106] Ingrid Burke Friedman, "China's Arctic Ambitions Could Make or Break US-Russian Relations in the Region," Russia Matters (Harvard Kennedy School Belfer Center for Science and International Affairs), December 1, 2021.

[107] See, for example, Atle Staalesen, "Norway's Celebration of Svalbard Treaty Was Followed by Ardent and Coordinated Response from Moscow Media," *Barents Observer*, July 2, 2020; Megan Eckstein, "Foggo: Changing Conditions Require New Arctic Strategy, International Code of Conduct," *USNI News*, June 26, 2020; Nerijus Adomaitis, "Norway Rejects Moscow's Claim It Violated Svalbard Treaty," *Reuters*, February 21, 2020; Luke Coffey, "Russia's and China's Interest in Cold Svalbard Heats Up," *National Interest*, February 13, 2020; Pavel K. Baev, "Moscow Plays Hard Ball in the High North," *Eurasia Daily Monitor*, February 10, 2020; Brett Davis, "Russia Has Always Challenged Norway on Svalbard. This Time Parts of Its Criticism is [sic] Different," *High North News*, February 10, 2020; Jennifer Alvarez, "As Russia Returns to Svalbard," *KXAN Daily News*, February 9, 2020; Marc Lanteigne, "Norway, Russia, and a Changing Svalbard," *Over the Circle*, February 7, 2020; Arme O. Holm, "If Russia Wants More Power on Svalbard, There Is A Far More Efficient Method," *High North N*ews, February 6, 2020; Atle Staalesen, "Amid Jubilant Celebration at Svalbard, Norway Sends Strong Signal It Will Not Accept Encroachment on Sovereignty," *Barents Observer*, February 9, 2020; Amund Trtellevik, "Russia With Stern Svalbard Warning to Norway," *High North N*ews, February 5, 2020; Tom Balmforth and Nerijus Adomaitis, "Russia Accuses Norway of

has objected to certain Norwegian actions regarding Svalbard and reportedly is taking steps within the terms of the treaty to enhance its presence in Svalbard.[108] Norwegian officials have also discussed tensions with Russia on other issues.[109] Even so, a February 11, 2022, press report quoted the chief of Norway's intelligence service as stating: "We see that Russia acts more careful[ly], [with] self-restraint here [in the north] compared with what they do in the Baltic Sea and especially in contrast to the Black Sea.... It is our understanding that Russia wants low tensions and stability in the north. This is in the interest of both countries.... This is what we strive for and also why we are predictable. We inform, behave professionally and polite when we meet Russian units. We believe this contributes to Russia finding it appropriate to do the same to Norway."[110]

Russia's government considers certain parts of the Northern Sea Route (NSR)—the Arctic shipping route linking Europe and Asia via waters running along Russia's Arctic coast—to be internal Russian waters and has asserted a right to regulate commercial shipping passing through these waters[111]—a position that creates a source of tension with the U.S. government, which considers those waters to be international waters.[112] The U.S.-Russian dispute over this issue could have implications not only for U.S.-Russian relations and the Arctic, but for other countries and other parts of the world as well, since international law is universal in its application, and a successful challenge to international waters in one part of the world can serve as a precedent for

Restricting Its Activities on Arctic Islands," *Reuters*, February 4, 2020.

[108] Thomas Nilsen (Barents Observer), "Russia Complains of Norwegian Navy's Visit to Svalbard," *ArcticToday*, November 15, 2021; Thomas Nilsen, "Moscow Aims to Enhance Presence in Svalbard as Part of Hybrid-Strategy, Expert Warns," *Barents Observer*, December 7, 2021. For further discussion, see Alex Kostin, "A Case Study of Russia's Arctic Posture," *Lawfare*, February 14, 2022; Daniel McVicar, "Risk Factors for Svalbard Conflict between Russia and Norway," Global Risk Insights, February 2, 2022.

[109] See, for example, Atle Staalesen, "Coercive Diplomacy Is Back, Says Norwegian FM as Russia Announces Drills in Nordic Country's Economic Zone," *Eye on the Arctic (Radio Canada International)*, February 18, 2022.

[110] Remarks of Vice Admiral Nils Andreas Stensønes, Chief of the Norwegian Intelligence Service, as quoted in Thomas Nilsen, "Russia Showed 'More Caution and Restraint' in Arctic Over Past 18 Months, Says Norwegian Intelligence," *Barents Observer*, February 11, 2022.

[111] See, for example, James Foggo III, "Russia, China Offer Challenges in the Arctic," *Defense One*, July 10, 2019; Dmitry Sudakov, "Russia Closes Northern Sea Route for Foreign Warships," *Pravda Report*, May 30, 2019; Nastassia Astrasheuskaya and Henry Foy, "Polar Powers: Russia's Bid for Supremacy in the Arctic Ocean," *Financial Times*, April 27, 2019; James R. Holmes, "Don't Let Russia Create a 'Caribbean' in the Arctic," *The Hill*, March 28, 2019; Marex (Maritime Executive), "Russia Tightens Control Over Northern Sea Route," *Maritime Executive*, March 8, 2019; Atle Staalesen, "Russia Sets Out Stringent New Rules for Foreign Ships on the Northern Sea Route," *Barents Observer*, March 8, 2019; Will Stewart, "Moscow Threatens to Sink Foreign Ships Using Arctic Sea Route That Links Atlantic to the Pacific Unless It Is Given 45 Days Notice of Voyages and Vessels Take a Russian Pilot on Board," *Daily Mail*, March 6, 2019; "Russia Will Restrict Foreign Warships in Arctic Ocean, Defense Official Says," *Moscow Times*, November 30, 2018.

[112] See, for example, Peter B. Danilov, "Russia has Advanced Unlawful Maritime Claims in the Arctic, Says Antony Blinken," *High North News*, May 19, 2021; Nikolaj Skydsgaard and Humeyra Pamuk, "Blinken Says Russia Has Advanced Unlawful Maritime Claims in the Arctic," *Reuters*, May 18, 2021.

challenging it in other parts of the world.[113] The issue of the NSR was reportedly discussed in detail at the June 2021 U.S.-Russian summit meeting in Geneva.[114]

Russian actions outside the Arctic can affect relations between Russia and the other Arctic states. In 2014, for example, in protest of Russia's forcible occupation and annexation of Crimea in 2014 and its actions elsewhere in Ukraine, Canada announced that it would not participate in an April 2014 working-level-group Arctic Council meeting in Moscow.[115]

Impact of Russia's 2022 Invasion of Ukraine

Russia's invasion of Ukraine beginning in late February 2022 has substantially affected U.S., Canadian, and Nordic relations with Russia in the Arctic. On March 3, 2022, in response to Russia's invasion, the seven Arctic states other than Russia issued a joint statement in which they announced that they would be "temporarily pausing participation in all meetings of the Council and its subsidiary bodies." The announced pause in participation came in the midst of Russia's two-year chairmanship of the Arctic Council, which began in May 2021. Russian officials reportedly called the pause in participation "regrettable" and said it would "inevitably lead to the accumulation of the risks and challenges to soft security in the region."[116] The text of the joint statement is as follows:

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[113] In that context, the U.S. government views the part of the Northwest Passage that runs through the Canadian archipelago as an international strait, while Canada's government considers it internal Canadian waters. In 1985, the use of the waterway by a U.S. polar icebreaker led to a diplomatic dispute between the United States and Canada. In January 1988, the two countries signed an agreement under which, observers say, the two sides essentially agreed to disagree on the issue. The agreement—formally called Agreement Between the Government of Canada and the Government of the United States of America on Arctic Cooperation—states in part that "the Government of the United States pledges that all navigation by U.S. icebreakers within waters claimed by Canada to be internal will be undertaken with the consent of the Government of Canada," and that "nothing in this agreement of cooperative endeavour between Arctic neighbours and friends nor any practice thereunder affects the respective positions of the Governments of the United States and of Canada on the Law of the Sea in this or other maritime areas or their respective positions regarding third parties." The text of the agreement as posted by the Canadian government is available at https://www.treaty-accord.gc.ca/text-texte.aspx?id=101701.

An August 26, 2021, press report states that

> A U.S. Coast Guard icebreaker embarked Wednesday [August 25, 2021] on a long Arctic mission that includes a rare transit of the Northwest Passage, conducting scientific research and a joint exercise with Canada in Arctic waters. The cutter Healy, one of two operational U.S. Coast Guard icebreakers, departed Wednesday from Seward, Alaska, for the three-week journey to Nuuk, Greenland.... Healy last transited the passage in 2005. In 2017, the U.S. cutter Maple [(WLB-207), a seagoing buoy tender] navigated the Northwest Passage from west to east together with the Canadian icebreaker Terry Fox to conduct research in a joint exercise with Canada.... U.S. vessels may travel through the passage if they are conducting research, according to a 1988 agreement with Canada.... The invocation of the 1988 agreement on Arctic cooperation means Canadian-U.S. relations are "returning back to normality," Rob Huebert, assistant professor at the University of Calgary, told *ArcticToday*.... The Coast Guard first approached Canada to request consent in summer 2020, [Jason Kung, a spokesperson for Global Affairs Canada] said, and Canadian and U.S. agencies have worked together closely on the trip.
>
> (Melody Schreiber, "US Icebreaker Departs on a Voyage that Will Transit the Northwest Passage," *ArcticToday*, August 26, 2021.)

[114] Atle Staalesen, "On Putin-Biden agenda: the Northern Sea Route," *Barents Observer*, June 17, 2021.

[115] For additional discussion of Canadian-Russian relations regarding the Arctic, see Sergey Sukhankin, "Russia's Arctic Agenda and the Role of Canada," *Eurasia Daily Monitor*, April 15, 2020.

[116] Gloria Dickie, "Russian Officials Call Arctic Council Boycott 'Regrettable,'" *Reuters*, March 4, 2022.

> Canada, the Kingdom of Denmark, Finland, Iceland, Norway, Sweden, and the United States condemn Russia's unprovoked invasion of Ukraine and note the grave impediments to international cooperation, including in the Arctic, that Russia's actions have caused.
>
> We remain convinced of the enduring value of the Arctic Council for circumpolar cooperation and reiterate our support for this institution and its work. We hold a responsibility to the people of the Arctic, including the indigenous peoples, who contribute to and benefit from the important work undertaken in the Council.
>
> The core principles of sovereignty and territorial integrity, based on international law, have long underpinned the work of the Arctic Council, a forum which Russia currently chairs. In light of Russia's flagrant violation of these principles, our representatives will not travel to Russia for meetings of the Arctic Council. Additionally, our states are temporarily pausing participation in all meetings of the Council and its subsidiary bodies, pending consideration of the necessary modalities that can allow us to continue the Council's important work in view of the current circumstances.[117]

The Nordic Council of Ministers similarly stated that it was suspending its cooperation with Russia and Belarus.[118] A March 5, 2022, press report stated that "several major oil companies and investors have announced in recent days they are withdrawing from Russian resource development or not pursuing new projects with Russia, including in the Arctic, after Russia's invasion of Ukraine."[119]

A March 3, 2022, press report stated the following about the impact of the pause in participation in Arctic Council meetings on cooperation among the eight Arctic states:

> The eight Arctic nations' cooperation, even in times of disagreement or conflict elsewhere on the globe, is "over for now," said Sherri Goodman, former U.S. deputy undersecretary of defense and a senior fellow at the Wilson Center's Polar Institute.
>
> The [Council's] working groups may find ways to continue this work, but Russia's chairmanship could make it more complicated.
>
> And during the pause, "there's no forum for dialogue and discussion with Russia, the largest Arctic country, on matters that affect the people, the ecology, the geography of the Arctic," Goodman said.
>
> In the longer term, the fallout of Russia's actions may increases the risk of miscommunication and miscalculation in the North, at a time where Arctic activities are increasing, she said.[120]

A March 9, 2022, press report stated the following about the impact on Arctic scientific research:

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[117] U.S. Department of State, "Joint Statement on Arctic Council Cooperation Following Russia's Invasion of Ukraine," March 3, 2022. See also Melody Schreiber, "Arctic Council Nations Are 'Pausing' Work After Russia's Invasion of Ukraine," *ArcticToday*, March 3, 2022.

[118] See, for example, Niina Aagaard, "Nordic Council of Ministers Suspends All Co-operation with Russia," *Nordic Co-operation*, March 3, 2022; Atle Staalesen, "Nordic Countries Halt All Regional Cooperation with Russia," *Barents Observer*, March 6, 2022. For a press report on separate developments, see David Lochead, "Russian Invasion of Ukraine Creates Strain for Arctic Organization," *Nunatsiaq News*, March 1, 2022; Eilís Quinn, "Sweden, Finland Pull Out of Arctic360 Conference in Toronto Where Russian Diplomats Scheduled to Attend," *Eye on the Arctic (Radio Canada International)*, February 25, 2022.

[119] Melody Schreiber, "Major Oil Companies and Investors Pull Back from Russian Arctic Oil and Gas," *ArcticToday*, March 5, 2022.

[120] Melody Schreiber, "Arctic Council Nations Are 'Pausing' Work After Russia's Invasion of Ukraine," *ArcticToday*, March 3, 2022.

> Right as Russia decided to attack Ukraine, a global consortium of permafrost scientists was poised to embark on a multi-year, Arctic-wide monitoring effort that would have helped provide crucial data on how the region is warming. But international uproar and financial sanctions over the unprovoked invasion put an immediate stop to any scientific collaboration with Russian researchers. And while climate scientists agree that the sanctions are necessary, they lament the lost opportunity for vital research in the region—Russia accounts for half the Arctic land mass.
>
> "At least half our work would have been in Russia, and now we can't do any science there at all," says Sue Natali, Arctic program director for the Woodwell Climate Research Center in Massachusetts, who now has a couple of pallets worth of methane and carbon monitoring equipment originally destined for Russian research stations lying unused in the back of her research center.
>
> As the conflict progresses, experts worry that eroding political cooperation among Arctic nations could see environmentally-harmful Russian activities in the region go unchecked—further worsening the effects of climate change.[121]

A March 18, 2022, opinion piece stated the following about the impact on Arctic cooperation with Russia both inside and outside the Arctic Council:

> it is important to understand that a pause in the work of the Arctic Council does not end regional cooperation per se. While the Arctic Council is the most well-known and influential forum for Arctic cooperation, most cooperation in the region does not occur under its auspices. Tremendous amounts of Arctic-related scientific research occur within and among Arctic States not involving Russia or the council, supported by ties between institutions and relevant governments....
>
> What has been disrupted is Arctic cooperation that directly involves Russia.
>
> Any cooperation involving access to Russian territory (such as to obtain samples for research or make scientific observations) or with Russian institutions (at least if the government is involved) will be put aside. We've seen that even cooperation not involving the Russian government has been affected, such as when the organizers of the Arctic Science Summit Week decided to close its upcoming annual meeting to individuals representing Russian institutions, organizations, and businesses both on-site in Tromsø, and online. It's not yet clear whether some unofficial contacts with Russian individuals can proceed in a meaningful way, despite travel bans and economic sanctions. And now the work of the Arctic Council has ground to a halt.
>
> The question is, how can the valuable work being done within the Arctic Council and its working groups be salvaged, and what is the best way of going about that? If we want to ensure that the council is viable in the future, after the war in Ukraine subsides, how do we do that?[122]

[121] Aryn Baker, "Ukraine's Conflict Has Rippled All the Way to the Arctic Circle," *Time*, March 9, 2022. See also Chelsea Harvey, "Russia's War in Ukraine Sends Tremors into the Arctic, Experts Worry Tensions Could Spill into the Polar Region and Potentially Affect Science and Security," *Scientific American*, March 14, 2022; Warren Cornwall, "'It Looks Like Iron Curtain 2.' Arctic Research with Russia Curtailed after Ukraine Invasion," *Science*, March 4, 2022; CBC, "War in Ukraine Has Implications for Arctic Co-operation, Climate Change Research," CBC, February 24, 202.

[122] Evan T. Bloom, "A New Course for the Arctic Council in Uncertain Times," *ArcticToday*, March 18, 2022. See also April Hudson, "[Canadian] Northern [Territory] Premiers Say Russia's War Jeopardizes Arctic Council's Work to Keep Peace in the North," *CBC*, March 18, 2022; Susanne Courtney, "Russia's Invasion of Ukraine Imperils Arctic Cooperation," *News Decorder*, March 11, 2022; Nong Hong, "Ukraine War May Freeze Both Russia and China Out of Arctic Cooperation," *South China Morning Post*, March 11, 2022; Timo Koivurova, "The Arctic Council Can Continue Without Russia," *ArcticToday*, March 10, 2022; Alice Rogoff, "It's Time for an Arctic Council 2.0, Russia's Threat to

NATO and European Union in the Arctic

NATO

Five of the eight Arctic states—the United States, Canada, Denmark, Iceland, and Norway—are members of NATO. The emergence of great power competition has led to a renewal of NATO interest in the alliance's more northerly areas.

During the Cold War, U.S. and allied political and military officials viewed NATO member Norway and its adjacent sea areas as the northern flank of NATO's defensive line against potential aggression by the Soviet-led Warsaw Pact alliance. The North Atlantic waters stretching from Greenland to Iceland to the UK, which were referred to as the GIUK gap, were viewed as a key maritime chokepoint or battle zone in the event of a NATO-Warsaw conflict. With the end of the Cold War and the shift to the post-Cold War era, NATO planning efforts shifted away from defending against potential aggression by Russia, which NATO officials considered highly unlikely, and toward other concerns, such as the question of how NATO countries might be able to contribute to their own security and that of other countries by participating in out-of-area operations, meaning operations in areas outside Europe.

With the emergence of great power competition, NATO is now once again focusing more on the question of how to deter potential Russian aggression against NATO countries, including in the Arctic.[123] As one consequence of that, Norway and its adjacent sea areas are once again receiving more attention in NATO planning. In September 2020, NATO established a new Atlantic Command in Norfolk, VA, called Joint Force Command Norfolk, as NATO's first command dedicated to the Atlantic since 2003. Co-located with the U.S. Navy's reestablished 2nd Fleet for the Atlantic, NATO states that Joint Force Command Norfolk is to "provide coherent command arrangements for Allied forces, maintain situational awareness, conduct exercises, and draw up operational plans covering vast geographic areas, from the US East Coast, past the Greenland-Iceland-U.K. gap and into the Arctic."[124]

The question of NATO's overall involvement in the Arctic has been a matter of debate within NATO and among other observers,[125] and could be affected by Russia's invasion of Ukraine

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Finland and Sweden Renders the Existing Paradigm for Arctic Cooperation Inoperable," *ArcticToday*, March 5, 2022; Gloria Dickie and Timothy Gardner, "Arctic Council in Upheaval over Russia as Climate Change Transforms Region," *Reuters*, March 3, 2022; Melody Schreiber and Krestia DeGeorge, "Russia's Invasion of Ukraine Will Have Spillover Effects in the Arctic, The Work of the Arctic Council, of Which Russia Holds the Rotating Two-Year-Chair, Could Be Delayed," *ArcticToday*, February 24, 2022.

[123] See, for example, Candace Huntington, "NATO Needs Unity as Russia's Arctic Presence Grows," Center for European Policy Analysis (CEPA), May 19, 2021; Christopher Woody, "Russian and NATO Militaries Are Getting More Active in the Arctic, but Neither Is Sure About What the Other Is Doing," *Business Insider*, July 21, 2020; Colin Barnard, "Why NATO Needs a Standing Maritime Group in the Arctic," Center for International Maritime Security, May 15, 2020; "NATO is facing up to Russia in the Arctic Circle," *Economist*, May 14, 2020; Sebastian Sprenger, "NATO's Camille Grand on the Alliance's Arctic Tack," *Defense News*, May 12, 2020; Rebecca Pincus, "NATO North? Building a Role for NATO in the Arctic," *War on the Rocks*, November 6, 2019; Anna Wieslander, "It's Time for NATO to Engage in the Arctic," *Defense One*, September 16, 2019; Tyler Cross, "The NATO Alliance's Role in Arctic Security," *Maritime Executive*, July 19, 2019.

[124] NATO headquarters news release, "NATO's New Atlantic Command Declared Operational," September 18, 2020. See also Levon Sevunts, "NATO's New Atlantic Command to Keep Watch over the European Arctic," *Eye on the Arctic (Radio Canada International)*, September 18, 2020.

[125] See, for example, Luke Coffey and Daniel Kochis, *NATO Summit 2021: The Arctic Can No Longer Be an Afterthought*, Heritage Foundation, June 10, 2021, 7 pp.; David Auerswald, "NATO in the Arctic: Keep Its Role Limited, for Now," *War on the Rocks*, October 12, 2020; Luke Coffey and Daniel Kochis, *Brussels NATO Summit*

beginning in late February 2022.[126] Russia has expressed opposition to the idea of NATO becoming more involved in the Arctic.[127]

European Union

Three of the eight Arctic states—Denmark, Finland, and Sweden—are members of the European Union (EU), and two other Arctic states—Iceland and Norway—have close ties to the EU as members of the European Economic Area. The EU is showing increased interest in the Arctic.[128] The European Parliament—the EU's only directly elected institution—supports an active EU role in the Arctic.[129] Some members of the parliament reportedly want the EU's Arctic policy to better reflect emerging security concerns in the region.[130]

The EU is considered an "observer in principle" to the Arctic Council, but to date has been denied full observer status at the council, alternately by Canada (because of Canadian Inuit objections to the EU's ban on the import of seal products) and Russia (following heightened EU-Russian tensions since Russia's 2014 invasion of Ukraine).[131]

In 2016, the European Commission (the EU's executive) and the EU's High Representative for Foreign Affairs and Security Policy issued a joint communication (i.e., policy paper) on the EU's Arctic strategy that stated that a "safe, stable, sustainable, and prosperous Arctic" is important for the region, the EU, and the world, and that "the EU has a strategic interest in playing a key role in the Arctic region."[132] In 2017, the EU appointed its first Ambassador-at-Large for the Arctic, and in October 2019, the EU held its first-ever Arctic Forum, a high-level conference in northern Sweden focused on promoting EU efforts in the Arctic.[133] The EU is also a major financial contributor to Arctic research, providing around €200 million in the past decade under the Horizon 2020 Research and Innovation Program.[134] Some analysts contended that the EU's policy

2018: Time to Get Serious About the Arctic, Heritage Foundation, June 27, 2018, 3 pp.

[126] See, for example, "How Russia's Future With NATO Will Impact The Arctic, Three Critical Ways the Crisis in Ukraine Will Determine the Region's Future," *Foreign Policy*, February 25, 2022.

[127] Peter Bakkemo Danilov, "Russia Warns Against Pulling NATO into the Arctic," *High North News*, June 17, 2020.

[128] See, for example, Romain Chuffart and Andreas Raspotnik, "More EU in the Arctic and More Arctic in the EU?" *New Security Beat (Wilson Center)*, February 7, 2022; Kevin McGwin, "Northern Mines Could Provide Most of the EU's Strategic Metals," *ArcticToday*, October 19, 2021; Kevin McGwin, "EU Lawmakers Push for More Visibility in the Arctic—and a Stronger Response to Russia and China," *ArcticToday*, July 6, 2021; European Interest, "Arctic: MEPs Call for Peace and Reduced Tension in the Region," *European Interest*, July 1, 2021; Timo Koivurova et al., *Overview of EU Actions in the Arctic and Their Impact, Final Report*, June 2021, 172 pp., (report prepared for European Commission by EPRD Office for Economic Policy and Regional Development Ltd., Kielce, Poland)..

[129] See European Parliament, "European Parliament Resolution of 7 October 2021 on the Arctic: Opportunities, Concerns and Security Challenges," October 7, 2021. See also European Parliament, "Arctic: MEPs Call for Peace and Reduced Tension in the Region," press release, October 7, 2021; Kevin McGwin, "The EU Approaches An 'Important Juncture' in its Arctic Involvement," *ArcticToday*, September 29, 2021; "Foreign Affairs Committee Stresses Importance of the Arctic for Europe," *Brussels Times*, September 28, 2021.

[130] See Peter B. Danilov, "Members of the European Parliament Want EU Arctic Policy to Better Reflect Security Concerns," *High North News*, October 6, 2021; "MEPs Want EU Arctic Policy to Better Reflect Security Concerns," European Parliament News, September 30, 2021.

[131] Kamrul Hossain, "EU Engagement in the Arctic: Do the Policy Responses from the Arctic States Represent the EU as a Legitimate Stakeholder?," *Arctic Review on Law and Politics*, Vol. 6, No. 2, November 2015.

[132] European Commission and High Representative of the Union for Foreign Affairs and Security Policy, Joint Communication to the European Parliament and the Council, *An Integrated European Union Policy for the Arctic*, April 27, 2016, p. 2.

[133] Martin Breum, "EU Plays Catch-up with US, China, Russia in Arctic," *EUobserver*, October 3, 2019.

[134] European Commission and High Representative of the Union for Foreign Affairs and Security Policy, Joint

statements on the Arctic had yet to coalesce into a clearly defined narrative with concrete goals; the European Commission's in-house think tank argued that the EU should develop a more comprehensive strategy that balances protecting the Arctic environment with facilitating the sustainable economic and social development of the region.[135]

In October 2021, the European Commission and the EU's High Representative for Foreign Affairs and Security Policy issued an updated joint communication on the EU's Arctic strategy that "commits the EU to increased engagement in and around the Arctic region, in response to the geopolitical, environmental, economic, security and social challenges they face, and to working with others to manage new opportunities there."[136] The document reiterates the EU's call for being granted official observer status in the Arctic Council.

For some observers, Russia's invasion of Ukraine beginning in late February 2022 has underscored a need for the EU to focus more on the security situation in the Arctic.[137] A March 1, 2022, press report stated that "Russia's invasion of Ukraine has prompted Italy to put on hold its share of financing for the $21 billion Arctic LNG 2 project led by privately-owned Russian gas producer Novatek."[138]

China in the Arctic

China's Growing Activities in the Arctic

China's growing diplomatic, economic, and scientific activities in the Arctic have emerged as a matter of focus for U.S., Canadian, and Nordic policymakers. Observers have expressed curiosity or concern about China's exact mix of motivations for its growing activities in the Arctic, and about what China's ultimate goals for the Arctic might be.[139]

Communication to the European Parliament and the Council, *An Integrated European Union Policy for the Arctic*, April 27, 2016, p. 2.

[135] European Political Strategy Centre/European Commission, *Walking on Thin Ice: A Balanced Arctic Strategy for the EU*, July 2019; Adam Stepien and Andreas Raspotnik, "The EU's Arctic Policy: Between Vision and Reality," College of Europe Policy Brief, August 2019.

[136] European Commission and High Representative of the Union for Foreign Affairs and Security Policy, Joint Communication to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, *A stronger EU Engagement for a Peaceful, Sustainable and Prosperous Arctic*, October 13, 2021, p. 16. See also Michael Mann, "EU's Arctic Policy Is Not 'Convenience' But Necessity," *EUobserver*, November 22, 2021; Andreas Raspotnik and Adam Stępień, "The EU's New Strategic Arctic Policy," *Internationale Politik Quarterly (IPQ)*, November 9, 2021; Andreas Raspotnik and Adam Stępień, "Oops, They Did It Again: The European Union's 2021 Arctic Policy Update," *Arctic Institute*, October 28, 2021; Marc Lanteigne, "Blog: Red Light, Green Light—the European Union Upgrades Its Arctic Policy, *Eye on the Arctic (Radio Canada International)*, October 28, 2021; Elizabeth Buchanan, "On Thin Ice: Does the EU Know What It Wants in the Arctic?" *National Interest*, October 20, 2021; Trine Jonassen, "The AEC on the EU Arctic Policy: 'Leave Arctic Business to the People who Live Here,'" *High North News*, October 15, 2021; Kevin McGwin, "Seeking a Greater Role in the Arctic, the EU Is Ready to Link Climate with Foreign Policy," *ArcticToday*, October 15, 2021; M. Apelblat, "EU Updates Arctic Policy Amid Tension with Competitors Looking for Natural Resources," *Brussels Times*, October 13, 2021; YLE News, "EU Commission: Climate Change 'Most Comprehensive Threat' Facing Arctic," *YLE News*, October 13, 2021.

[137] See Andreas Raspotnik and Andreas Østhagen, "The End of an Exceptional History: Re-Thinking the EU-Russia Arctic Relationship," *E-International Relations*, March 23, 2020.

[138] Giuseppe Fonte, "Exclusive[:] Italy Freezes Loan for Russian Arctic LNG 2 Plant—Sources," *Reuters*, March 1, 2022.

[139] See, for example, Morten Buttler, "Danish Spy Agency Frets Over Arctic Operations by China and Russia," *Bloomberg*, January 13, 2022; Jacob Gronholt-pedersen, "Denmark Accuses Russia, China, Iran of Espionage Threat," *Reuters*, January 13, 2022; Bala Chauhan, "China's Growing Arctic Footprint May Hit India's Security and Climate

In 2013, China was one of six non-Arctic states that were approved for observer status by the Arctic Council.[140] In January 2018, China released a white paper on China's Arctic policy that refers to China as a "near-Arctic state."[141] (China's northernmost territory, northeast of Mongolia, is at about the same latitude as the Aleutian Islands in Alaska, which, as noted earlier in this report, the United States includes in its definition of the Arctic for purposes of U.S. law.) The white paper refers to trans-Arctic shipping routes as the Polar Silk Road, and identifies these routes as a third major transportation corridor for the Belt and Road Initiative (BRI), China's major geopolitical initiative, first announced by China in 2013, to knit Eurasia and other regions together in a Chinese-anchored or Chinese-led infrastructure and economic network.[142] The polar

Interests: Experts," *New Indian Express*, August 13, 2021; Emil Avdaliani, "China Seeks To Boost Role In The Arctic—Analysis," *Eurasia Review*, May 26, 2021; Abigail Ng, "Tensions Will Likely Grow as China Seeks Bigger Role in the Arctic," *CNBC*, May 20 (updated May 22), 2021; Rush Doshi, Alexis Dale-Huang, and Gaoqi Zhang, *Northern Expedition, China's Arctic Activities and Ambitions*, Brookings Institution, April 2021, 69 pp.

[140] The other five were India, Italy, Japan, Singapore, and South Korea. For a list of the observer states and when they were approved for observer status, see Arctic Council, "Non-Arctic States," accessed February 24, 2022, at https://arctic-council.org/en/about/observers/non-arctic-states/.

[141] "Full Text: China's Arctic Policy," *Xinhua*, January 26, 2018. The white paper states that "China is an important stakeholder in Arctic affairs. Geographically, China is a 'Near-Arctic State', one of the continental States that are closest to the Arctic Circle. The natural conditions of the Arctic and their changes have a direct impact on China's climate system and ecological environment, and, in turn, on its economic interests in agriculture, forestry, fishery, marine industry and other sectors. China is also closely involved in the trans-regional and global issues in the Arctic, especially in such areas as climate change, environment, scientific research, utilization of shipping routes, resource exploration and exploitation, security, and global governance. These issues are vital to the existence and development of all countries and humanity, and directly affect the interests of non-Arctic States including China."

Somewhat similarly, France's June 2016 national roadmap for the Arctic refers to France as a "polar nation." (Republique Francaise, Ministere des Affaires Etrangeres et du Developpement International, *The Great Challenge of the Arctic, National Roadmap for the Arctic*, June 2016, 60 pp.) The document states on page 9 that "France has established itself over the last three centuries as a polar nation, with a strong tradition of expeditions and exploration, and permanent research bases at the poles," and on page 17 that "[b]uilding on its long-standing tradition of exploration and expeditions in high latitudes, France has carved out its place as a polar nation over the last three centuries. France has permanent scientific bases in the Arctic and in Antarctica." It can also be noted that the northernmost part of mainland France, next to Belgium and across the Strait of Dover from England, is almost as far north as the more southerly parts of the Aleutian Islands.

Also somewhat similarly, a November 2018 UK parliamentary report refers to the UK as a "near-Arctic neighbour." The report states the following: "While the UK is not an Arctic state, it is a near-Arctic neighbour. The UK's weather system is profoundly affected by changes in the Arctic's climate and sea currents. The UK has been an Observer to the Arctic Council since 1998." (United Kingdom, House of Commons, Environmental Audit Committee, *The Changing Arctic, Twelfth Report of Session 2017-19*, November 29, 2018, p. 3. [Report, together with formal minutes relating to the report, Ordered by the House of Commons to be printed November 6, 2018]. See also pp. 6, 29, and 32.)

See also Eva Dou, "A New Cold War? China Declares Itself a 'Near-Arctic State,' *Wall Street Journal*, January 26, 2018; Grant Newsham, "China As A 'Near Arctic State'—Chutzpah Overcoming Geography," *Asia Times*, January 30, 2018.

[142] See, for example, Maria Shagina and Elizabeth Buchanan, "China Enters the Arctic Digitization Race," *National Interest*, January 17, 2021; Nima Khorrami, "Data Hunting in Subzero Temperatures: The Arctic as a New Frontier in Beijing's Push for Digital Connectivity," Arctic Institute, August 4, 2020; Marc Lanteigne, "The Twists and Turns of the Polar Silk Road," *Over the Circle*, March 15, 2020; Zhang Chun, "China's 'Arctic Silk Road,'" *Maritime Executive*, January 10, 2020; Sabena Siddiqui, "Arctic Ambition: Beijing Eyes the Polar Silk Road," *Asia Times*, October 25, 2018. See also Atle Staalesen, "Chinese Money for Northern Sea Route," *Barents Observer*, June 12, 2018; Lin Boqiang, "China Can Support Arctic Development as Part of B&R," *Global Times*, August 9, 2018. The BRI's other two main corridors, which were announced at the outset of the BRI, are a land corridor that runs east to west across the middle of Eurasia—the "belt" in BRI—and a sea corridor called the Maritime Silk Road that passes through the South China Sea and the Indian Ocean to the Persian Gulf and the Mediterranean Sea—the "road" in BRI. For more on the BRI, also known as the One Belt, One Road (OBOR) initiative, see CRS In Focus IF11735, *China's "One Belt, One Road" Initiative: Economic Issues*, by Karen M. Sutter, Andres B. Schwarzenberg, and Michael D. Sutherland.

regions (both the Arctic and Antarctic) are included in China's 14th Five-Year Plan, covering the period 2021-2025.[143]

China has a Ukrainian-built polar-capable icebreaker, *Xue Long* (Snow Dragon), that has made several transits of Arctic waters conducting what China has said are research expeditions.[144] A second polar-capable icebreaker (the first that China has built domestically), named *Xue Long 2*, entered service in 2019, and China reportedly is planning to build a third polar-capable icebreaker.[145]

China has engaged in growing diplomatic activities with the Nordic countries, and has increased the size of its diplomatic presence in some of them. China has also engaged in growing economic discussions with Iceland and also with Greenland, a self-governing part of the Kingdom of Denmark.[146] China's engagement with Greenland appears related in significant part to Greenland's deposits of rare earth elements. Like several other nations, China has established a research station in Norway's Svalbard archipelago. China maintains a second research station in Iceland.

China appears interested in using the NSR to shorten commercial shipping times between Europe and China[147] and perhaps also to reduce China's dependence on southern sea routes (including those going to the Persian Gulf) that pass through the Strait of Malacca—a maritime choke point that China appears to regard as vulnerable to being closed off by other parties (such as the United States) in time of crisis or conflict.[148] 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 NSR.[149] In addition to using the NSR, China reportedly reached an agreement with Russia on July 4, 2017, to create an "Ice Silk Road."[150]

China has made significant investments in Russia's Arctic oil and gas industry, particularly the Yamal natural gas megaproject located on Russia's Yamal Peninsula in the Arctic.[151] China's

[143] See, for example, Marc Lanteigne, "The Polar Policies in China's New Five-Year Plan," *Diplomat,* March 12, 2021.

[144] See, for example, "Icebreaker Sets Sail on China's 9th Arctic Research Expedition," *Xinhua*, July 20, 2018; "China Begins 9th Arctic Expedition to Help Build 'Polar Silk Road,'" *Global Times,* July 20, 2018.

[145] See, for example, Polina Leganger Bronder, "China to Build Its Third icebreaker," *Barents Observer,* December 10, 2021; Malte Humpert, "China to Build New Heavy Icebreaker and Lift Vessel for Arctic," *High North News*, November 16, 2021; Liu Zhen, "China to Develop New Heavy Icebreaker for 'Polar Silk Road,'" *South China Morning Post,* November 13, 2021.

[146] See, for example, Yang Jiang, *Chinese Investments in Greenland, Origins, Progress and Actors,* Dansk Institut for Internationale Studier (DIIS), 2021, 34 pp. (posted online November 17, 2021); Marc Lanteigne, "Greenland's Widening World," *Over the Circle*, March 28, 2020; Marco Volpe, "The Tortuous Path of China's Win-Win Strategy in Greenland," Arctic Institute, March 24, 2020; Marc Lanteigne, "Stumbling Block: China-Iceland Oil Exploration Reaches an Impasse," *Over the Circle*, January 24, 2018. "Greenland Plans Office in Beijing to Boost Trade Ties with China," *Reuters*, July 18, 2018.

[147] See, for example, Eduardo Baptista, "China 'More Than Other States' Looks to Future Sea Route Through Resource-Rich Arctic, Study Says," *South China Morning Post*, September 22, 2020.

[148] See, for example, Jonathan Hall, "Arctic Enterprise: The China Dream Goes North," *Journal of Political Risk*, September 2019. See also Andrew Latham, "China Looks to the Arctic to Avoid Another Suez Slowdown," *National Interest,* April 2, 2021.

[149] "Chinese Make First Successful North Sea Route Voyage," *The Arctic Journal,* September 12, 2013. See also Malte Humpert, "Chinese Shipping Company COSCO To Send Record Number of Ships Through Arctic," *High North News*, June 13, 2019; Marex (Maritime Executive), "Russia and China Sign Arctic Deal," *Maritime Executive*, June 8, 2019.

[150] Xinhua, "China, Russia agree to jointly build 'Ice Silk Road,'" *Xinhuanet*, July 4, 2017.

[151] See, for example, Malte Humpert (High North News), "China Acquires 20 Percent Stake in Novatek's Arctic LNG 2 Project," *ArcticToday,* April 30, 2019; Ernesto Gallo and Giovanni Biava, "A New Energy Frontier Called 'Polar Silk

government reportedly is also interested in mining opportunities in the Canadian Arctic, and as mentioned earlier, in Greenland.[152] China's leaders may also be interested in Arctic fishing grounds.

China's growing activities in the Arctic may additionally reflect a view among China's leaders that China, like other major world powers, should be active in the polar regions for conducting research and other purposes. (Along with its growing activities in the Arctic, China has increased the number of research stations it maintains in the Antarctic.[153])

Arctic States' Response

China's growing activities in the Arctic could create new opportunities for cooperation between China and the Arctic states.[154] They also, however, have the potential for posing challenges to the Arctic states in terms of defending their own interests in the Arctic.[155] In light of Russia-China

Road,'" *China Daily*, April 12, 2019.

[152] See, for example, Jacob Gronholt-Pedersen, "Greenland Strips Chinese Mining Firm of Licence to Iron Ore Deposit," *Reuters*, November 22, 2021; Jack Ewing, "The World Wants Greenland's Minerals, but Greenlanders Are Wary," *New York Times*, October 1, 2021; Robert Fife and Steven Chase, "Top Defence Official Says China is a Threat to Canadian Arctic," *Globe and Mail (Canada)*, March 10 (updated March 11), 2021; Marc Montgomery, "China's Effort to Buy an Arctic Gold Mine Raises Many Concerns," *Radio Canada International*, August 10 (updated August 11), 2020; Vipal Monga, "China's Move to Buy Arctic Gold Mine Draws Fire in Canada," *Wall Street Journal*, July 26, 2020; Mingming Shi and Marc Lanteigne, "A Cold Arena? Greenland as a Focus of Arctic Competition," Diplomat, June 10, 2019; Nadia Schadlow, "Why Greenland Is Really About China," *The Hill*, August 28, 2019; Marc Lanteigne and Mingming Shi, "China Steps up Its Mining Interests in Greenland," *Diplomat*, February 12, 2019; John Simpson, "How Greenland Could Become China's Arctic Base," *BBC*, December 18, 2018; Marc Lanteigne, "Do Oil and Water Mix? Emerging China-Greenland Resource Cooperation," *Over the Circle*, November 2, 2018; Martin Breum, "China and the US Both Have Strategic Designs for Greenland," *ArcticToday*, October 17, 2018; Mia Bennett, "The Controversy over Greenland Airports Shows China Isn't Fully Welcome in the Arctic—Yet," *ArcticToday*, September 13, 2018; Mingming Shi and Marc lanteigne, "The (Many0 Roles of Greenland in china's Developing Arctic Policy," *Diplomat*, March 30, 2018; Miguel Martin, "China in Greenland: Mines, Science, and Nods to Independence," *China Brief*, March 12, 2018.

[153] For additional discussion, see CRS Report R46708, *Antarctica: Overview of Geopolitical and Environmental Issues*, by Pervaze A. Sheikh, Bruce Vaughn, and Kezee Procita. See also Alexander B. Gray, "China's Next Geopolitical Goal: Dominate Antarctica," *National Interest*, March 20, 2021.

[154] See, for example, Nong Hong, "How Cooperation on Climate Change, Polar Research Can Help Thaw US-China Relations," Institute for China-America Studies (ICAS), May 3, 2021; Ellis Quinn, "Iceland Welcomes 'Peaceful, Low-Tension Cooperation' with China in Arctic, Says Foreign Minister," *Eye on the Arctic (Radio Canada International)*, February 15, 2021; Atle Staalesen, "As Arctic Talks Move to China, Leaders Downplay Divides," *Barents Observer*, May 11, 2019; Thomas Nilsen, "China Seeks a More Active Role in the Arctic," *Barents Observer*, May 11, 2019; Nathan Vanderklippe, "Agreeing on the Arctic: Amid Dispute, Canada Sides with China over the U.S. on How to Manage the North," *Globe and Mail*, May 10, 2019; "China and Finland: The Ice Road Cometh?" *Over the Circle*, March 17, 2020; Nong Hong, "Arctic Ambitions of China, Russia—and Now the US—Need Not Spark a Cold War," *South China Morning Post*, March 11, 2019.

[155] See, for example, David Pugliese, "Canada Calls Out China, Climate Change as Growing Concerns in Arctic," *Defense News*, April 11, 2021; Sanna Kopra and Matti Puranen, "China's Arctic Ambitions Face Increasing Headwinds in Finland," *Diplomat*, March 18, 2021; Thomas Nilsen, "China Wanted to Buy Airport in Lapland for North Pole Climate Research Flights, The Finnish Defence Forces Spurned an Offer by the Chinese Polar Research Institute to Buy or Rent Kemijärvi Airport over Security Reasons," *Barents Observer*, March 4, 2021; Mingming Shi and Marc Lanteigne, "China's Central Role in Denmark's Arctic Security Policies," *Diplomat*, December 08, 2019; Humphrey Hawksley, "Nordic Nations Can Stand Up to China in the Arctic," *Nikkei Asian Review*, June 13, 2019; Thomas Nilsen, "'We Must Be Prepared for Clearer Chinese Presence in Our Neighborhood'; Chief of Norway's Military Intelligence Service, Lieutenant General Morten Haga Lunde, Highlighted Chinese, Russian Arctic Cooperations in His Annual Focus Report," *Barents Observer*, February 11, 2019. See also Isobel Cockerell, "'We'll Kill You': Uyghur Exile Who Fled to Arctic Circle Still Fears Reach of Chinese State, For Asylum Seekers, Norway Is a Sanctuary But Even in Remote Towns, Muslim Refugees Say They Face Surveillance and Threats," *Guardian*, March 15, 2022.

strategic cooperation and China's reaction to Russia's invasion of Ukraine beginning in late 2022, some observers speculate that Russia's invasion could complicate China's ability to work with Arctic states other than Russia in matters relating to the Arctic.[156]

Regarding the U.S. response to China's growing activities in the Arctic, a general question for U.S. policymakers is how to integrate China's activities in the Arctic into overall U.S.-China relations, and whether and how, in U.S. policymaking, to link China's activities in the Arctic to its activities in other parts of the world. Some observers see potential areas for U.S.-Chinese cooperation in the Arctic.[157] As noted earlier, an August 2021 press report stated that "the U.S., China, Japan and Russia are among the countries planning to conduct joint research in the Arctic Ocean in a step toward preventing overfishing in the region.… Representatives from nine countries and the European Union aim to meet in South Korea early next year to discuss exploratory fishing based on similar treaties covering other regions."[158] Other observers view the Arctic as emerging arena of U.S.-China strategic competition.[159] Still other observers view the Arctic as a mixed situation involving potential elements of cooperation and competition.[160]

A specific question could be whether to impose punitive costs on China in the Arctic for unwanted actions that China takes elsewhere. As one potential example, U.S. policymakers could consider moving to suspend China's observer status on the Arctic Council[161] as a punitive cost-

[156] See, for example, Sanna Kopra, "The Ukraine Crisis Is a Major Challenge for China's Arctic Visions," *ArcticToday*, March 1, 2022; Nong Hong, "Ukraine War May Freeze Both Russia and China Out of Arctic Cooperation," *South China Morning Post*, March 11, 2022; Asian News International (ANI), "Russia-Ukraine War Poses Threat to China's Arctic Ambitions," The Print (India), March 12, 2022.

[157] See, for example, Sarah Keisler, "Arctic Balancing: Biden Should Ally with China before Russia Does," *National Interest*, August 9, 2021; Pavel Devyatkin, "Science Cooperation with the Snow Dragon: Can the U.S. and China Work Together on the Arctic Climate Crisis?" Arctic Institute, April 15, 2021; James Stavridis, "Can the U.S. and China Cooperate? Sure," *Bloomberg*, July 31, 2020; Stephen Delaney, "The United States Must Work with China to Ensure Freedom of Navigation in the Arctic," *Global Security Review*, September 6, 2019; Alison McFarland, "Arctic Options: Why America Should Invest in a Future with China," *National Interest*, September 30, 2018.

[158] Miki Okuyama, "International Research Planned to Manage Arctic Fish Stocks," *Nikkei Asia*, August 1, 2021. See also Peter B. Danilov, "US, China and Russia Plan Joint Research in Order to Regulate Arctic Fishing," *High North News*, August 2, 2021.

[159] See, for example, Michael Krull, "The Arctic: China Wants It; We Need to Deny Them," *American Military News*, September 8, 2020; Simone McCarthy, "Trade, tech … and Now the Arctic? The Next Frontier in the China-US Struggle for Global Control," *South China Morning Post*, January 14, 2020 (ellipsis as in the article's title); Chen Zinan, "To Keep Hegemony, US Trying to Obstruct China's Rights in Arctic," Global Times, December 25, 2019.

[160] See, for example, Laura Zhou, "US Admiral Warns of Risk of 'Bogus' Chinese Claims in Arctic," *South China Morning Post*, June 28 (updated June 29), 2020.

[161] Paragraph 37 of the Arctic Council's rules of procedure states the following:

> Once observer status has been granted, Observers shall be invited to the meetings and other activities of the Arctic Council unless SAOs [Senior Arctic Officials] decide otherwise. Observer status shall continue for such time as consensus exists among Ministers. Any Observer that engages in activities which are at odds with the Council's [Ottawa] Declaration [of September 19, 1996, establishing the Council] or these Rules of Procedure shall have its status as an Observer suspended.

Paragraph 5 of Annex II of the Arctic Council's rules of procedure—an annex regarding the accreditation and review of observers—states the following:

> Every four years, from the date of being granted Observer status, Observers should state affirmatively their continued interest in Observer status. Not later than 120 days before a Ministerial meeting where Observers will be reviewed, the Chairmanship shall circulate to the Arctic States and Permanent Participants a list of all accredited Observers and up-to-date information on their activities relevant to the work of the Arctic Council.
>
> (Arctic Council, *Arctic Council Rules of Procedure*, p. 9. The document was accessed February 24,

imposing measure for unwanted Chinese actions in the South China Sea.[162] In a May 6, 2019, speech in Finland, then-Secretary of State Pompeo stated (emphasis added)

> The United States is a believer in free markets. We know from experience that free and fair competition, open, by the rule of law, produces the best outcomes.
>
> But all the parties in the marketplace have to play by those same rules. Those who violate those rules should lose their rights to participate in that marketplace. Respect and transparency are the price of admission.
>
> And let's talk about China for a moment. **China has observer status in the Arctic Council, but that status is contingent upon its respect for the sovereign rights of Arctic states.** The U.S. wants China to meet that condition and contribute responsibly in the region. But China's words and actions raise doubts about its intentions.[163]

China's interest and investments in Greenland are a matter of concern for U.S. policymakers.[164] Chinese firms have invested in resource extraction ventures in Greenland, including potential sites for mining rare earth elements. In February 2019, it was reported that the United States in 2018 had urged Denmark to finance the construction of airports that China had offered to build in

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2022, at https://oaarchive.arctic-council.org/handle/11374/940.

Paragraph 4.3 of the Arctic Council's observer manual for subsidiary bodies states in part

> Observer status continues for such time as consensus exists among Ministers. Any Observer that engages in activities which are at odds with the Ottawa Declaration or with the Rules of Procedure will have its status as an Observer suspended.
>
> (Arctic Council. *Observer Manual for Subsidiary Bodies*, p. 5. The document was accessed February 24, 2022, at https://oaarchive.arctic-council.org/handle/11374/939.)

See also Alyson JK Bailes, "Understanding The Arctic Council: A 'Sub-Regional' Perspective," *Journal of Military and Strategic Studies*, Vol. 15, Issue 2, 2013: 48; Brianna Wodiske, "Preventing the Melting of the Arctic Council: China as a Permanent Observer and What It Means for the Council and the Environment," *Loyola of Los Angeles International and Comparative Law Review*, Vol. 315, Issue 2, 2014 (November 1, 2014): 320; Sebastian Knecht, "New Observers Queuing Up: Why the Arctic Council Should Expand—And Expel," Arctic Institute, April 20, 2015; Evan Bloom, "Establishment of the Arctic Council," undated; accessed February 24, 2022, at https://2009-2017.state.gov/e/oes/ocns/opa/arc/ac/establishmentarcticcouncil/index.htm, which states "The following paper was authored by Evan Bloom in July 1999 when serving as an attorney in the Office of the Legal Adviser at the U.S. Department of State. Mr. Bloom is now the Director of the Office of Oceans and Polar Affairs for the Bureau of Oceans and International Environmental and Scientific Affairs at the U.S. Department of State." See also Kevin McGwin, "After 20 years, the Arctic Council Reconsiders the Role of Observers," *ArcticToday*, October 24, 2018.

[162] For more on China's actions in the South China Sea and their potential implications for U.S. interests, see CRS Report R42784, *U.S.-China Strategic Competition in South and East China Seas: Background and Issues for Congress*.

[163] U.S. Department of State, "Looking North: Sharpening America's Arctic Focus, Remarks, Michael R. Pompeo, Secretary of State, Rovaniemi, Finland, May 6, 2019."

[164] See, for example, Robinson Meyer, "Greenland's Rare-Earth Election," *Atlantic*, May 3, 2021; Liselotte Odgaard, "Greenland's National Election and the US-China Tech Competition: The Rare Earth Challenge," Hudson Institute, April 9, 2021; Antonia Noori Farzan, "How an Election in Greenland Could Affect China—and the Rare-Earth Minerals in Your Cellphone," *Washington Post*, April 8, 2021; Stacy Meichtry and Drew Hinshaw, "China's Greenland Ambitions Run Into Local Politics, U.S. Influence," *Wall Street Journal*, April 8, 2021; Agence France-Presse, "Greenland Gears Up for Election Sparked by Debate over Chinese-Backed Rare Earths Mining," *South China Morning Post*, April 4, 2021; Sam Dunning, "56,000 Greenlanders Could Shape the Future of Rare Earths, Washington and Beijing Are Watching a Snap Election on the Huge Island Closely," *Foreign Policy*, March 10, 2021; Mary Kay Magistad, "How China's Belt and Road and an Australian Mining Company Could be the Deciding Issues in the Greenland Election," *ABC [Australian Broadcasting Corporation] News*, March 6 (updated March 14), 2021; Eric Onstad, "Five Eyes Alliance Urged to Forge Ties with Greenland to Secure Minerals," *Reuters*, March 4, 2021; Jacob Gronholt-Pedersen and Eric Onstad, "Mining Magnets: Arctic Island Finds Green Power Can Be a Curse," *Reuters*, March 1, 2021; Per Kalvig and Hans Lucht, "Greenland's Minerals to Consolidate China's Rare Earth Dominance?" Dansk Institut for Internationale Studier (DIIS), February 25, 2021.

Greenland. U.S. officials were concerned about this attempt by China to increase its presence and influence in Greenland and the broader Arctic region. (The Danish government ultimately financed the airport construction.[165])

In May 2019, the State Department announced a plan for establishing a permanent diplomatic presence in Greenland,[166] and on June 2020, the State Department formally announced the reopening of the U.S. consulate in Greenland's capital of Nuuk.[167] In April 2020, the U.S. government announced $12.1 million economic aid package for Greenland that the Trump Administration presented as a U.S. action done in a context of Chinese and Russian actions aimed at increasing their presence and influence in Greenland.[168] The Biden Administration's proposed FY2022 Department of State, Foreign Operations, and Related Programs budget requested $10.4 million in Economic Support Fund (ESF) funding for Greenland.[169] One observer stated in a January 2022 opinion piece that "it is still not clear what Washington really wants in Greenland."[170]

Some observers argue that a desire to preclude China (or Russia) from increasing its presence and influence in Greenland may have been one of the reasons why President Trump in August 2019 expressed an interest in the idea of buying Greenland from Denmark,[171] an idea that U.S. officials

[165] Drew Hinshaw and Jeremy Page, "How the Pentagon Countered China's Designs on Greenland; Washington Urged Denmark to Finance Airports that Chinese Aimed to Build on North America's Doorstep," *Wall Street Journal*, February 10, 2019. See also Marc Lanteigne, "Greenland's Airport Saga: Enter the US?" *Over the Circle*, September 18, 2018; Marc Lanteigne, "Greenland's Airports: A Balance between China and Denmark?" *Over the Circle*, June 15, 2018; Arne Finne (translated by Elisabeth Bergquist), "Intense Airport Debate in Greenland," *High North News*, May 30, 2018.

[166] U.S. Department of State, "Secretary Pompeo Postpones Travel to Greenland," Press Statement, Morgan Ortagus, Department Spokesperson, May 9, 2019. See also Krestia DeGeorge, "US State Department Announces Plans for a Diplomatic Presence in Greenland," *ArcticToday*, May 9, 2019; Morten Soendergaard Larsen and Robbie Gramer, "Trump Puts Down New Roots in Greenland," *Foreign Policy*, November 8, 2019.

[167] See, for example, Eavan Cull, "Setting Up Shop in Nuuk," *Foreign Service Journal*, May 2021; Lauren Meier and Guy Taylor, "U.S. Reopens Consulate in Greenland Amid Race for Arctic Supremacy," *Washington Times*, June 10, 2020.

[168] See U.S. Department of State, Briefing On the Road to Nuuk: Economic Cooperation, Special Briefing, Michael J. Murphy, Deputy Assistant Secretary, Bureau of European and Eurasian Affairs, Francis R. Fannon, Assistant Secretary, Bureau of Energy Resources, Jonathan Moore, Principal Deputy Assistant Secretary, Bureau of Oceans and International Environmental and Scientific Affairs, Gretchen Birkle, USAID Deputy Assistant Administrator, May 15, 2020; and U.S. Department of State, Briefing on the Administration's Arctic Strategy, Special Briefing, Office of the Spokesperson, April 23, 2020.

[169] See Department of State, *Congressional Budget Justification, Department of State, Foreign Operations, and Related Programs, Fiscal Year 2022*, pp. 87. See also Jacob Gronholt-pedersen, "In Arctic Push, US Extends New Economic Aid Package to Greenland," *Reuters*, September 15, 2021.

[170] Martin Breum, "A Year Into Biden's Presidency, U.S. Military Plans for Greenland Remain Unclear," *ArcticToday*, January 19, 2022.

[171] See, for example, Marc Lanteigne and Mingming Shi, "'No Sale': How Talk of a US Purchase of Greenland Reflected Arctic Anxieties," *Over the Circle*, September 17, 2020; Stuart Lau, "Did China's Growing Presence in Arctic Prompt Donald Trump's Offer to Buy Greenland?" *South China Morning Post*, September 1, 2019; Nadia Schadlow, "Why Greenland Is Really About China," *The Hill*, August 28, 2019; Daniel Lippman, "Trump's Greenland Gambit Finds Allies Inside Government," *Politico*, August 24, 2019; Seth Borenstein (Associated Press), "Icy Arctic Becomes Hot Property for Rival Powers," *Navy Times*, August 22, 2019; Ragnhild Grønning, "Why Trump Is Looking to Buy Greenland—Even If It's Not for Sale," *High North News*, August 19, 2019. See also Caitlin Hu and Stephen Collinson, "Why Exactly Is the US So Interested in Greenland?" *CNN*, July 23, 2020. See also Tarisai Ngangura, "Ex-Staffer: Trump Wanted to Trade 'Dirty' Puerto Rico for Greenland," *Vanity Fair*, August 19, 2020; Jacob Gronholt-Pedersen, "As the Arctic's Attractions Mount, Greenland is a Security Black Hole," *Reuters*, October 20, 2020; Gordon Lubold, "U.S. Holds Talks Over Economic, Security Arrangements With Greenland," *Wall Street Journal*, October 28, 2020.

had proposed at certain earlier points in U.S. history.[172] Some observers, viewing Trump's expressed interest in the idea of buying Greenland, noted past U.S. purchases of land from other countries.[173] After Greenlandic and Danish officials asserted that Greenland is "open for business, not for sale," President Trump canceled a previously scheduled state visit to Denmark in early September and subsequently objected to Danish Prime Minister Mette Frederiksen's description of his proposal as "absurd."[174] In May 2021, Secretary of State Antony Blinken confirmed that the United States does not seek to buy Greenland,[175] and made a stop in Greenland while returning to the United States from an Arctic Council ministerial meeting in Reykjavik. During the stop, he was accompanied by Greenland's prime minister, Greenland's foreign minister, and Denmark's foreign minister.[176]

Regarding Russia's response to China's growing activities in the Arctic, Russia is promoting the NSR for use by others, including China, in part because Russia's government apparently sees significant economic opportunities in offering icebreaker escorts, refueling posts, and supplies to the commercial ships that will ply the waterway. More broadly, Russia and China have increased their cooperation on security and other issues, in no small part as a means of balancing or countering the United States in international affairs, and Russian-Chinese cooperation in the Arctic (including China's investment in Russia's Arctic oil and gas industry) can both reflect and contribute to that cooperation.[177]

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[172] See, for example, Tom Barnes, "Trump 'Repeatedly Raising Idea of Buying Greenland', Aides Say, Denmark Previously Refused to Sell World's Largest Island to United States, Turning Down a $100m Offer in 1946," *Independent*, August 16, 2021; Paul Musgrave, "American Imperialists Have Always Dreamed of Greenland," *Foreign Policy*, August 16, 2019; Billy Perrigo, "President Trump Reportedly Wants to Buy Greenland. TIME Reported Similar Plans in 1947," *Time*, August 16, 2019; Vivian Salama, Rebecca Ballhaus, Andrew Restuccia, and Michael C. Bender, "President Trump Eyes a New Real-Estate Purchase: Greenland," *Wall Street Jour*nal, August 16, 2021; Dwayne Ryan Menezes, "Trump's Greenland Plan: The Rebirth of an 1867 American Dream," *Polar Connection*, August 20, 2019; Agence France-Presse with reporting by Rónán Duffy, "Trump's Attempt to Buy Greenland Follows a Long History of the US Buying Territory with Cash," *The Journal (Ireland)*, August 24, 2021. See also "Proposals for the United States to Purchase Greenland," *Wikipedia*.

[173] See, for example, Gillian Brockell, "Trump's Interest in Buying Greenland Is Being Mocked. So Was the Purchase of Alaska," *Washington Post*, August 19, 2019; Len Rosen, "Trump Wants to Be Another Seward But Instead of Buying Alaska from Russia He Wants to Purchase Greenland from Denmark," *NPR*, August 16, 2021; David Carlin, "Could Greenland Be The New Alaska?" *Forbes*, August 21, 2019; Mariel Padilla, "Greenland Aside, Buying Foreign Land Used to Be Common," *New York Times*, August 27 (updated August 30), 2019; Farz Edraki and Keri Phillips, "Donald Trump's Greenland plan was widely criticised. But the US Has a Long History of Buying Foreign Land," *ABC Radio National (Australia)*, September 2 (updated September 3), 2019.

[174] For further discussion, see CRS Insight IN11161, *Greenland, Denmark, and U.S. Relations*, by Kristin Archick. See also Jon Henley, "No Thanks, We're Not for Sale, Aghast Greenland Tells Trump," Guardian, August 16, 2021; Jacob Gronholt-Pedersen (additional reporting by Sarah N. Lynch), "Danish PM Says Trump's Idea of Selling Greenland to U.S. Is Absurd," *Reuters*, August 18, 2019; Allan Smith, "Trump Says He's Still Interested in Buying Greenland. Denmark Says It's Not for Sale," *NBC News*,, August 18, 2019; Emma Anderson, "Danish PM: Trump's Interest in Buying Greenland Is 'Absurd,'" *Politico*, August 19, 2019; Ben Gittleson, "After Denmark's PM Calls Buying Greenland 'Absurd,' Trump Calls Her Comment 'Nasty,' ABC News, August 21, 2019; Scott Neuman and Sasha Ingber, "Trump Skips Visit To Denmark, Calls Danish Leader 'Nasty' For Greenland Sale Rebuff," *NPR*, August 21, 2019.

[175] See, for example, Chris Cameron, "Secretary of State Confirms the U.S. Does Not Want to Buy Greenland," *New York Times*, May 20 (updated May 22), 2021; Humeyra Pamuk, "Blinken Confirms the U.S. Does Not Want to Buy Greenland after Trump Proposal," *Reuters*, May 20, 2021; Rebecca Beitsch, "Blinken Confirms US No Longer Seeking to Purchase Greenland," *The Hill*, May 21, 2021.

[176] Kevin McGwin, "Blinken's Stop-Over in Greenland Highlights Its Importance to the US," *ArcticToday*, May 21, 2021. See also Rebecca Beitsch, "Blinken Confirms US No Longer Seeking to Purchase Greenland," *The Hill*, May 21, 2021. For further discussion, see CRS Insight IN11161, *Greenland, Denmark, and U.S. Relations*, by Kristin Archick.

[177] See, for example, Andrea Kendall-Taylor and David Shullman, "China and Russia's Dangerous Convergence,"

The U.S. Department of Defense stated in 2020 that China's "expanding Arctic engagement has created new opportunities for engagement between China and Russia. In April 2019, China and Russia established the Sino-Russian Arctic Research Center. In 2020. China and Russia plan to use this center to conduct a joint expedition to the Arctic to research optimal routes of the Northern Sea Route and the effects of climate change. The PRC will cover 75 percent of the expedition's expenses."[178] A February 4, 2022, joint statement by Russia and China about their cooperation on security and other issues stated that the two countries "agreed to continue consistently intensifying practical cooperation for the sustainable development of the Arctic."[179]

On the other hand, Russian officials reportedly are also concerned that China's continued growth in wealth and power might eventually lead to China becoming the dominant power in Eurasia, and to Russia being relegated to a subordinate status in Eurasian affairs.[180] Increased use by China of the NSR could accelerate the realization of that scenario: As noted above, the NSR forms part of China's geopolitical Belt and Road Initiative (BRI). Some observers argue that actual levels of Sino-Russian cooperation in the Arctic are not as great as Chinese or Russian announcements about such cooperation might suggest.[181] As mentioned earlier, one observer stated in 2021 that "Russian wariness of China's Arctic ambitions could provide novel opportunities for warming ties between Moscow and Washington."[182]

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*Foreign Affai*rs, May 3, 2021; Sherri Goodman and Yun Sun, "What You May Not Know About Sino-Russian Cooperation in the Arctic and Why it Matters," *Diplomat*, August 13, 2020; Sarah Cammarata, "Russia and China Should Be Viewed as 'One Alliance' in the Arctic, U.K. Defense Official Warns," *Politico*, June 6, 2020; Owen Matthews, "Putin Needs Xi More than China Needs Russia," *Spectator USA*, May 25, 2020; Ken Moriyasu, "US Awakens to Risk of China-Russia Alliance in the Arctic," *Nikkei Asian Review*, May 24, 2020; Christopher Weidacher Hsiung, "The Emergence of a Sino-Russian Economic Partnership in the Arctic?" Arctic Institute, May 19, 2020; Mario Giagnorio, "A Cold Relation: Russia, China and Science in the Arctic," *New Eastern Europe*, March 25, 2020 (interview with Rasmus Gjedssø Bertelsen and Mariia Kobzeva); Alana Monteiro, "Strategic Partnership, Arctic-Style: How Russia and China Play the Game," *Modern Diplomacy*, March 14, 2020.

Nicholas Groffman, "Why China-Russia Relations Are Warming Up in the Arctic," *South China Morning Post*, February 17, 2018.

[178] Department of Defense, *Military and Security Developments Involving the People's Republic of China 2020, Annual Report to Congress*, generated August 21, 2020, released September 1, 2020, p. 133.

[179] Joint Statement of the Russian Federation and the People's Republic of China on the International Relations Entering a New Era and the Global Sustainable Development, February 4, 2022, English-language version posted by China Aerospace Studies Institute (Air University), accessed March 24, 2022, at https://www.airuniversity.af.edu/Portals/10/CASI/documents/Translations/2022-02-04%20China%20Russia%20joint%20statement%20International%20Relations%20Entering%20a%20New%20Era.pdf. The joint statement also states that the two countries "call upon all countries to strengthen cooperation in sustainable transport, actively build contacts and share knowledge in the construction of transport facilities, including smart transport and sustainable transport, development and use of Arctic routes, as well as to develop other areas to support global post-epidemic recovery." See also Mathiew Leiser, "Russia and China to Deepen Cooperation in the Arctic," *Barents Observer*, February 4, 2022.

[180] See, for example, Paul Goble, "Moscow Needs Beijing in the Arctic but Worries About China's Expanding Role," *Eurasia Daily Monitor*, February 1, 2022.

[181] For additional discussion, see, for example, Jim Townsend and Andrea Kendall-Taylor, *Partners, Competitors, or a Little of Both? Russia and China in the Arctic*, Center for a New American Security (CNAS), March 2021, 17 pp.; Duncan Depledge, "Why We Must Watch Sino-Russia Relations in the Arctic," *Sunday Guardian*, November 28, 2020; Elizabeth Buchanan, "Russia and China in the Arctic: Assumptions and Realities," Australian Strategic Policy Institute, September 25, 2020; Maria Shagina and Benno Zogg, "Arctic Matters: Sino-Russian Dynamics," Center for Security Studies (CSS) at ETH Zurich, September 2020, 4 pp.; Elizabeth Buchanan, "There Is No Arctic Axis, Russia and China's Partnership in the North is Primarily Driven by Business, Not Politics," *Foreign Policy*, July 21, 2020; Mariia Kobzeva, "A Framework for Sino-Russian Relations in the Arctic," Arctic Institute, May 5, 2020.

[182] Ingrid Burke Friedman, "China's Arctic Ambitions Could Make or Break US-Russian Relations in the Region," Russia Matters (Harvard Kennedy School Belfer Center for Science and International Affairs), December 1, 2021.

Linkages Between Arctic and South China Sea

Observers have sometimes made a linkage between the Arctic and the South China Sea in connection with international law of the sea or international cooperation and competition.[183] One aspect of this linkage relates to whether China's degree of compliance with international law of the sea in the South China Sea has any implications for understanding potential Chinese behavior regarding its compliance with international law of the sea (and international law generally) in the Arctic. A second aspect, mentioned above, is whether the United States should consider the option of moving to suspend China's observer status on the Arctic Council as a punitive cost-imposing measure for unwanted Chinese actions in the South China Sea. A third aspect concerns the question of whether the United States should become a party to UNCLOS: Discussions of that issue sometimes mention both the Arctic and the situation in the South China Sea.[184]

U.S. Military Forces and Operations[185]

Introduction

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 long-range bombers, tactical combat aircraft, maritime patrol aircraft, nuclear-powered submarines, surface warships, and ground forces 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, leading to a post-Cold War period of reduced emphasis on the Arctic in U.S. military planning. In more recent years, the emergence of great power competition and a significant increase in Russian military presence and operations in the Arctic has led to growing concerns among U.S. officials and other observers that the Arctic is once again becoming a region of military tension and competition,[186] and to a renewed focus on the Arctic in

[183] See, for example, Nong Hong, "Weighing the Sources of International Law: The Arctic, Antarctica and the South China Sea," Institute for China-America Studies (ICAS), December 11, 2020; Robinson Meyer, "The Next 'South China Sea' Is Covered in Ice," *Atlantic*, May 15, 2019; Justin D. Nankivell, "The Role of History and Law in the South China Sea and Arctic Ocean," *Maritime Awareness Project*, August 7, 2017; Sydney J. Freedberg, "Is The Arctic The next South China Sea? Not Likely," *Breaking Defense*, August 4, 2017; Caroline Houck, "The Arctic Could Be the Next South China Sea, Says Coast guard Commandant," *Defense One*, August 1, 2017; Daniel Thomassen, "Lessons from the Arctic for the South China Sea," Center for International Maritime Security, April 4, 2017. For a different perspective, see Elizabeth Buchanan and Bec Strating, "Why the Arctic Is Not the 'Next' South China Sea," *War on the Rocks*, November 5, 2020.

[184] For further discussion of this situation, see CRS Report R42784, *U.S.-China Strategic Competition in South and East China Seas: Background and Issues for Congress*.

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

[186] See, for example, Tyler Rogoway, "Massive Expansion Underway At Russia's Northernmost Arctic Air Base (Updated)," *The Drive*, August 23, 2021; Hercules Reyes, "Russia Launches New Arctic Military Drills," *The Defense Post*, August 6, 2021; Nancy Teeple, "The Impact of the Post-Arms Control Context and Great Power Competition in the Arctic," *Arctic Institute*, June 22, 2021; Christopher Woody, "As Militaries Get Busier in the Arctic, the US and Russia Are Running Out of Ways to Solve Problems There," *Business Insider*, May 26, 2021; Kris Osborn, "Russia vs. U.S. Navy: How a Warming Arctic Is Heating up Military Competition," *National Interest*, January 12, 2021; Rebecca Hersman, Eric Brewer, and Maxwell Simon, *Strategic Stability and Competition in the Arctic*, Center for Strategic and International Studies (CSIS), January 2021, 11 pp.; Christopher Woody, "As Trump Shakes Up the Military Footprint in Europe, the US and Russia Are Making Moves in the High North," *Business Insider*, August 30, 2020; Anya Gorodentsev, "Will the Arctic Become the Next South China Sea?" *National Interest*, May 17, 2020; "America and Britain Play Cold-War Games with Russia in the Arctic," *Economist*, May 10, 2020. See also "Arctic Military Activity Tracker," Center for Strategic and International Studies (CSIS).

U.S. military planning. Department of Defense (DOD) officials have stated that U.S. military operations in Alaska can play a role in countering China's activities in the Arctic and the Indo-Pacific region.[187]

As mentioned earlier, the Interim National Security Strategic Guidance document released by the Biden Administration in March 2021[188] does not specifically mention the Arctic. An unclassified summary of the National Defense Strategy released by the Trump Administration in January 2018[189] does not specifically mention the Arctic.

Russia's Arctic Military Modernization

As noted earlier, Russia since 2008 has adopted a series of strategy documents outlining plans that call for, among other things, bolstering the country's Arctic military capabilities. Among other actions, Russia established a new Arctic Joint Strategic Command at Severomorsk (the home of the Russian navy's Northern Fleet), upgraded to the command to the full status of a Military District in 2021 (making it the country's fifth Military District), reactivated and modernized Arctic military bases that fell into disuse with the end of the Cold War, assigned upgraded forces to those bases, and increased military exercises and training operations in the Arctic.[190]

Some observers have expressed growing concern at these developments, particularly following Russia's invasion of Ukraine beginning in late February 2022.[191] Other observers have noted the

[187] See, for example, Hilde-Gunn Bye, "US Secretary of Defense Highlights the Importance of Alaska," *High North News*, August 2 (updated August 3), 2021; Robert Delaney, "Arctic Is Key Region in Countering China's Aggression, US Air Force Officials Say," *South China Morning Post*, July 28, 2021; Carla Babb, "Alaska Seen as Strategic US Military Asset Against China, Russia," *Voice of America*, July 25, 2021.

[188] White House, *Interim National Security Strategic Guida*nce, March 2021, released on March 3, 2021, 23 pp.

[189] Department of Defense, *Summary of the 2018 National Defense Strategy of the United States of America: Sharpening the American Military's Competitive Edge*, January 2018, 11 pp.

[190] Regarding increased Russian military presence and operations in the Arctic, see, for example, "Russia's New Arctic Missile System," Rebellion Research, February 8, 2022; Stephen Blank and Peter Huessy, "How Russia's Military Buildup Is Changing the Arctic," *National Interest*, January 26, 2022; Gabrielle Tétrault-Farber, "Russia Starts Navy Drills to Rehearse Protecting Arctic Shipping Lane," *Reuters*, January 26, 2022; Atle Staalesen, "New Barnaul-T Air Defense System Comes to Motorized Rifle Brigade in Pechenga," *Barents Observer*, December 17, 2021; Michael Peck, "Russian Arctic Patrol Ships Will Carry Containerized Cruise Missiles," *19FortyFive*, October 19, 2021; Mark Episkopos, "Why Russia Is Ready to Build an Arctic Fleet," *National Interest*, October 8, 2021; Joe Saballa, "Russia Wants to Establish Navy Arctic Fleet," *Defense Post*, October 7, 2021; Jyri Lavikainen, *Strengthening Russia's Nuclear Forces in the Arctic, The Case of the Kinzhal Missile*, Center for Strategic and International Studies (CSIS), September 2021, 7 pp. (posted online September 14, 2021); Atle Staalesen, "How to Ambush an Arctic Seaport. Russian Marines Stage a Show," *Barents Observer*, September 10, 2021.

See also Heather A. Conley and Joseph S. Bermudez Jr., *Ice Curtain: Tiksi Airbase—Many Russian Announcements, Little Equipment*, Center for Strategic and International Studies (CSIS), March 2020, 9 pp.; Heather A. Conley and Joseph S. Bermudez Jr., *Ice Curtain: Why Is There a New Russian Military Facility 300 Miles from Alaska*? Center for Strategic and International Studies (CSIS), March 2020, 6 pp.; Matthew Melino, Heather A. Conley, and Joseph S. Bermudez Jr., *Modernization on the Kola Peninsul*a, Center for Strategic and International Studies (CSIS), March 2020, 15 pp.; Matthew Melino and Heather A. Conley, "The Ice Curtain: Russia's Arctic Military Presence," Center for Strategic and International Studies (CSIS), March 26, 2020.

[191] See, for example, Michel Comte (Agence France-Presse), "Canada's Arctic Security Moves to Forefront after Russian Invasion of Ukraine," *Yahoo News*, March 23, 2022; Anja Karadeglija, "Russia's Invasion Has Ottawa Looking to 'Protect Our Arctic Sovereignty,'" *National Post (Canada)*, March 18, 2022; Marie Woolf (Canadian Press), "Canada's Defence Chief Warns Russia Has Reoccupied Arctic Bases," *Global News (Canada)*, March 10, 2022; Bryan Passifiume, "'We're Effectively a Border State with Russia': Defending Canada's Far-North Called Key to Protecting Sovereignty," *National Post (Canada)*, March 11, 2022.

cooperative aspects of relations among the Arctic states, including Russia, and have argued, at least prior to Russia's invasion of Ukraine beginning in late February 2022, that the competitive aspects have been overstated.[192] Some observers argue that Russia's military investment in the Arctic is sometimes exaggerated, reflects normal modernization of aging capabilities, or is intended partly for domestic Russian consumption.[193]

U.S. and Allied Arctic Military Activities

In General

DOD and the Coast Guard (which is part of the Department of Homeland Security [DHS]) are devoting increased attention to the Arctic in their planning and operations. DOD as a whole, the Army, the Navy and Marine Corps, the Air Force, and the Coast Guard have each issued Arctic strategy documents.[194] All U.S. military services are conducting increased exercises and training operations in the region, some in conjunction with forces from NATO allies and non-NATO Nordic countries, that are aimed at

- reacquainting U.S. forces with—and responding to changes in—operating conditions in the region,
- rebuilding Arctic-specific warfighting skills that eroded during the post-Cold War era,
- strengthening interoperability with allied forces in the region,
- identifying Arctic military capability gaps,
- testing the performance of equipment under Arctic conditions, and
- sending Russia and China signals of resolve and commitment regarding the Arctic.[195]

[192] See, for example, Robert David English and Morgan Grant Gardner, "Phantom Peril in the Arctic, Russia Doesn't Threaten the United States in the Far North—But Climate Change Does," *Foreign Affairs*, September 29, 2020; Mia Bennett, "U.S. Rhetoric About the Strategic Importance of the Arctic Is Out of Step with Its Spending Priorities," *ArcticToday*, July 26, 2019; "Arctic Conflict With Russia 'Not Likely In The Short-Term', Analyst Says," *Forces*, January 30, 2019.

[193] See, for example, Hilde-Gunn Bye, "Russia Pays Considerable Attention to Improve Arctic Infrastructure, Says Defence Minister," *High North News*, April 14, 2021; Lyle Goldstein, "Washington Should Chill Out over Russia's Arctic Ambitions," *Defense News*, November 13, 2020; Robert D. English, "Why an Arctic Arms Race Would Be a Mistake," *ArcticToday*, June 18, 2020; Marc Montgomery, "Russia's Military Feat in Arctic, Spectacular, But No Real Threat to West," *Radio Canada International*, May 12, 2020; Elizabeth Buchanan and Mathieu Boulègue, "Russia's Military Exercises in the Arctic Have More Bark Than Bite," *Foreign Policy*, May 20, 2019; Arne F. Finne, "Russia Is a Responsible Actor in the Arctic," *High North News*, January 22, 2019. See also Hilde-Gunn Bye, "From Norway to North America: Differing Views On New Russian Weapon Systems," *High North News*, February 24, 2020.

[194] See the following documents:

- Department of Defense, *Report to Congress, Department of Defense Arctic Strategy*, June 2019, 18 pp.;
- Department of the Army, *Regaining Arctic Dominance, The U.S. Army in the Arctic*, January 19, 2021, 48 pp.;
- Department of the Navy, *A Blue Arctic, A Strategic Blueprint for the Arctic*, undated, released January 5, 2021, 25 pp.;
- Department of the Air Force, *Arctic Strategy, Ensuring a Stable Arctic Through Vigilance, Power Projection, Cooperation, and Preparation*, undated, with cover letter dated July 21, 2020, 14 pp.; and
- U.S. Coast Guard, *Arctic Strategic Outlook*, April 2019, 45 pp.

[195] See, for example, Seth Koenig, "Navy Brings 'Backpacker's Mindset' to Nearly Zero-Footprint Arctic Ice Camp,"

In addition to these increased exercises and training operations, the Coast Guard, as a major new acquisition project, is procuring new polar icebreakers called Polar Security Cutters (PSCs) to replace its aging heavy polar icebreakers. (For further discussion of this program, see the next section of this report.) A July 28, 2021 press report stated: "US military leaders said on Tuesday [July 27] that they see Arctic operations as a deterrent to China, which has staked a claim to the region as part of its Belt and Road Initiative, and increasingly as a base for operations in the Indo-Pacific."[196]

Canada, the UK, and the Nordic countries are taking steps to increase their own military presence and operations in the region, and as noted above, have participated alongside U.S. military forces in certain Arctic exercises.[197] A NATO exercise called Trident Juncture 18 that was held from October 25 to November 7, 2018, in Norway and adjacent waters of the Baltic and the Norwegian Sea, with participation by 29 NATO members plus Sweden and Finland, was described as NATO's largest exercise to that point since the Cold War. It featured a strong Arctic element, including the first deployment of a U.S. Navy aircraft carrier above the Arctic Circle since 1991.[198] Another large NATO exercise in Norway and surrounding waters, called Cold Response

U.S. Navy, March 16, 2022; Steve Beynon, "'It's Lethal Here': Army Aims to Master the Arctic, Where the Environment Is the Enemy," *Military.com*, March 15, 2022; Jon Schlosberg, Tommy Brooksbank, Kayna Whitworth, and Leda Alvim, "Navy Launches Training Exercise in Arctic Circle as Global Tensions Rise," *ABC News*, March 15, 2022; Alex J. Rouhandeh, "US Military Arctic Training Sends Message to Russians," *Newsweek*, March 11, 2022; Davis Winkie, "CTC on Ice: Army Holds First Arctic Brigade-Level Training Rotation," *Army Times*, March 9, 2022; Joseph Vonnida, "National Guard Troops from 15 States Join Arctic Exercise," U.S. Army, March 1, 2022; Hilde-Gunn Bye, "US Army to Hold Major Winter Exercise in Alaska," *High North News*, February 16, 2022; "Joint Exercise Arctic Eagle To Descend On Nome," *Nome Nugget*, January 21, 2022.

[196] Robert Delaney, "Arctic Is Key Region in Countering China's Aggression, US Air Force Officials Say," *South China Morning Post*, July 28, 2021. See also Jim Garamone, "Austin Says Alaska Is Strategic Hotspot for Indo-Pacific, Arctic Operations," *DOD News*, July 25, 2021.

[197] See, for example, Royal Navy, "Royal Marines Carry Out Fjord Recce Mission as Huge Arctic Exercises with NATO Allies Take Shape," Royal Navy, March 2, 2022; Janet E Silver, "Experts say Canada must defend itself from the Arctic ambitions of China and Russia," *iPolitics*, January 3, 2022; Larisa Brown, "British Troops Must Train to Fight in Arctic over Russian Threat, Says Ben Wallace," *Times (UK)*, December 10, 2021; Jim Dorschner, "Taking No Chances: Regional Security Challenges Prompt Nordic Military Buildup," *Jane's Defence Weekly*, November 15, 2021; Jay Heisler, "UK-Canada Naval Training Pact Reflects Rising Interest in Arctic," *Voice of America (VOA)*, October 28, 2021; John Grady, "Defense Chief: U.K. Needs to Develop 'Capability and Deterrence' in the High North," *USNI News*, October 19, 2021; Fabian Villalobos, "As U.S. Shifts Arctic Strategy to Counter Russia, Allies Offer Valuable Info," *United Press International*, September 24, 2021; Jalen Zeman, "No Need to Read Between the Lines: How Clear Shifts in Nordic Strategies Create Opportunities for the United States to Enhance Arctic Security," RAND, September 15, 2021; Andrew Eversden, "7 Allies Sign onto Polar Research Project," *C4ISRNet*, April 11, 2021; Larry Luxner, "How Russia, China, and Climate Change Are Shaking Up the Arctic," Atlantic Council, March 23, 2021; John Grady, "Norwegian Officials: Russian Arctic Expansion Making Security Landscape 'Difficult,'" *USNI News*, March 22, 2021; Ed Adamczyk, "NORAD Readies for Arctic Air Defense Exercises," *United Press International*, March 17, 2021; Larisa Brown, "Royal Navy to Defend Arctic Trade as Ice Melts," *Times (UK)*, March 10, 2021; Secretary of the Air Force Public Affairs, "Acting SecAF, Nordic Ministers of Defense Sign Letter of Intent Strengthening US-Nordic Defense Ties," U.S. Air Force, February 18, 2021; Richard Milne, "Denmark Raises Investment in Arctic Surveillance to Counter Russian Build-up," *Financial Times*, February 14, 2021; Jacob Gronholt-Pedersen, "Denmark to Spend More on Arctic Defence as Melting Sea Ice Prompts Jostle for Control," *Reuters*, February 11, 2021; Patricia Kime, "Nordic Allies Help Navy Improve Ship Ops in Icy Waterways as Arctic Competition Heats Up," *Military.com*, February 4, 2021.

[198] See, for example, Christopher Woody, "'We Can Do Better': The Navy's Newest Fleet Commander Says US Ships and Sailors Got 'Beat Up' During NATO's Biggest Exercise Since the Cold War," *Business Insider*, December 4, 2018; Levon Sevunts, "NATO's Arctic Dilemma; Two Visions of the Arctic Collide as NATO and Russia Flex Muscles," *Radio Canada International*, December 3, 2018; Megan Eckstein, "Truman CSG: Arctic Strike Group Operations Required Focus on Logistics, Safety," *USNI News*, November 6, 2018; Mary Thompson-Jones, "NATO's Arctic Exercise is a Good Start to Standing Up to Russian Militarization of the High North," *National Interest*, November 6, 2018; Pierre-Henry Deshayes, "Antifreeze and Balaclavas: NATO Troops in cold War Games,"

2022, began in March 2022, with a total of about 30,000 soldiers, sailors, Marines, and airmen from 27 countries participating.[199]

U.S. Navy and Coast Guard

The diminishment of Arctic ice is creating new operating areas in the Arctic for Navy surface ships and Coast Guard cutters.[200] The Navy has increased deployments of attack submarines and surface ships to the Arctic for exercises and other operations.[201] The Coast Guard annually deploys a polar icebreaker, other cutters, and aircraft into the region to perform various Coast Guard missions and to better understand the implications of operating such units there.[202] Key points relating to the Navy and Coast Guard in the Arctic that have emerged include the following:

- Search and rescue (SAR) in the Arctic is a mission of increasing importance, particularly for the Coast Guard, and one that poses potentially significant operational challenges;
- Navy officials have stated that they do not see a strong near-term need for building ice-hardened surface ships and deploying them into the Atlantic, but acknowledge that such a need might emerge in the longer run.[203]

Military.com, November 2, 2018; Vasco Cotovio and Frederik Pleitgen, "Submarines a Centerpiece of Russia's Navy," *CNN*, November 19, 2018; Shawn Snow, "The Corps' Armor Makes a Big Showing in Norway as Marines Test Future Force," *Marine Corps Times*, October 25, 2018; Terje Solsvik, "As Winter Comes, NATO Kicks Off Largest Maneuvers Since Cold War," *Reuters*, October 25, 2018; Kyle Rempfer, "US Breaches the Arctic with Marines, Fighter Jets and Aircraft Carriers," *Military Times*, October 23, 2018; Megan Eckstein, "Truman Carrier Strike Group Operating North of Arctic Circle; First Time for US Navy Since 1991," *USNI News*, October 19, 2018; Thomas Gooley, "HST Strike Group Enters Arctic Circle, Prepares for NATO Exercise," *DVIDS (Defense Visual Information Distribution Service)*, October 19, 2018; Thomas Nilsen, "US Marines Launch Exercise in Northern Norway Ahead of Trident Juncture," *Barents Observer*, October 15, 2018.

[199] See "Exercise Cold Response 2022—NATO and Partner Forces Face the Freeze in Norway," NATO, March 7 (updated March 21), 2022; Reuters, "NATO Arctic Exercises Get Under Way in Norway," *Reuters*, March 14, 2022; Phillip Walter Wellman, "US Sends Sizable Contingent to Norway for Giant NATO Exercise in Region Rattled by Russia," *Stars and Stripes*, March 14, 2022; Idrees Ali and Robin Emmott, "NATO, in Arctic Training Drills, Faces Up to Putin's 'Unpredictable' Russia," *Reuters*, March 23, 2022; Michael Fabey, "'Cold Response 2022' Links USMC Amphibious Warfare Expertise with Norwegian Arctic Knowledge," *Jane's Defence Weekly*, March 23, 2022; Michael Fabey, " 'Cold Response 2022' Touted as Signal of NATO Strength," Jane's Defence Weekly, March 23, 2022. Idrees Ali and Robin Emmott, "NATO, in Arctic Training Drills, Faces Up to Putin's 'Unpredictable' Russia,' *Reuters*, March 23, 2022.

[200] See, for example, Sonoko Kuhara, "What the 'Blue Arctic' Means for the US Pacific Military Presence," *Diplomat*, August 21, 2021; Seapower Staff, "U.S. Coast Guard Cutters Patrol the U.S. Arctic," *Seapower*, August 13, 2021.

[201] See, for example, Diana Stancy Correll, "Destroyer Ross Treks into the Barents Sea's Arctic Waters—Again," *Navy Times*, October 21, 2020; Thomas Nilsen, "U.S. Warship Returns to Barents Sea," *Barents Observer*, October 20, 2020; John Vandiver, "For the Third Time This Year, a Navy Destroyer Enters the Barents Sea," *Stars and Stripes*, October 20, 2020; Caleb Larson, "The U.S. Navy Wants to Make Sure It Can Take on Russia in the Arctic," *National Interest*, October 7, 2020; Christopher Woody, "A US Navy Destroyer Teamed Up with Canada's Navy to Learn How to Operate in Harsh Arctic Conditions," *Business Insider*, September 17, 2020; Caitlin M. Kenney, "US Participates in Arctic Exercise as Region Sees Increased Military Activity from Russia and China," *Military.com*, August 4, 2020; Christopher Woody, "With Russia Keeping Watch, US Navy Subs Ventured Back to the High North to Train Where There's 'No Safe Haven,'" *Business Insider*, June 10, 2020.

[202] See, for example, Seapower Staff, "U.S. Coast Guard Completes Operation Nanook 2021," *Seapower*, August 18, 2021.

[203] See, for example, Ben Werner, "Arleigh Burke Destroyers Are More Viable Option for Near-Term Navy Presence in Arctic," *USNI News*, September 18, 2019; Megan Eckstein, "CNO: Arctic Operations Limited Now, But Future Ship Designs Should Consider Environment," *USNI News*, September 12, 2016.

- More complete and detailed information on the Arctic as an operating area is needed to more properly support expanded Navy and Coast Guard ship and aircraft operations in the region.
- 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.[204]
- Cooperation with other Arctic countries will be valuable in achieving defense and homeland security goals.

In May 2018, the Navy announced that it would reestablish the 2nd Fleet, which was the Navy's fleet during the Cold War for countering Soviet naval forces in the North Atlantic. The fleet's formal reestablishment occurred in August 2018. The 2nd Fleet was created in 1950 and disestablished in September 2011. In its newly reestablished form, it is described as focusing on countering Russian naval forces not only in the North Atlantic but in the Arctic as well.[205]

Recent Developments

Surveillance and Reconnaissance, Domain Awareness, and Communications

DOD and Coast Guard officials have stated that recent U.S. military operations in the Arctic have highlighted a need for

- improved capabilities for conducting surveillance and reconnaissance in the region, so as to support improved domain awareness (i.e., real-time or near-real-time awareness of military and other activities taking place across the region), and
- improved communication abilities, because existing U.S. military communications systems were designed to support operations in lower latitudes rather than in the polar regions.[206]

U.S. military services are starting to take actions to address the need for improved surveillance and reconnaissance, domain awareness, and communications in the Arctic.[207]

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[204] See, for example, Christopher Woody, "The Navy Is Putting 'The Proper Equipment' Back on Its Ships to Operate in Harsh Arctic Conditions," *Business Insider*, August 8, 2020; Andrew Eversden, "Failure to Communicate: US Navy Seeks Faster Data Transfers amid Arctic Ice," *Defense News*, May 12, 2020; Nathan Strout, "SpaceX Could Fill the US Military's Arctic Communications Gap by the End of This Year," *C4ISRNet*, May 4, 2020; Geoff Ziezulewicz, "Welcome to the Arctic: Degraded Radios, Poor Satellite Geometry and Sea Charts Dating Back to Capt. Cook," *Navy Times*, September 19, 2019.

[205] See, for example, Christopher Woody, "The US Navy's Newest Fleet Is Bulking Up for 'Leaner, Agile' Operations to Counter Russia in the Atlantic and the Arctic," *Business Insider*, January 18, 2019; Patricia Kime, "The Navy Isd gearing Up for 'Leaner, Agile' Operations in Arctic, North Atlantic," *Military.com*, January 16, 2019; Rich Abott, "2nd Fleet To Be Fully Operational in 2019, Sees Real Russian Threat," *Defense Daily*, December 3, 2018; Sam LaGrone, "U.S. 2nd Fleet Racing Toward a 2019 Operational Capability," USNI News, November 29, 2018; Paul McLeary, "New Second Fleet To Stay Lean, Unpredictable, Commander Says; & Watching China," *Breaking Defense*, November 29, 2018; Sam LaGrone, "CNO: New 2nd Fleet Boundary Will Extend North to the Edge of Russian Waters," *USNI News*, August 24, 2018.

[206] See, for example, Aaron Mehta and Theresa Hitchens, "NORTHCOM Needs Help In Space For Arctic Communications," *Breaking Defense*, August 25, 2021; David B. Larter, "The Arctic Is a Strategic Hot Spot, but Western Allies Lack Good Intel," *Defense News*, September 21, 2020.

[207] See, for example, Bill Liquori and Iris Ferguson, "How the US Space Force Plans to Improve Arctic Communication," *C4ISRNet*, July 14, 2021; William McCormick, "NORTHCOM, NORAD Request $80M Budget for Testing of Arctic Communication Satellites," *ExecutiveBiz*, June 11, 2021; Nathan Strout, "NORAD, NORTHCOM

U.S. and Canada Plan to Update Warning Radars in Arctic

The United States and Canada are working together to modernize the North American Aerospace Defense Command (NORAD). Efforts are to include joint investments in new sensing and command and control capabilities for defending against ballistic missile threats."[208]

April 2021 Agreement Regarding Bases in Norway

On April 16, 2021, the State Department announced that on that date "the United States and the Kingdom of Norway concluded the recently negotiated Supplementary Defense Cooperation Agreement (SDCA).... The Agreement supplements the provisions of the 1951 NATO Status of Forces Agreement (SOFA) and establishes a framework to advance our capabilities, in support of the NATO Alliance's collective defense.... The SDCA includes four initial key locations as focal points for increased cooperation with Norway: Evenes Air Station, Ramsund Naval Station, Rygge Air Station, and Sola Air Station."[209]

Impact of Warmer Temperatures on Bases in Alaska and Exercises in Norway

DOD's September 2021 draft climate adaptation plan states: "In the Arctic, permafrost plays an important role regarding natural and built infrastructure. For example, it provides stability of large acreages of wetlands and lakes across the tundra. Permafrost thaw threatens to undermine roads and structural foundations."[210] An August 2020 press report identifies Eielson Air Force Base southeast of Fairbanks, Fort Wainwright in Fairbanks, and Clear Space Force Station south of Anderson (previously known as Clear Air Force Base) as locations where facilities have been impacted by thawing permafrost.[211]

Want $80 Million to Test SpaceX and OneWeb in the Arctic," *C4ISRNet*, June 10, 2021; Frank Wolfe, "10 Starlink Satellites to Enhance Arctic Communications for NORTHCOM," *Defense Daily*, April 15, 2021; Theresa Hitchens, "AFRL, NORTHCOM Eye Commercial Internet Sats For Arctic," *Breaking Defense*, March 3, 2021; Frank Wolfe, "Air Force Envisions Improved Communications and Sensor Capabilities for Arctic," *Defense Daily*, October 5, 2020; Joseph Trevithick, "The Navy Is Building A Network Of Drone Submarines And Sensor Buoys In The Arctic," *The Drive*, October 1, 2020.

[208] See, for example, Department of Defense, "Joint Statement on NORAD Modernization," news release, August 17, 2021; Nathan Strout, "US and Canada Want to Collaborate on NORAD Modernization," *C4ISRNet*, August 18, 2021; Jason Sherman, "U.S., Canada Set New Framework for NORAD Modernization, Guide for Future Investments," *Inside Defense*, August 18, 2021; Lee Berthiaume (Canadian Press), "Ukraine War Sparks Fresh Worries About North America's Own Defences," *CBC*, March 5, 2022.

[209] Department of State, "U.S.-Norway Supplementary Defense Cooperation Agreement (SDCA)," Fact Sheet, Bureau Of Political-Military Affairs, April 16 16, 2021; Government of Norway, "Norway signs Supplementary Defense Cooperation Agreement with the United States," April 16, 2021. See also Chad Garland, "US Can Build Military Facilities in Norway Under New Defense Cooperation Pact," *Stars and Stripes*, April 16, 2021; Thomas Nilsen, "U.S. Navy Will Build Airport Infrastructure in Northern Norway to Meet Upped Russian Submarine Presence," *Barents Observer*, April 16, 2021; Terje Solsvik and Nerijus Adomaitis, "Norway to Allow U.S. Military to Build on Its Soil in New Accord," *Reuters*, April 16, 2021; Paul McLeary, "Norway, US Bolster Russian Sub Watching With New Bases," *Breaking Defense*, April 19, 2021.

[210] Department of Defense, Office of the Undersecretary of Defense (Acquisition and Sustainment), *Department of Defense Draft Climate Adaptation Plan, Report Submitted to National Climate Task Force and Federal Chief Sustainability Officer*, September 1, 2021, p. 13.

[211] Sara Karlovitch, Luciana Perez-Uribe, Julia Lerner, and Lindsey Collins, "As the World Warms, Costs Rise for Alaska Military Bases," *Anchorage Daily News*, August 1, 2020. (Also published as Sara Karlovitch, Luciana Perez-Uribe, Julia Lerner, and Lindsey Collins, "Global Warming Is Having a Costly, and Dangerous, Impact on Key Military Bases in Alaska," *Seattle Times*, August 9, 2020.) See also Sharon E. Burke, "The Arctic Threat that Must Not Be Named," *War on the Rocks*, January 28, 2021; Brian W. Everstine, "Climate Change Will Guide How the Air Force

A March 2022 press report stated: "The weather along Norway's Arctic coast... is becoming increasingly hard to predict as warming trends change the terrain and storms become more frequent.... The changing conditions mean that U.S. forces will have to adapt how they operate, both for the safety of their forces and the success of any potential future combat operations in the High North.... In the air, pilots must account for more extreme rainfall and storms.... Avalanches are also a greater risk now."[212]

June 2021 DOD Creation of Ted Stevens Center for Arctic Security Studies

A June 9, 2021, DOD News article states: "The Defense Department announced today the creation of a new DOD center to focus on issues related to the Arctic. The Ted Stevens Center for Arctic Security Studies will be the sixth such regional center for the department, Pentagon Press Secretary John F. Kirby said during a briefing today at the Pentagon."[213]

Sufficiency of U.S. Arctic Military Activities

Some observers have expressed concern about whether the United States is doing enough militarily to defend its interests in the Arctic, and in some cases have offered recommendations for doing more.[214] Whether DOD and the Coast Guard are devoting sufficient resources to the Arctic and taking sufficient actions for defending U.S. interests in the region is a topic of congressional oversight. Those who argue that DOD and the Coast Guard are not devoting sufficient resources and taking sufficient actions argue, for example, that DOD and the Coast Guard should build ice-hardened surface ships other than icebreakers for deployment to the Arctic and/or establish a strategic port in Alaska's north to better support DOD and Coast Guard operations in the Arctic.[215]

Builds Arctic Infrastructure," *Air Force Magazine*, November 20, 2020; Rhemi Marlatt, "The Intersection of U.S. Military Infrastructure & Alaskan Permafrost Through the 21st Century," Arctic Institute, October 27, 2020.

[212] Phillip Walter Wellman, "As Weather Warms, Heavy Rains and Avalanches Become Part of Planning for Marines During Arctic Exercise," Stars and Stripes, March 22, 2022.

[213] Department of Defense news release, "DOD Announces Center to Collaborate on, Advance Shared Interests in Arctic Region," *DOD News*, June 9, 2021. See also Department of Defense, "The Department of Defense Announces Establishment of Arctic Regional Center," June 9, 2021.

[214] See, for example, Hilde-Gunn Bye, "Air Force General: The US Needs to do More to be Ready for Operations in the Arctic," *High North News*, March 9, 2022; Noel Williams, "Send the Marines to Alaska," *War on the Rocks,* August 17, 2021; David Auerswald, "A U.S. Security Strategy for the Arctic," *War on the Rocks,* May 27, 2021; Thomas Grove, "Russian Military Seeks to Outmuscle U.S. in Arctic," *Wall Street Journal,* May 25, 2021; Timothy Greenhaw, Daniel L. Magruder Jr., Rodrick H. McHaty, and Michael Sinclair, *US Military Options To Enhance Arctic Defense*, Brookings Institution, May 2021, 15 pp.; Mark Magnier, "A More Accessible Arctic Becomes Proving Ground for US-China Military Jockeying," South China Morning Post, May 3, 2021; C. Todd Lopez, "U.S. Must Get 'On the Field' in Arctic to Defend National Interests There," *DOD News,* April 15, 2021; Christen McCurdy, "NORTHCOM says U.S. must defend interests in the Arctic," *United Press International*, April 15, 2021; John Grady, "Panel: NATO Needs to Take Russian Offensive, Defensive Advances in Arctic Seriously," *USNI News,* July 1, 2020; Jerry Hendrix, "The United States Must Defend Open Seas in the Arctic," *National Review*, May 13, 2020; Mathieu Boulegue, "Military Assets in the Arctic: A Russia-West Correlation of Forces," *Russia Matters,* January 22, 2020.

[215] Brian W. Everstine, "DOD Leaders Want More Arctic Funding, But Not Right Now," *Air Force Magazine,* June 17, 2021; Greg Hadley, "VanHerck: Services 'Didn't Move the Ball Very Far' With Arctic Spending in 2022," *Air Force Magazine,* June 10, 2021.

Recent Legislative Activity

FY2021 National Defense Authorization Act (H.R. 6395/P.L. 116-283)

The FY2021 National Defense Authorization Act (H.R. 6395/P.L. 116-283 of January 1, 2021) includes a number of provisions relating to the Arctic, including the following:

- **Section 905**, which directs the Assistant Secretary of Defense for International Security Affairs to assign responsibility for the Arctic region to the Deputy Assistant Secretary of Defense for the Western Hemisphere or any other Deputy Assistant Secretary of Defense the Secretary of Defense considers appropriate.
- **Section 1045**, which directs the Secretary of Defense and the Chairman of the Joint Chiefs of Staff to continue assessing potential multidomain risks in the Arctic, identifying capability and capacity gaps in the current and projected force, and planning for and implementing the training, equipping, and doctrine requirements necessary to mitigate such risks and gaps, and authorizes the Secretary to conduct research and development on the current and future requirements and needs of the Armed Forces for operations in the Arctic.
- **Section 1089**, which directs the Secretary of Defense, in coordination, with the Secretary of State, to submit a plan to establish a DOD Regional Center for Security Studies for the Arctic, and authorizes the Secretary, subject to the availability of appropriations, to establish and administer such a center, to be known as the Ted Stevens Center for Arctic Security Studies.
- **Section 1208**, which directs the Secretary of Defense, in coordination with the Secretary of State, to submit, within 90 days of enactment of the FY2021 National Defense Authorization Act, a plan to establish a Department of Defense Regional Center for Security Studies for the Arctic, and authorizes the Secretary of Defense, not earlier than 30 days after the plan is submitted, and subject to the availability of appropriations, to establish and administer a Department of Defense Regional Center for Security Studies for the Arctic, to be known as the "Ted Stevens Center for Arctic Security Studies."

Division G of H.R. 6395/P.L. 116-283 is the Elijah E. Cummings Coast Guard Authorization Act of 2020, which includes the following additional provisions relating to the Arctic:

- **Section 8421**, which makes a number of findings regarding the strategic importance of the Arctic and expresses the sense of the Congress regarding the strategic importance of the Arctic and on actions the Coast Guard should take to better align its mission prioritization and development of capabilities to meet the growing array of challenges in the region.
- **Section 8422**, which directs the Coast Guard to engage directly with local coastal whaling and fishing communities in the Arctic region when conducting the Alaskan Arctic Coast Port Access Route Study.
- **Section 8424**, which directs the Coast Guard to submit a report setting forth the results of a study on the Arctic capabilities of the Armed Forces, and to enter into a contract with an appropriate federally funded research and development center for the conduct of the study.
- **Section 8425**, which directs the Coast Guard to submit a report on the Coast Guard's search and rescue capabilities in Arctic coastal communities.

FY2022 National Defense Authorization Act (S. 1605/P.L. 117-81)

In the FY2022 National Defense Authorization Act (S. 1605/P.L. 117-81), Section 1090 directs the Commander of the U.S. Northern Command, in consultation and coordination with the Commander of the U.S. Indo-Pacific Command, the Commander of the U.S. European Command, the military services, and the defense agencies, to complete an independent assessment of activities and resources required in FY2023-FY2027 to achieve certain objectives relating to the Arctic. Section 1090 also directs the Secretary of Defense to brief the congressional defense committees on a plan to carry out a program of activities to enhance security in the Arctic region, and permits the Secretary to establish a five-year program of activities for enhancing security in the Arctic, to be known as the Arctic Security Initiative.

H.R. 4135 and S. 2294 in 117th Congress

H.R. 4135 and S. 2294 in the 117th Congress, the Arctic Security Initiative Act of 2021, would "requir[e] the Department of Defense (DOD) to conduct a security assessment of the Arctic region and establish an Arctic Security Initiative (ASI) with a five-year plan to fully resource the DOD and individual service-specific strategies for the Arctic that have been released over the past several years. U.S. Northern Command (USNORTHCOM) would lead the independent assessment in coordination with U.S. Indo-Pacific Command (USINDOPACOM) and U.S. European Command USEUCOM)."[216]

Polar Icebreaking[217]

Within the U.S. government, the Coast Guard is the U.S. agency responsible for polar icebreaking. U.S. polar ice operations conducted in large part by the Coast Guard's polar icebreakers support 9 of the Coast Guard's 11 statutory missions.[218] The Coast Guard's large icebreakers are called polar icebreakers rather than Arctic icebreakers because they perform missions in both the Arctic and Antarctic. Operations to support National Science Foundation (NSF) research activities in both polar regions account for a significant portion of U.S. polar icebreaker operations.

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*. *Polar Sea*, however, suffered an engine casualty in June 2010 and has been nonoperational 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

[216] The quoted summary of what the bill would require is taken from Office of Senator Dan Sullivan, "Sullivan, King, Gallagher & Luria Launch Arctic Security Initiative Act," press release dated June 24, 2021, accessed February 24, 2022, at https://www.sullivan.senate.gov/newsroom/press-releases/sullivan-king-gallagher-and-luria-launch-arctic-security-initiative-act.

[217] This section was prepared by Ronald O'Rourke, Specialist in Naval Affairs, Foreign Affairs, Defense, and Trade Division. It adapts material from CRS Report RL34391, *Coast Guard Polar Security Cutter (Polar Icebreaker) Program: Background and Issues for Congress*.

[218] 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.)

lives. The Coast Guard has used *Polar Sea* as a source of spare parts for keeping *Polar Star* operational.[219]

Providing support for NSF's research in the Antarctic focuses on performing an annual mission, called Operation Deep Freeze (ODF), to break through Antarctic sea ice so as to reach and resupply McMurdo Station, the large U.S. Antarctic research station located on the shore of McMurdo Sound, near the Ross Ice Shelf. The Coast Guard's medium polar icebreaker, *Healy*, spends most of its operational time in the Arctic supporting NSF research activities and performing other operations.

Even with the diminishment of polar ice, there are still significant ice-covered areas in the polar regions, and diminishment of polar ice could lead in coming years to increased commercial cargo ship, cruise ship, research ship, and naval surface ship operations, as well as increased exploration for oil and other resources, in the Arctic. Such activities could require increased levels of support from polar icebreakers, particularly since waters described as "ice free" can actually still have some amount of ice. A 2007 study stated that changing ice conditions in Antarctic waters had made the McMurdo resupply mission more challenging since 2000.[220]

Some observers have identified polar icebreaking capacity as a component of U.S.-Russia (or U.S.-China) competition in the Arctic, and express concern about what they view as a U.S. "icebreaker gap" compared to the much-larger Russian polar icebreaker fleet.[221] Other observers disagree with that perspective.[222]

The Coast Guard in its FY2013 budget initiated a program, now known as the Polar Security Cutter (PSC) program, to acquire new heavy polar icebreakers. The Coast Guard envisages procuring three new PSCs (i.e., heavy polar icebreakers), followed by the procurement of up to three new Arctic Security Cutters (ASCs, i.e., medium polar icebreakers). The Coast Guard estimates the total procurement costs of the new PSCs as $1,039 million (i.e., about $1.0 billion) for the first ship, $792 million for the second ship, and $788 million for the third ship, for a combined estimated cost of $2,619 million (i.e., about $2.6 billion). The first ship will cost more than the other two because it will incorporate design costs for the class and be at the start of the production learning curve for the class.

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[219] See CRS Report RL34391, *Coast Guard Polar Security Cutter (Polar Icebreaker) Program: Background and Issues for Congress*, by Ronald O'Rourke.

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

[221] See, for example, Mike Glenn, "U.S. Icebreaker Gap with Russia a Growing Concern as Arctic 'Cold War' Heats Up," *Washington Times*, September 23, 2021; Christopher Woody, "As US Tries to Close 'Icebreaker Gap' with Russia, Its Only Working Icebreaker Is Making a Rare Trip North," *Business Insider*, November 9, 2020. For earlie examples, see Hal Brands, "America Is Losing the Battle of the Arctic," *Bloomberg*, July 30, 2019; Alan Kaplan, "Coast Guard Icebreakers Not Optional as China and Russia Surge in Arctic," *The Hill*, July 25, 2018; James Di Pane, *The Coast Guard Needs Six New Icebreakers to Protect U.S. Interests in the Arctic and Antarctic*, Heritage Foundation, April 9, 2018, 3 pp.; David Hambling, "Does the U.S. Stand a Chance Against Russia's Icebreakers?" *Popular Mechanics*, April 4, 2018; Tom Anderson, "Breaker, Breaker: Russia Has 41 Icebreakers, the US Has Two—Yes Two. Time to Catch Up," *Fox News*, June 30, 2017; Robert Farley, "How Russia Could Win a War in the Arctic," *National Interest*, June 13, 2017; Franz-Stefan Gady, "Russia and China in the Arctic: Is the US Facing an Icebreaker Gap?" *Diplomat*, September 7, 2015.

[222] See, for example, Paul C. Avey, "The Icebreaker Gap Doesn't Mean America Is Losing In The Arctic," *War on the Rocks*, November 28, 2019; Andreas Kuersten, "The Dangerous Myth of an 'Icebreaker Gap,'" *Defense One*, September 6, 2016; Andrew C. Revkin, "The U.S. Icebreaker Gap is About Arctic Needs, Not About Chasing Russia," *New York Times (Dot Earth Blog)*, September 1, 2015.

The PSC program has received a total of $1,754.6 million (i.e., about $1.8 billion) in procurement funding through FY2021. With the funding the program has received through FY2021, the first two PSCs are fully funded.

Search and Rescue (SAR)[223]

Increasing sea and air traffic through Arctic waters has increased concerns regarding Arctic-area search and rescue (SAR) capabilities.[224] 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 in distress or a downed aircraft in Arctic waters. The Coast Guard states that "the closest Coast Guard Air Station to the Arctic is located in Kodiak, AK, approximately 820 nautical miles south of Utqiagvik, AK, which is nearly the same distance as from Boston, MA, to Miami, FL."[225] In addition to such long distances, the harsh climate complicates SAR operations in the region.

Particular concern has been expressed about cruise ships carrying large numbers of civilian passengers that may experience problems and need assistance.[226] There have been incidents of this kind with cruise ships in waters off Antarctica, and a Russian-flagged passenger ship with 162 people on board ran aground on Canada's Northwest Passage on August 24, 2018.[227]

The Coast Guard is participating in exercises focused on improving Arctic SAR capabilities.[228] Further increasing U.S. Coast Guard SAR 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.[229] It

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

[224] See, for example, Romain Chuffart, "French and Danish Navies Hold Joint SAR Exercises in Greenland's Waters," *High North News*, September 6, 2019; "Arctic Search and Rescue May Face Challenges," *Cruise Industry News*, June 27, 2019; Robbie Gramer, "Stretched Thin on Thin Ice; With the Arctic Melting and Norther Coast Guards Struggling to Keep Up, the Next Disaster Is a Matter of When, Not If," *Foreign Policy*, September 12, 2018; Edward Struzik, "As Ice Recedes, the Arctic Isn't Prepared for More Shipping Traffic," phys.org, September 5, 2018; Derek Minemyer, "Arctic Council Members Say Alaska Needs Search and Rescue in the Arctic, Now," *KTUU*, August 16, 2018; Timothy William James Smith, *Search and Rescue in the Arctic: Is the U.S. Prepared?* RAND Corporation, 2017, 148 pp. (Dissertation report RGSD-382.)

[225] Coast Guard, *Arctic Strategic Outlook*, April 2019, p. 11.

[226] See, for example, Ken Potter, "Passenger Vessels and the Canadian Arctic: A Risky Combination?" *Maritime Executive*, June 9, 2021; Jane George, "Exercise Held to Prepare for Arctic Cruise Ship Mishap," *Nunatsiaq News*, April 15, 2019; Brian Castner, "How to Rescue a Cruise Ship in the Northwest Passage," *Motherboard (Vice)*, October 24, 2017; Henry Fountain, "With More Ships in the Arctic, Fears of Disaster Rise," *New York Times*, July 23, 2017; Gwladys Fouche, "Uncharted Waters: Mega-Cruise Ships Sail the Arctic," *Reuters*, October 10, 2016; Abbie Tingstad and Timothy Smith, "Being Safer in the Arctic," *National Interest*, October 3, 2016.

[227] Malte Humpert, "A Cruise Ship Runs Aground in Canada's Arctic Waters; The Akademik Ioffe's Sister Ship Was Nearby, and Together with Canadian Coast guard Ships, Was Able to Rescue All Passengers," *ArcticToday*, August 28, 2018.

[228] See, for example, Melody Schreiber, "US, Canada Conduct a Joint Arctic Search-and-Rescue Exercise in Nunavut," *ArcticToday*, September 9, 2021; Jane George, "Arctic Reps Practise Response to Maritime Emergency," *Nunatsiaq News*, April 17, 2021; Eilís Quinn, "Arctic Guardian Exercise 2021 Underway to Test Joint Emergency Marine Response," *Barents Observer*, April 13, 2021; Melody Schreiber, "Arctic Disaster Responders Train Together in a First-of-Its-Kind Joint Exercise," *ArcticToday*, April 15, 2021. See also "Results from Virtual Joint Arctic Search and Rescue Exercise Published," *Cruise Industry News*, August 13, 2021.

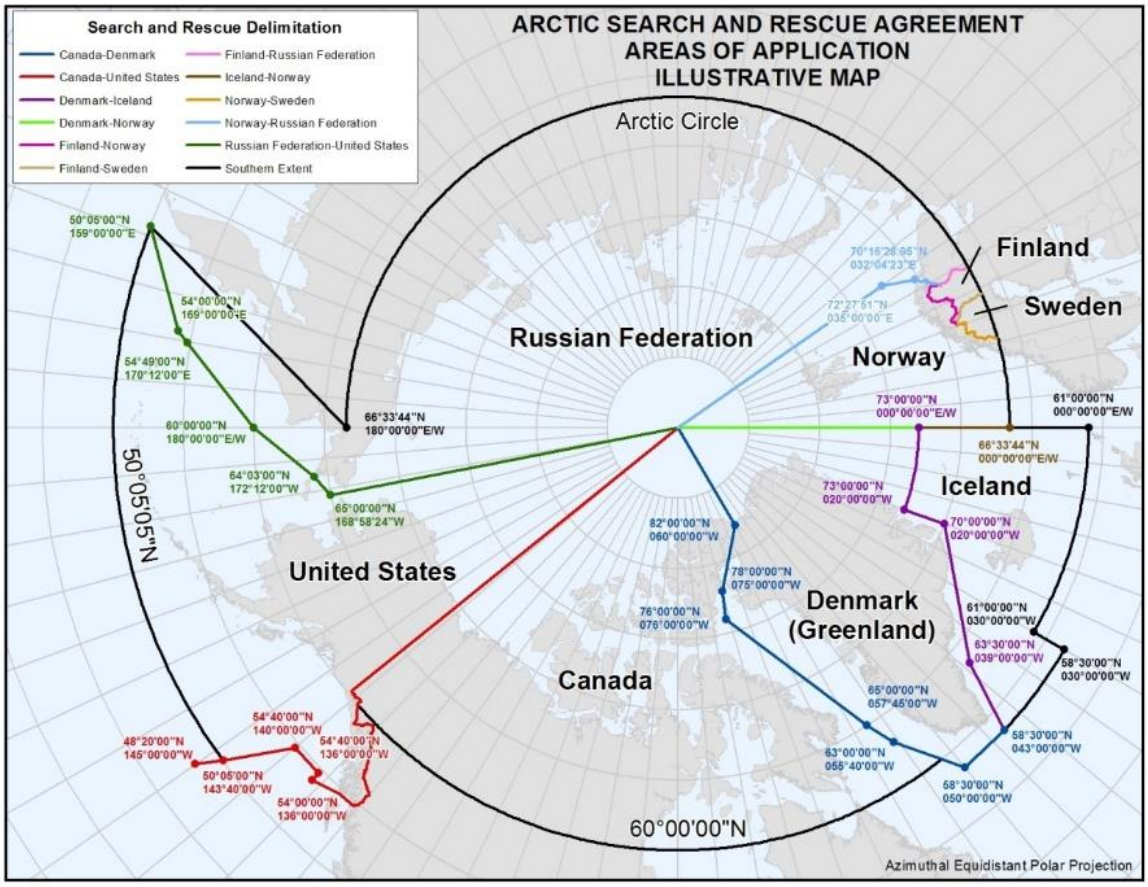
[229] For a report assessing certain emergency scenarios in the Arctic, including search and rescue scenarios, see *Opening the Arctic Seas, Envisioning Disasters and Framing Solutions*, Coastal Response and Research Center, University of

may also entail enhanced forms of cooperation with navies and coast guards of other Arctic countries.

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 SAR in the Arctic.[230] The agreement divides the Arctic into SAR areas within which each party has primary responsibility for conducting SAR operations. **Figure 5** shows a map of the national areas of SAR responsibility based on the geographic coordinates listed in the Annex to the agreement.

Figure 5. Arctic SAR Areas in Arctic SAR Agreement

(Based on geographic coordinates listed in the agreement)



Source: Map posted at "Arctic Region," U.S. Department of State, accessed February 24, 2022, at https://www.state.gov/key-topics-office-of-ocean-and-polar-affairs/arctic/.

New Hampshire, report of January 2009, based on conference held March 18-20, 2008, at Durham, NH.

[230] 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 February 24, 2022, at https://2009-2017.state.gov/r/pa/prs/ps/2011/05/163285.htm.

Commercial Sea Transportation[231]

Background

The search for a shorter route from the Atlantic to Asia has been the quest of maritime powers since the Middle Ages. The diminishment of Arctic ice raises the possibility of saving several thousands of miles and several days of sailing between major trading blocs.[232] 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.[233] Melting ice could potentially open up two trans-Arctic routes:[234]

- **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. Most transits through the NSR are associated with the carriage of LNG from Russia's Yamal Peninsula, and Russia is actively promoting the use of this route. The NSR accounts for the vast majority of large cargo ship transits in the Arctic.[235]
- **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.[236] The NWP is potentially applicable for trade between northeast Asia (north of Shanghai) and the northeast of North America, but it is less commercially viable than the NSR.[237] Cargo ship transits have been extremely rare but cruise vessel excursions and research vessels are more common.

[231] This section was prepared by John Frittelli, Specialist in Transportation Policy, Resources, Science, and Industry Division.

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

[233] Presentation by Stephen Carmel, Senior Vice President, Maersk Line Ltd., Halifax International Security Forum, *Arctic Security: The New Great Game?* November 21, 2009.

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

[235] Traffic statistics available at https://arctic-lio.com/.

[236] 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.

[237] 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.

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.

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 and 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 forecast.[238] 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 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. Several container shipping lines and shippers have pledged not to ship through the Arctic.[239] 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.[240] 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

[238] 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.

[239] Ocean Conservancy, https://oceanconservancy.org/protecting-the-arctic/take-the-pledge/.

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

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.[241]

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 or not sufficiently accurate.[242] To remedy this problem, aviation reconnaissance of ice conditions and satellite images would need to become readily available for ship operators.[243] 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.

The U.S. Army Corps of Engineers, along with the state of Alaska, has studied the feasibility of a "deep-draft" port in the Arctic (accommodating ships with a draft of about 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. 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.[244] However, at a July 2016 hearing, the Coast Guard indicated its preferred strategy was to rely on mobile assets (vessels and aircraft) and seasonal bases of operation rather than pursue a permanent port in the Arctic.[245] Congress has provided funds for engineering and design of the Nome project.

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[241] 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.

[242] 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 https://web.archive.org/web/20180605213143/http://www.noaanews.noaa.gov/stories2010/20100720_fairweather.html.

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

[244] *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.

[245] Oral testimony of Admiral Charles D. Michel, Coast Guard Vice Commandant, House Committee on Transportation and Infrastructure, Subcommittee on Coast Guard and Maritime Transportation, *Coast Guard Arctic Implementation Capabilities*, July 12, 2016.

The U.S. Committee on the Marine Transportation System, a Cabinet-level committee of federal agencies with responsibilities for marine transportation, identified a list of infrastructure improvements for Arctic navigation in a 2013 report.[246] The report 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.[247]

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 and 2010. 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 major economies, 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 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 Polar Code

While SOLAS and other IMO conventions include provisions regarding the operation of ships in ice-infested waters, they were not specific to the polar regions. To supplement these requirements, a new IMO polar code went into effect on January 1, 2017.[248] The code applies to passenger and cargo ships of 500 gross tons or more engaged in international voyages. It does not apply to fishing vessels, military vessels, pleasure yachts, or smaller cargo ships. The polar requirements 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

[246] U.S. Committee on the Marine Transportation System, *U.S. Arctic Marine Transportation System: Overview and Priorities for Action*, 2013.

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

[248] https://www.imo.org/en/MediaCentre/HotTopics/Pages/Polar-default.aspx.

code requires ships to carry fully or partially enclosed lifeboats. The code requires that the crew have training in ice navigation. 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.[249] Canada and Russia have additional pollution regulations for Arctic waters exceeding MARPOL. The U.S. Coast Guard has studied and has recommended a specific vessel traffic separation scheme for the Bering Strait between Alaska and Russia, which experiences over 400 transits per year, and which the IMO has approved.[250]

Oil, Gas, and Mineral Exploration[251]

Decreases in summer polar ice may alter options for oil, gas, and mineral exploration in Arctic offshore and onshore areas. Offshore of Alaska, the U.S. outer continental shelf (OCS) covers more than 1 billion acres,[252] including some areas with high oil and gas potential. Even with warmer 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, gas, and minerals from newly discovered deposits. Severe weather poses challenges to several ongoing offshore operations as well as to new exploration.

Offshore oil and gas exploration is affected by efforts to map the margins of the U.S. OCS. Shrinking sea ice cover in the Arctic has intensified interest in surveying and mapping the continental margins of multiple 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 consideration of development on substantial amounts of submerged lands. 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, including for areas that may contain large amounts of oil, natural gas, methane hydrates, or minerals.

With respect to onshore energy and mineral development, warming temperatures result in thawing permafrost and can result in higher transportation and infrastructure costs. Warming temperatures could potentially reduce sea ice to a level that allows sea access to remote development sites.

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[253] can explore regions of the Arctic

[249] For example, see Alaska State Legislature, HJR 19, Arctic Marine Safety Agreements; http://www.akleg.gov/basis/Bill/Detail/30?Root=HJR%2019.

[250] 82 *Federal Register* 11935, February 27, 2017.

[251] This section was prepared by Laura Comay, Specialist in Natural Resources Policy, Resources, Science, and Industry Division; Caitlin Keating-Bitonti, Analyst in Natural Resources Policy, Resources, Science, and Industry Division; and Brandon Tracy, Analyst in Energy Policy, Resources, Science, and Industry Division.

[252] This region includes some areas within the Arctic boundary as defined by the ARPA (15 U.S.C. 4111; see **Figure 1**), such as the Beaufort and Chukchi Seas, and some areas outside that boundary, such as Cook Inlet.

[253] 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

Ocean, Chukchi Sea, Beaufort Sea, and other offshore regions for longer periods of time with less 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 Arctic drilling 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.[254] The USGS stated that the "extensive Arctic continental shelves may constitute the geographically largest unexplored prospective area for petroleum remaining on Earth."[255] 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).[256] This would constitute approximately 13% of the world's undiscovered conventional oil resources and 30% of natural gas, according the U.S. Energy Information Administration.[257] In terms of U.S. resources specifically, DOI's Bureau of Ocean Energy Management (BOEM) estimated in 2021 that the Alaska portions of the U.S. OCS contain undiscovered, technically recoverable resources of approximately 25 billion barrels of oil and 124 trillion cubic feet of natural gas (although not all of these resources may be economically viable to recover).[258]

Despite the warming trend in the Arctic, severe weather and sea ice continue to pose challenges to exploration. In addition, any discovery of new oil and gas deposits far from existing storage, pipelines, and shipping facilities could not be developed until infrastructure is built to extract and transport the petroleum.

Some have expressed interest in expanding America's ocean energy portfolio in the region. Currently, among 15 federal planning areas in the region, the Beaufort Sea and Cook Inlet are the only two areas with active federal leases,[259] and only the Beaufort Sea has any producing wells in federal waters (from a joint federal-state unit).[260] The Trump Administration had stated its interest in promoting offshore development in the region, and had issued a draft five-year offshore oil and

seismic signals are processed and interpreted to give a cross-section or three-dimensional image of the subsurface.

[254] See 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."

[255] USGS 2008 Fact Sheet.

[256] USGS 2008 Fact Sheet, p. 1.

[257] U.S. 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.

[258] Bureau of Ocean Energy Management, "Assessment of Undiscovered Technically Recoverable Oil and Gas Resources of the Nation's Outer Continental Shelf, 2021," at https://www.boem.gov/sites/default/files/documents/oil-gas-energy/resource-evaluation/2021_National_Assessment_Map_BTU.pdf. BOEM defines *technically recoverable resources* as "oil and gas that could be produced as a consequence of natural pressure, artificial lift, pressure maintenance, or other secondary recovery methods, but without any consideration of economic viability" (BOEM, "Assessment of Undiscovered Oil and Gas Resources of the Nation's Outer Continental Shelf, 2021," at https://www.boem.gov/sites/default/files/documents/oil-gas-energy/resource-evaluation/2021%20Fact%20Sheet.pdf). BOEM's *2019-2024 Outer Continental Shelf Oil and Gas Leasing Draft Proposed Program* (January 2015, chapter 5, at https://www.boem.gov/NP-Draft-Proposed-Program-2019-2024/, hereinafter cited as "BOEM 2019-2024 Draft Proposed Program") estimates a range of resources that would be economically recoverable under various oil and gas price points and cost conditions.

[259] Although part of BOEM's Alaska region, Cook Inlet lies outside the Arctic boundary as defined by the ARPA (15 U.S.C. 4111; see **Figure 1**).

[260] 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.

gas leasing program for 2019-2024 that would have scheduled lease sales in all 15 Alaska planning areas, including three sales in the Beaufort Sea and three in the Chukchi Sea.[261] The draft program did not advance further in the Trump Administration, and the Biden Administration has not released a five-year offshore program proposal. Current lease sales on the Alaska OCS are governed by the Obama Administration's leasing program for 2017-2022, which included one lease sale in the Cook Inlet (scheduled for 2021) and none in other Alaska planning areas.[262] In August 2021, the Department of the Interior announced that it would proceed with environmental review of the scheduled Cook Inlet lease sale, after work on this sale had been halted in response to President Biden's Executive Order 14008, which directed a pause and review of the federal oil and gas leasing program broadly.[263]

Offshore oil and gas activities in the region have fluctuated as industry weighs changing oil prices, development costs, and regulations. For example, in 2015, Shell Oil Company announced its decision to cease exploration in offshore Alaska for the foreseeable future. Shell cited several reasons for the decision, including insufficient indications of oil and gas at its Burger J well in the Chukchi Sea, the high costs associated with Arctic exploration, and the "challenging and unpredictable" federal regulatory environment.[264] BOEM also reported that, between February and November 2016, companies relinquished more than 90% of leases they had held in the Beaufort and Chukchi Sea planning areas, in the midst of a slump in oil prices.[265] While there were 450 active leases in the Chukchi Sea planning area at the end of 2015, as of August 2021 there were none.[266] In the Beaufort Sea, active leases dropped from 77 at the end of 2015 to 19 in August 2021.[267]

Despite these changes, some activities have indicated ongoing industry interest in the region. For example, in November 2017, the Trump Administration approved an application for permit to drill (APD) on a lease in the Beaufort Sea held by the Eni U.S. Operating Company.[268] In October

[261] BOEM 2019-2024 Draft Proposed Program, p. 8.

[262] Bureau of Ocean Energy Management, *2017-2022 Outer Continental Shelf Oil and Gas Leasing Proposed Final Program,* November 2016, at https://www.boem.gov/2017-2022-OCS-Oil-and-Gas-Leasing-PFP/, hereinafter cited as "BOEM 2017-2022 Proposed Final Program."

[263] President Joseph Biden, Executive Order 14008, "Tackling the Climate Crisis at Home and Abroad," January 27, 2021, 86 *Federal Register* 7619, at https://www.federalregister.gov/documents/2021/02/01/2021-02177/tackling-the-climate-crisis-at-home-and-abroad. On February 4, 2021, BOEM had canceled public meetings and a public comment period related to the Cook Inlet sale as a result of the executive order (BOEM, "BOEM Cancels Comment Period, Virtual Meetings for Proposed Lease Sale Offshore Alaska," press release, February 4, 2021, at https://www.boem.gov/boem-cancels-comment-period-virtual-meetings-proposed-lease-sale-offshore). On August 16, 2021, DOI announced that BOEM would now issue and take comments on a draft environmental impact statement analyzing the Cook Inlet sale (DOI, "Interior Department Files Court Brief Outlining Next Steps in Leasing Program," August 24, 2021, at https://www.doi.gov/pressreleases/interior-department-files-court-brief-outlining-next-steps-leasing-program).

[264] 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.

[265] BOEM 2017-2022 Proposed Final Program, p. S-3.

[266] For 2015 data, see BOEM, "Combined Leasing Report, as of January 1, 2016," at https://www.boem.gov/Combined-Leasing-Reports-2016/. For August 2021 data, see BOEM, "Combined Leasing Report, as of August 1, 2021," at https://www.boem.gov/sites/default/files/documents/regions/pacific-ocs-region/Lease%20stats%208-1-21.pdf.

[267] Ibid.

[268] Bureau of Safety and Environmental Enforcement (BSEE), "BSEE Approves New Drilling Operations in Arctic," press release, November 28, 2017, at https://www.bsee.gov/newsroom/latest-news/statements-and-releases/press-releases/bsee-approves-new-drilling-operations-in. The BSEE Director stated in the press release that "responsible resource development in the Arctic is a critical component to achieving American energy dominance."

2018, BOEM issued conditional approval to Hilcorp Alaska LLC for an oil and gas development and production plan in the Beaufort Sea, which would be the region's first production facility entirely in federal waters; however, the approval was vacated in December 2020 by the U.S. Court of Appeals for the Ninth Circuit.[269] Recent discoveries onshore and in state waters on Alaska's North Slope also have contributed to ongoing interest in the region.

The evolving federal regulatory environment for Arctic offshore activities has been 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 July 2016, BOEM and the Bureau of Safety and Environmental Enforcement (BSEE) released final 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.[270] Some Members of Congress and industry stakeholders opposed the regulations as overly prescriptive and unnecessarily burdensome, while other Members and environmental organizations asserted that the rules did 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.[271] Legislation was introduced in the 115th Congress both to repeal the Arctic rule and, conversely, to codify it in law.[272] In December 2020, the Trump Administration published a proposed revision to the rule,[273] but in June 2021 the Biden Administration withdrew the proposed revision.[274]

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.[275] For example, congressional and presidential moratoria 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.[276] President Obama reinstated the

[269] Concerning the approval, see Department of the Interior press release, "Interior Approves Long-Awaited First Oil Production Facility in Federal Waters Offshore Alaska," October 24, 2018, at https://www.doi.gov/pressreleases/interior-approves-long-awaited-first-oil-production-facility-federal-waters-offshore. On May 29, 2019, NOAA's National Marine Fisheries Service issued a proposed rule to govern the taking of marine mammals incidental to the construction and operation of the project's drilling and production island (84 Federal Register 24926). Public comments were accepted through July 31, 2019 (84 Federal Register 32697). For the December 2020 decision of the Ninth Circuit Court of Appeals vacating the approval, see https://legacy-assets.eenews.net/open_files/assets/2020/12/08/document_ew_02.pdf.

[270] Department of the Interior, "Requirements for Exploratory Drilling on the Arctic Outer Continental Shelf," 81 *Federal Register* 46477, July 15, 2016.

[271] For differing congressional viewpoints, see, e.g., 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 https://republicans-naturalresources.house.gov/calendar/eventsingle.aspx?EventID=398713.

[272] For example, in the 115th Congress, H.R. 4239, the SECURE American Energy Act, would have provided that the Arctic rule would have no force or effect. Conversely, S. 2720, the Clean Coasts Act, would have enacted the regulation into law. These measures were not enacted, and no similar legislation was introduced in the 116th Congress or to date in the 117th Congress.

[273] BSEE, "Oil and Gas and Sulfur Operations on the Outer Continental Shelf—Revisions to the Requirements for Exploratory Drilling on the Arctic Outer Continental Shelf," 85 *Federal Register* 79266, December 9, 2020.

[274] BSEE, "Oil and Gas and Sulfur Operations on the Outer Continental Shelf—Revisions to the Requirements for Exploratory Drilling on the Arctic Outer Continental Shelf," 86 Federal Register 34172, June 29, 2021.

[275] 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."

[276] FY2004 DOI Appropriations (P.L. 108-108). Furthermore, the Continuing Appropriations Resolution 2009 (P.L.

moratorium in the North Aleutian Basin, indefinitely withdrawing acreage located in Bristol Bay from eligibility for oil and gas leasing.[277] Also, in December 2016, President Obama indefinitely withdrew from leasing disposition other large portions of the U.S. Arctic, including the entire Chukchi Sea planning area and almost all of the Beaufort Sea planning area.[278] President Obama separately withdrew from leasing consideration planning areas in the North Bering Sea.[279] In April 2017, President Trump issued Executive Order 13795, which modified President Obama's withdrawals so as to open all of these areas for leasing consideration except for the North Aleutian Basin.[280] However, in a March 2019 court decision, the U.S. District Court for the District of Alaska vacated this provision in President Trump's executive order, ruling that the Outer Continental Shelf Lands Act gives the President the authority to make withdrawals, but not to revoke prior presidential withdrawals.[281] Additionally, in January 2021, President Biden issued Executive Order 13990, reinstating President Obama's Arctic withdrawals in their original form.[282]

Extent of the Continental Margin

Increased interest in developing offshore resources in the Arctic has sparked efforts by Arctic coastal states to map the extent of their continental margins beyond the 200-mile EEZ limit. As discussed earlier, under Article 76 of UNCLOS, nations can make a submission to the Commission on the Limits of the Continental Shelf (hereinafter referred to as the Commission) 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

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.

[277] Presidential Memorandum, "Withdrawal of Certain Areas of the United States Outer Continental Shelf from Leasing Disposition," December 16, 2014, at https://obamawhitehouse.archives.gov/the-press-office/2014/12/16/presidential-memorandum-withdrawal-certain-areas-united-states-outer-con. Earlier, President Obama had withdrawn the area from leasing for a time-limited period. Presidential Memorandum, "Withdrawal of Certain Areas of the United States Outer Continental Shelf from Leasing Disposition," March 31, 2010, at https://www.govinfo.gov/content/pkg/DCPD-201000214/pdf/DCPD-201000214.pdf.

[278] Presidential Memorandum, "Withdrawal of Certain Portions of the United States Arctic Outer Continental Shelf from Mineral Leasing," December 20, 2016, at https://www.whitehouse.gov/the-press-office/2016/12/20/presidential-memorandum-withdrawal-certain-portions-united-states-arctic. Earlier, President Obama had indefinitely withdrawn from leasing disposition certain smaller areas in the Beaufort and Chukchi Seas, including the Hanna Shoal region of the Chukchi Sea and other areas. 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.

[279] Executive Order 13754, "North Bering Sea Climate Resilience," December 9, 2016, at https://www.gpo.gov/fdsys/pkg/FR-2016-12-14/pdf/2016-30277.pdf.

[280] Executive Order 13795, "Implementing an America-First Offshore Energy Strategy," April 28, 2017, at https://www.gpo.gov/fdsys/pkg/FR-2017-05-03/pdf/2017-09087.pdf. For additional discussion, see CRS Legal Sidebar WSLG1799, *Trump's Executive Order on Offshore Energy: Can a Withdrawal be Withdrawn?*

[281] League of Conservation Voters v. Trump, 363 F.Supp.3d 1013 (D.Alaska 2019). The President's withdrawal authority is contained in Section 12(a) of the Outer Continental Shelf Lands Act (43 U.S.C. Section 1341(a)).

[282] Executive Order 13990, "Protecting Public Health and the Environment and Restoring Science To Tackle the Climate Crisis," January 20, 2021, at https://www.govinfo.gov/content/pkg/FR-2021-01-25/pdf/2021-01765.pdf.

continuing for hundreds of miles offshore. The three major Arctic Ocean ridge systems are the Alpha-Mendeleev Ridge, the Lomonosov Ridge, and the Gakkel Ridge. Disputes over maritime boundaries involving these ridge systems or other regions of the Arctic seafloor (e.g., extended continental shelf submissions) must be resolved between the nations involved in the disagreement because the Commission has no mandate to establish boundaries or resolve disputes and cannot prejudice the resolution of boundary disputes.

Arctic coastal states have conducted complex investigations needed to support submissions to the Commission for an extended continental shelf (ECS) in the Arctic. All Arctic coastal states except for the United States, which is a non-party to the UNCLOS, have made submissions to the Commission. Arctic coastal states with submissions yet to receive an action from the Commission include Canada, the Kingdom of Denmark (Greenland), and the Russian Federation.[283]

Russia's initial 2001 UNCLOS 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 political activities and potentially establish security infrastructure in Arctic regions. The Commission found the Russian Federation's 2001 submission to have insufficient scientific evidence. The Russian Federation presented a revised submission in 2015 to the Commission that included not only the Lomonosov Ridge but also the Mendeleev Rise and Chukchi Plateau—additional subsea features claimed by Russia to be natural parts of its continental margin.[284] The United States communicated no objections to the Division of Ocean Affairs and the Law of the Sea regarding Russia's 2015 revised submission.[285] In late March 2021, the Russian Federation submitted two addenda to its 2015 revised submission, presenting evidence for the Gakkel Ridge and the Nansen and Amundsen Basins to be components of the extended Russian continental shelf.[286] In total, Russia's ECS submission would capture approximately 70% of the Arctic Ocean beyond its EEZ, extending into both Canada's and Greenland's EEZs.[287] Thus far, no country has submitted a formal response to the Commission regarding Russia's 2021 addenda. The Commission has not rendered a decision on the Russian Federation submission as of August 2021.

In December 2014, the Kingdom of Denmark with the Government of Greenland submitted a recommendation on the Northern Continental Shelf of Greenland to the Commission.[288] Their

[283] Iceland, though not an Arctic coastal state, has filed a submission regarding waters in the vicinity of the Arctic Circle. Source: United Nations, Division for Ocean Affairs and the Law of the Sea, "Submissions, through the Secretary-General of the United Nations, to the Commission on the Limits of the Continental Shelf, pursuant to article 76, paragraph 8, of the United Nations Convention on the Law of the Sea of 10 December 1982," updated April 1, 2021, at https://www.un.org/Depts/los/clcs_new/commission_submissions.htm. See also Department of State, "Frequently Asked Questions—U.S. Extended Continental Shelf Project," at https://www.state.gov/frequently-asked-questions-u-s-extended-continental-shelf-project/.

[284] United Nations, "Partial Revised Submission of the Russian Federation to the Commission on the Limits of the Continental Shelf in Respect of the Continental Shelf of the Russian Federation in the Arctic Ocean," 2015, at http://www.un.org/Depts/los/clcs_new/submissions_files/rus01_rev15/2015_08_03_Exec_Summary_English.pdf.

[285] Department of State, "Receipt of the Partial Revised Submission made by the Russian Federation to the Commission on the Limits of the Continental Shelf," at https://www.un.org/depts/los/clcs_new/submissions_files/rus01_rev15/2015_11_02_US_NV_RUS_001_en.pdf.

[286] UN, "Addendum to the Partial Revised Submission of the Russian Federation to the Commission on the Limits of the Continental Shelf in the Area of the Gakkel Ridge, Nansen and Amundsen Basins," 2021, at https://www.un.org/depts/los/clcs_new/submissions_files/rus01_rev15/Addendum_1_2021_Executive_Summary_Gakkel_Ridge_English.pdf.

[287] *ArcticToday*, "Russia Extends Its Claim to the Arctic Ocean Seabed" April 4, 2021, at https://www.arctictoday.com/russia-extends-its-claim-to-the-arctic-ocean-seabed/?wallit_nosession=1.

[288] UN, "Partial Submission of the Government of the Kingdom of Denmark together with the Government of

submission presented data suggesting that the Lomonosov Ridge, the Gakkel Ridge, the Alpha-Mendeleev ridge complex, and the Chukchi Borderland are morphologically continuous with the land mass of Greenland. As of August 2021, the Commission has not rendered a decision for this submission.

In 2019, Canada made a partial submission to the Commission for the consideration of areas of the Central Arctic Plateau, which included the Lomonosov Ridge, Alpha Ridge, and Mendeleev Rise, providing evidence that these areas are natural components of its continental margin.[289] Canada's submission includes potentially overlapping areas with the United States' continental shelf in the Arctic Ocean. Through regular consultations, the United States does not object to the consideration of Canada's submission on the Arctic Ocean and communicated such to the Division of Ocean Affairs and the Law of the Sea on August 28, 2019.[290] The Commission has not rendered a decision on the partial submission of Canada as of August 2021.

The United States has started to gather and analyze data to determine the extent of its continental shelf through a U.S. federal initiative called the U.S. Extended Continental Shelf Project that is consistent with international law.[291] The U.S. ECS Project has also assisted more than 30 countries with their efforts to delineate their extended continental shelves worldwide.[292] Canada and the United States share overlapping regions of the seabed as part of the extended continental margin of both nations. Much of the data to delineate the ECS for both countries was collected in a two-ship operation involving the U.S. Coast Guard Cutter *Healy* and the Canadian Coast Guard ship *Louis S. Saint Laurent*.[293] The two-ship operation collected more than 13,000 linear kilometers (about 8,078 miles) of seismic data over four field seasons in the Arctic beginning in 2007. The data collected will help each country delineate the extent of its own ECS, which should then enable the countries to determine the amount of overlap in the seabed and ultimately establish a maritime boundary in the Arctic.[294]

The United States also has potentially overlapping ECS areas with Russia. Russia (then the Soviet Union) and the United States agreed to a maritime boundary in 1990, and so far Russia has not asserted its ECS in any areas that might be considered part of the U.S. ECS.[295]

Greenland to the Commission on the Limits of the Continental Shelf The Northern Continental Shelf of Greenland," 2014, at https://www.un.org/depts/los/clcs_new/submissions_files/dnk76_14/dnk2014_es.pdf.

[289] UN, "Partial Submission of Canada to the Commission on the Limits of the Continental Shelf regarding its Continental Shelf in the Arctic Ocean," 2019, at https://www.un.org/depts/los/clcs_new/submissions_files/can1_84_2019/CDA_ARC_ES_EN_secured.pdf.

[290] Department of State, "Receipt of the Partial Submission Made by Canada to the Commission on the Limits of the Continental Shelf," at https://www.un.org/depts/los/clcs_new/submissions_files/can1_84_2019/2019_08_28_USA_NV_UN_001.pdf.

[291] The purpose of the U.S. Extended Continental Shelf (ECS) Project is to establish the full extent of the continental shelf of the United States, consistent with international law. The work to delineate the ECS is coordinated by the ECS Task Force, located at the National Oceanic and Atmospheric Administration's (NOAA's) National Centers for Environmental Information in Boulder, CO. The Department of State, U.S. Geological Survey (USGS), and NOAA conduct the majority of work on the project. NOAA has the lead in collecting bathymetric data. USGS has the lead in collecting seismic data. For more information, see the project's website at https://www.state.gov/u-s-extended-continental-shelf-project/.

[292] U.S. ECS Project, https://www.state.gov/international-support-and-cooperation-u-s-extended-continental-shelf-project/.

[293] Ibid.

[294] Ibid.

[295] The Senate gave advice and consent to ratify the maritime boundary agreement in 1991. Although the Russian Duma has not approved the agreement, both countries continue to provisionally apply the boundary agreement. See

Onshore Energy and Mineral Development

A warming Arctic means new opportunities and challenges for energy and mineral exploration and development onshore.[296] Longer summers could extend exploration seasons for areas that are only accessible for ground surveys during the warmer months.

Many factors affect the economic viability of an onshore energy or mineral development; one key factor is transportation costs. Onshore energy and mineral developments require transportation access to deliver machinery and supplies, and to transport the product to market. Generally, onshore developments in temperate climates can be accessed by roads; the rugged terrain and harsh climate in parts of the Arctic can result in sites being inaccessible by permanent roads. Some responses to these unusual transportation challenges include the use of sea transport and seasonal roads.

In some parts of the Arctic, less sea ice could allow ships to transport heavy equipment to remote locations, and to transport ore from mines to markets. Such potential improvements in access would be limited by the onshore development's proximity to a suitable sea harbor. Current infrastructure in the Arctic that supports energy and mineral development includes the construction and use of ice roads, which are built and used when temperatures fall and remain below a threshold. As temperatures rise, the roads weaken, ultimately to a point at which they can no longer be used. Warmer Arctic temperatures are shortening the ice road transport season and creating transportation challenges, while changes in the technologies employed to build and manage ice roads are acting to extend the ice road season.[297]

Another factor that could affect onshore energy and mineral developments is the thawing of the permafrost. Permafrost, which is ground, soil, rock, or other material that remains frozen from year to year, has historically served as a solid foundation base for infrastructure, including roads. Thawing permafrost creates many challenges, as roads, buildings, and other infrastructure can become unstable and collapse. These changes can result in higher costs to onshore energy and mineral developments, potentially leading existing developments to close, or rendering new projects unfeasible to pursue.

Oil Pollution and Pollution Response[298]

Oil Pollution Implications of Arctic Change

Climate change impacts in the Arctic, particularly the decline of sea ice and retreating glaciers, has led to increased human activities in the region, some of which have the potential to create oil pollution.[299] 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, potential economic activity, such as tourism (cruise ships), oil

U.S. Extended Continental Shelf Project, https://www.state.gov/frequently-asked-questions-u-s-extended-continental-shelf-project/.

[296] For information on the oil and gas program for the Arctic National Wildlife Refuge and related issues, see CRS Report RL33872, *Arctic National Wildlife Refuge (ANWR): An Overview*.

[297] See National Oceanic and Atmospheric Administration, "Arctic Change," at https://www.pmel.noaa.gov/arctic-zone/detect/land-road.shtml.

[298] This section was prepared by Jonathan L. Ramseur, Specialist in Environmental Policy, Resources, Science, and Industry Division.

[299] For further discussion of issues relating to oil spills in general, see CRS Report RL33705, *Oil Spills: Background and Governance*.

and gas exploration, and cargo transportation, increases the risk of oil pollution (and other kinds of pollution) in the Arctic.[300] Significant spills in high northern latitudes (e.g., the 1989 *Exxon Valdez* spill on the southern coast of 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."[301]

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 conducted in the region. Although changes to the Arctic climate 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, unpredictable ice conditions may discourage trans-Arctic shipping. If trans-Arctic shipping were to occur frequently, it would likely represent a considerable portion of the overall oil pollution risk 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.[302]

Offshore oil exploration and extraction activities in the Arctic may present a risk of oil pollution. Interest in these activities in the region has fluctuated in recent years. Historically, oil well blowouts from offshore oil 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.[303] During that incident, the uncontrolled well released (over an 87-day period) approximately 200 million gallons of crude oil.[304] 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.[305]

Until the 2010 *Deepwater Horizon* incident, the spill record for offshore platforms in U.S. federal waters had shown improvement from prior years.[306] A 2003 National Research Council (NRC) study of oil and gas activities on Alaska's North Slope stated "blowouts that result in large spills are unlikely."[307] Similar conclusions were made in federal agency documents regarding deepwater drilling in the Gulf of Mexico before the 2010 *Deepwater Horizon* event.[308] Some would likely

[300] 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; see also Brian Dunn, "Report on 12th Arctic Shipping Summit, Montreal, February 21-22," *Canadian Sailings*, March 12, 2018, pp. 34-36.

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

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

[303] 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).

[304] 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*.

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

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

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

[308] See, for example, Minerals Management Service (MMS), Outer Continental Shelf Oil & Gas Leasing Program: 2007-2012, Final Environmental Impact Statement, 2007, chapter 4; MMS, Proposed Gulf of Mexico OCS Oil and Gas

contend that the underlying analyses behind these conclusions should be adjusted to account for the 2010 Gulf oil spill. However, others may argue that any 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, some have pointed out that the pressures in the Chukchi Sea would be two to three times less than they were in the well involved in the 2010 Gulf oil spill.[309] Regardless of these differences, even under the most stringent control systems, oil exploration and extraction activities would present some level of oil spill risk in the region, as some accidents are likely to occur from equipment failure or human error. In addition, as discussed below, an oil spill in the Arctic would present unique response and cleanup challenges.

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 oil spill impacts that are less understood than in the more temperate regions.[310] According to a 2016 study, "oil spill science in ice-covered waters is at an ad hoc level."[311] For example, information on the long-term effects of oil and its environmental persistence within the Arctic is limited.[312] In addition, the historical data for the region do not provide reliable baselines to assess current environmental or ecosystem states,[313] presenting challenges to those tasked with measuring impacts.

Response and Cleanup Challenges in the Arctic

Conditions in the Arctic impose unique challenges for personnel charged with (1) oil spill response, which is the process of getting people and equipment to the incident, and (2) cleanup duties, either recovering the spilled oil or mitigating the contamination so that it poses less harm to the ecosystem. These challenges may play a role in 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

Lease Sale 206, Central Planning Area, Environmental Assessment, 2007.

[309] 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," 2011).

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

[311] Mawuli Afenyo, "A State-of-the-Art Review of Fate and Transport of Oil Spills in Open and Ice-Covered Water," *Ocean Engineering*, 2016.

[312] NRC Report, 2014.

[313] Ibid.

or mix with surrounding ice.[314] 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.[315] A response gap is a period of time in which oil spill response activities would be unsafe or infeasible. A 2016 study (prepared for the Bureau of Safety and Environmental Enforcement) estimated response gaps for two locations in the U.S. Beaufort and Chukchi Seas during the summer and winter seasons, and for the year overall.[316] The study found that during the summer months (July-October), open water oil recovery would not be "favorable" approximately 33% of the time.[317] By comparison, that estimate increases to 75% and 95% for the year overall and for the winter months (November-June), respectively. The response gap for the northern Arctic latitudes is likely to be extremely high compared to other regions.[318]

In the event of an oil spill, the Coast Guard has response authority in the coastal zone.[319] A Coast Guard official would serve as the On-Scene Coordinator with the authority to perform cleanup immediately using federal resources, monitor the response efforts of the spiller, or direct the spiller's cleanup activities. 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 spill."[320] The logistics in the Arctic were described as a "tyranny of distance" by the Vice Commandant of the Coast Guard.[321]

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.[322] Although some of the communities have airstrips capable of landing cargo planes, no roads connect these Arctic communities to the main highway systems or large communities in Alaska.[323] Vessel infrastructure is also limited. The nearest major port is in the Aleutian Islands, approximately 1,300 miles from Point Barrow.

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

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

[315] 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.

[316] Nuka Research and Planning Group, *Estimating an Oil Spill Response Gap for the U.S. Arctic Ocean*, 2016; study funded by the Department of the Interior's Bureau of Safety and Environmental Enforcement.

[317] A 2017 study stated that most of the marine activities in the Arctic region occur during the summer months. See Jeremy Wilkinson, et al., "Oil Spill Response Capabilities and Technologies for Ice-Covered Arctic Marine Waters: A Review of Recent Developments and Established Practices," *Ambio*, 2017.

[318] A 2007 estimate of Prince William Sound (PWS) also 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.

[319] For more details, see CRS Report RL33705, *Oil Spills: Background and Governance*.

[320] NRC Report, 2014.

[321] Admiral Ray Charles, Vice Commandant of the Coast Guard, Testimony before the Senate Committee on Commerce, Science, and Transportation, December 12, 2019, https://www.commerce.senate.gov/2019/12/expanding-opportunities-challenges-and-threats-in-the-arctic-a-focus-on-the-u-s-coast-guard-arctic-strategic-outlook.

[322] G.M. Sulmasy and A.P. Wood, U.S. Coast Guard Academy, "U.S. Coast Guard Activity in the Arctic Region," Law of the Sea Institute, Occasional Paper #6, 2014; and U.S. Coast Guard, *Report to Congress: U.S. Coast Guard Polar Operations*, 2008.

[323] NRC Report, 2014.

information for the Arctic and technological problems with communications.[324] 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.[325] The U.S. Coast Guard includes an initiative to "strengthen marine environmental response in the Arctic" as part of its Arctic Strategy Implementation Plan.[326] A 2016 GAO Report provided an initial assessment of these efforts.[327] In 2019, the Coast Guard issued its Arctic Strategic Outlook, which stated one of its objectives was to "enhance capability to operate effectively in a dynamic Arctic."[328]

In addition, the Department of the Interior's BOEM and BSEE issued a final rule in 2016 requiring certain safety measures for drilling operations in the Arctic, but, as discussed above, the status of that rulemaking is uncertain.[329]

The costs of an oil spill response would likely be significantly higher than a similar incident in lower latitude locations of comparable remoteness. This could place a relatively larger burden on the oil spill liability and compensation framework.[330] Pursuant to the Oil Pollution Act (OPA),[331] parties responsible for an oil spill may be liable for cleanup costs, natural resource damages, and specific economic damages.[332] OPA provided both limited defenses from liability and conditional liability limits for cleanup costs and other eligible damages.[333] The Oil Spill Liability Trust Fund (OSLTF) provides an immediate source of funds for federal responses to oil spills and compensation for certain damages.[334] The OSLTF can be used if a responsible party's liability limit is reached, but the fund can only provide $1 billion per incident.[335]

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:

> 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.[336]

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[324] 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, 2010.

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

[326] U.S. Coast Guard, *Arctic Strategy Implementation Plan*, 2015, https://www.dco.uscg.mil/Portals/9/DCO%20Documents/5pw/Arctic%20Policy/CGAS%20IPlan%20Final%20Signed.pdf?ver=2017-08-25-075935-927.

[327] Government Accountability Office, *Arctic Strategy Is Underway, but Agency Could Better Assess How Its Actions Mitigate Known Arctic Capability Gaps*, GAO-16-453, 2016.

[328] U.S. Coast Guard, Arctic Strategic Outlook, 2019, https://www.uscg.mil/Portals/0/Images/arctic/Arctic_Strategic_Outlook_APR_2019.pdf.

[329] See the section above titled "Offshore Oil and Gas Exploration."

[330] For more information on this framework, see CRS Report RL33705, *Oil Spills: Background and Governance*.

[331] P.L. 101-380, primarily codified at 33 U.S.C. §2701 et seq.

[332] 33 U.S.C. §2702.

[333] 33 U.S.C. §2703 and §2704.

[334] 33 U.S.C. §2712.

[335] 26 U.S.C. §9509.

[336] 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.

The behavior of oil spills in cold and icy waters is not as well understood as oil spills in more temperate climates.[337] In addition, in the summer months, the sea ice zone is a particularly challenging environment because the concentration of ice floes within a region is continuously changing.[338] The 2014 NRC report highlights some recent advancements in understanding oil spill behavior in the Arctic climate. At the same time, the report recommends further study on a range of related issues.

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."[339] 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 to humans and other species in the ecosystem.

In addition, the 2014 report states the following:

> 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.

Oil Spill Policy–Regional Framework

The existing framework for international governance of maritime operations in the Arctic combines broader maritime agreements and agreements that focus on the geographic region. In terms of broader frameworks, the Safety of Life at Sea Convention (SOLAS) and other International Maritime Organization (IMO) conventions include provisions regarding ships in icy waters, but the provisions are not specific to the polar regions.

The IMO's International Code for Ships Operating in Polar Waters (Polar Code) entered into force in 2017 and is mandatory under SOLAS and the International Convention for the Prevention of Pollution from Ships (known as MARPOL).[340] The Polar Code addresses a range of issues, including environmental protection.

In 2013, the member states of the Arctic Council signed an Agreement on Cooperation on Marine Oil Pollution Preparedness and Response in the Arctic.[341] The agreement's objective is to "strengthen cooperation, coordination, and mutual assistance ... on oil pollution preparedness and response in the Arctic." The agreement entered force in 2016.[342] A 2018 Coast Guard document describes the agreement as "binding."[343] The agreement includes multiple requirements for the

Washington, DC.

[337] NRC Report, 2014.

[338] Jeremy Wilkinson, et al., "Oil Spill Response Capabilities and Technologies for Ice-Covered Arctic Marine Waters: A Review of Recent Developments and Established Practices," *Ambio*, 2017.

[339] NRC Report, 2014.

[340] See the above section titled "Regulation of Arctic Shipping."

[341] Available at http://www.arctic-council.org. The agreement is sometimes described as the Agreement on Cooperation on Marine Oil Spill Preparedness and Response in the Arctic (MOSPA).

[342] Arctic Council, *Status of ratification of Agreements negotiated under the auspices of the Arctic Council*, 2016.

[343] U.S. Coast Guard, Marine Environmental Response and Preparedness Manual, 2018, https://media.defense.gov/2018/Oct/01/2002046527/-1/-1/0/CIM_16000_14A.PDF.

parties, including oil spill notification, a process for requesting assistance and seeking reimbursement for costs, and joint preparation activities. Pursuant to the agreement the Arctic nations have conducted several joint training exercises.[344]

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.[345] 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 spill-related activities in Arctic waters. The 2014 NRC report asserted that the agreement has not been tested to the same extent as the U.S.-Canada agreement. In 2018, officials from both nations reportedly held a tabletop exercise for an oil spill scenario in the Bering Strait.[346]

Fisheries[347]

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. Climate change is likely to affect the ranges and productivity of living marine resources including species that support marine fisheries. In addition, ocean acidification is occurring as the increasing concentration of carbon dioxide (CO_2) in the atmosphere leads to greater absorption of CO_2 by the global ocean. The increase in CO_2 absorption changes ocean chemistry and makes ocean waters more acidic (decreases the pH). The Arctic Ocean is acidifying faster than most other regions of the global ocean and is likely to affect marine organisms (e.g., Arctic cod) and ecosystems in the Arctic region.[348]

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.[349] Unprecedented amounts of foreign fishing vessel trash washed ashore across the Bering Strait

[344] See Arctic Council, Emergency Prevention Preparedness and Response Working Group, Planning Guidance for MOSPA Exercises, 2019; see also Michael LeVine et al., "Oil Spill Response in the North American Arctic," in *Managing the Risks of Offshore Oil and Gas Accidents: The International Legal Dimension*, edited by Gunther Handl and Kristoffer Svendsen, 2019.

[345] For more information, see U.S. Department of the Interior, Bureau of Ocean Energy Management, *Oil Spill Preparedness, Prevention, and Response on the Alaska OCS*, 2019.

[346] World Wildlife Federation, "Russia and the United States Hold Joint Exercises to Respond to Oil Spills in the Bering Strait," November 2018, https://wwf.ru/en/resources/news/bioraznoobrazie/rossiya-i-ssha-proveli-sovmestnye-ucheniya-po-reagirovaniyu-na-razlivy-nefti-v-beringovom-prolive/.

[347] This section was prepared by Caitlin Keating-Bitonti, Analyst in Natural Resources Policy.

[348] Twila A. Moon et al., *Arctic Report Card 2021*, National Oceanic and Atmospheric Association, December 2021.

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

region in 2020, demonstrating increased foreign interest in exploiting Arctic marine fisheries (e.g., Pacific cod, pollock).[350]

As climate changes and ocean acidification increases, fishery 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. Currently, there is no commercial fishing in central Arctic Ocean and it is questionable whether existing fisheries resources could sustain a fishery.

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 North Pacific Fishery Management Council's (NPFMC) Fishery Management Plan for Fish Resources of the Arctic Management Area (Arctic plan).[351] The management area includes marine waters in the U.S. Exclusive Economic Zone (EEZ) of the Chukchi and Beaufort Seas.[352] The Arctic plan addresses concerns that unregulated or inadequately regulated commercial fisheries in the U.S. EEZ off Alaska could harm marine resources such as commercial fish populations, fish habitat, and other marine populations. The Arctic plan 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.[353] The plan takes a precautionary approach by requiring the consideration of research needs that may improve scientific understanding of fish stocks and environmental conditions before developing commercial fisheries in the region.[354] The NPFMC developed a discussion paper that examines exploratory fishing undertaken by regional fishery management organizations and potential application of these efforts to the Arctic Ocean.[355]

The United States also has been active in promoting international approaches to management of stocks in the Arctic Ocean. International cooperation is necessary to manage Arctic resources because fish stocks are shared to some degree among the five Arctic coastal states.[356] Further, a large portion of the central Arctic Ocean is a high seas area roughly the size of the Mediterranean Sea (2.8 million square kilometers) that lies outside the EEZs of these nations. Ideally, regional management would recognize the need to coordinate management for fish populations that move among these national jurisdictional zones and the high seas.

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

[350] Twila A. Moon et al., *Arctic Report Card 2021*, National Oceanic and Atmospheric Association, December 2021.

[351] 74 *Federal Register* 56734-56746, November 3, 2009.

[352] The state of Alaska has jurisdiction over waters from 0-3 nautical miles from the baseline. The baseline generally follows the shoreline. NOAA, "Fish Resources of the Arctic Management Plan," at https://www.fisheries.noaa.gov/management-plan/fish-resources-arctic-management-plan.

[353] NOAA, "Implementation of the Fishery Management Plan for Fish Resources of the Arctic Management Area (Arctic FMP)," at https://www.fisheries.noaa.gov/action/implementation-fishery-management-plan-fish-resources-arctic-management-area-arctic-fmp.

[354] North Pacific Fishery Management Council, "Fishery Management Plan for Fish Resources of the Arctic Management Area," August 2009, p. 41, at https://www.npfmc.org/wp-content/PDFdocuments/fmp/Arctic/ArcticFMP.pdf.

[355] Steve MacLean, *Exploratory Fishing in Global Regional Fishery Management Organizations*, North Pacific Fishery Management Council, Anchorage, AK, February 2018.

[356] As noted in the "Background" section, the five Arctic coastal states include Canada, Denmark (by virtue of Greenland), Norway, the Russian Federation, and the United States.

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." On July 16, 2015, the five Arctic coastal states signed a nonbinding declaration to prevent unregulated commercial fishing in the high seas portion of the central Arctic Ocean.[357] These five nations agreed that a precautionary approach to fishing is needed because there is limited scientific knowledge of marine resources in the central Arctic Ocean.

The declaration was followed by negotiations among officials from the five Arctic coastal states, four major fishing nations, [358] and the European Union.[359] On October 3, 2018, the parties signed a legally binding international accord to prevent unregulated high seas fisheries in the central Arctic Ocean. The objective of the accord, as stated in its preamble, is

> to prevent unregulated fishing in the high seas portion of the central Arctic Ocean through the application of precautionary conservation and management measures as part of a long-term strategy to safeguard healthy marine ecosystems and to ensure the conservation and sustainable use of fish stocks.[360]

The parties agreed that no commercial fisheries will be conducted in the Arctic high seas before an international management regime is put in place to regulate commercial fishing. The ban on unregulated commercial fishing will remain in force for 16 years and for successive 5-year increments unless any party presents a formal objection to extension of the agreement.[361] The agreement also established a joint scientific program to conduct research and monitor the region's marine ecosystem, requiring the parties to meet every two years to share relevant scientific information.[362] The agreement is seen as the first step toward establishing one or more regional fisheries management organizations for the Arctic Ocean. On June 25, 2021, the agreement entered into force with the ratification of all ten signatories.[363] However, it remains an open question whether an Arctic Ocean regional fishery management organization will be established, which countries would be included in such an arrangement, and if sustainable commercial fisheries can be developed in the central Arctic Ocean.

Protected Species[364]

There are several federal trust species in the Arctic protected by U.S. statutes such as the Endangered Species Act (ESA; 16 U.S.C. §§1531-1543), Marine Mammal Protection Act (MMPA; 16 U.S.C. §§ 1361-1407), and the Migratory Bird Treaty Act (MBTA; 16 U.S.C. §703-712).[365] Species included under these statutes are protected to varying degrees from factors that

[357] See https://www.regjeringen.no/globalassets/departementene/ud/vedlegg/folkerett/declaration-on-arctic-fisheries-16-july-2015.pdf.

[358] The four major fishing nations include Iceland, Japan, South Korea, and the People's Republic of China.

[359] The agreement includes Arctic indigenous peoples as participants in meetings and as a source of scientific information and local knowledge.

[360] Fisheries and Oceans Canada, *Agreement to Prevent Unregulated High Seas Fisheries in the Central Arctic Ocean*, October 3, 2018, https://www.dfo-mpo.gc.ca/international/agreement-accord-eng.htm.

[361] Agreement to Prevent Unregulated High Seas Fisheries in the Central Arctic Ocean, Article 13.

[362] Agreement to Prevent Unregulated High Seas Fisheries in the Central Arctic Ocean, Article 4.

[363] Department of State, "The Agreement to Prevent Unregulated High Seas Fisheries in the Central Arctic Ocean Enters into Force," press release, June 25, 2021.

[364] This section was prepared by Pervaze A. Sheikh, Specialist in Natural Resources Policy.

[365] For more information on the Endangered Species Act, see CRS Report R46677, *The Endangered Species Act:*

affect their populations. Some examples of species listed under one or more of these statutes include the polar bear (*Ursus maritimus*), the bowhead whale (*Balaena mysticetus*), and the Eskimo curlew (*Numenius borealis*).[366]

Ecological changes due to climate change and human activities could affect some protected species in the Arctic. For example, the polar bear was listed as threatened under the ESA in 2008 and is protected under MMPA due to its classification as a marine mammal.[367] Declining sea ice levels in the Arctic threaten polar bear populations. Polar bears use sea ice as a platform to hunt for seals and other prey, travel to maternal denning areas, and seek mates, among other things.[368] In contrast, changing ecological conditions in the Arctic could be helping the bowhead whale. The bowhead whale is listed under the ESA and covered by the MMPA. Bowhead whale populations declined due to hunting and commercial whaling until these activities ceased in the 1920s. According to scientists, in the past 30 years populations of bowhead whales have increased in the Pacific Arctic and East Canada/West Greenland region due to increases in ocean primary production and the availability of zooplankton, which is a food source for the species.[369]

Certain activities in the Arctic have the potential to affect, directly or indirectly, species, including federal trust species, and habitat in the areas in which they are undertaken. In turn, the laws that designate or provide the authority to list and protect federal trust species and their implementing regulations may, with certain exceptions, restrict certain activities, require action agencies to seek permits, or mandate efforts to protect such species. ESA, MMPA, and MBTA, for example, prohibit *take*, including in some cases nonlethal harassment, of covered species.[370] For example, as described in the cases below, federal agencies that authorize, fund, or carry out activities that may affect federally listed endangered or threatened species or modify critical habitat designated under the ESA may be required to consult with FWS or NMFS pursuant to Section 7 of the ESA, and individuals undertaking actions that may harm or harass marine mammals may be required to obtain an incidental take authorization from either FWS or NMFS. For marine mammals that are listed as threatened or endangered under the ESA, action agencies may be required to obtain both an incidental take authorization pursuant to the MMPA, as well as undertake consultation pursuant to the ESA.

Overview and Implementation, by Pervaze A. Sheikh, Erin H. Ward, and R. Eliot Crafton.

[366] Covered species pursuant to the ESA, MBTA, and MMPA are listed in the Code for Federal regulations at 50 C.F.R. §§17.11-17.12 (Endangered and Threatened Wildlife and Plants), 50 C.F.R. §10.13 (List of Migratory Birds), and 50 C.F.R. 18.3 and 216.3 (definitions).

[367] There are 19 populations of polar bears inhabiting the Arctic.

[368] U.S. Fish and Wildlife Service, *Polar Bears*, https://www.fws.gov/alaska/pages/marine-mammals/polar-bear.

[369] Richard L. Thoman et al., *Arctic Report Card 2020*, National Oceanic and Atmospheric Association, December 2020.

[370] *Take* is defined in statute for ESA and MMPA and defined or clarified in regulations for MMPA and MBTA. With regard to the ESA, *take* "means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct" (16 U.S.C. §1532(19)). Pursuant to MMPA, take is defined "take" means to harass, hunt, capture, or kill, or attempt to harass, hunt, capture, or kill any marine mammal" (16 U.S.C. §1362(13)) and is further clarified in regulations to include "the collection of dead animals or parts thereof; the restraint or detention of a marine mammal, no matter how temporary; tagging a marine mammal; or the negligent or intentional operation of an aircraft or vessel, or the doing of any other negligent or intentional act which results in the disturbing or molesting of a marine mammal" (50 C.F.R. §18.3). For the MBTA, *take* is not defined in statute but is defined in regulation to mean "to pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to pursue, hunt, shoot, wound, kill, trap, capture, or collect" (50 C.F.R. §10.12). Pursuant to regulations, both ESA and MMPA allow for certain subsistence use and take by Alaska Natives (50 C.F.R. parts 17 and 18).

Section 9 of the ESA identifies prohibited acts related to species listed as endangered under the act, and Section 4(d) authorizes the listing agency, either FWS or NMFS, to establish protections, including prohibiting take, for species listed as threatened through the issuance of a special rule known as a 4(d) rule.[371] Further, Section 7 of the act requires federal agencies that carry out, fund, or authorize actions that may affect listed species or designated critical habitat to consult with FWS or NMFS.[372] This consultation may result in in the issuance of a biological opinion, which provides recommendations and requirements to minimize or avoid negative impacts to listed species and critical habitat and may authorize the incidental take—take that is otherwise prohibited and incidental to but not the purpose of an otherwise lawful the action—of listed species.[373] Activities that may require Section 7 consultation could include, but are not limited to, actions related to construction, fisheries, oil and gas, research, and military. For example, the Bureau of Land Management may need to consult with FWS before authorizing oil and gas activities that may affect the polar bear (*Ursus maritimus*) or may be required to consult with FWS.[374] Similarly the Navy may need to consult with NMFS before undertaking military activity that may affect the arctic ringed seal (*Phoca hispida hispida*).[375] In addition, because each of the aforementioned activities may impact marine mammals, both would also be subject to MMPA and may require an incidental harassment authorization under such act.[376]

CRS Reports on Specific Arctic-Related Issues

CRS In Focus IF10740, *The Nordic Countries and U.S. Relations*, by Kristin Archick

CRS Insight IN11161, *Greenland, Denmark, and U.S. Relations*, by Kristin Archick

CRS Report R46761, *Russia: Foreign Policy and U.S. Relations*, by Andrew S. Bowen and Cory Welt

CRS Report RL34391, *Coast Guard Polar Security Cutter (Polar Icebreaker) Program: Background and Issues for Congress*, by Ronald O'Rourke

CRS Report RL33872, *Arctic National Wildlife Refuge (ANWR): An Overview*, by M. Lynne Corn, Michael Ratner, and Laura B. Comay

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[371] Section 9 of the ESA is at 16 U.S.C. 1538, and Section 4(d) is at 16 U.S.C. 1533(d). In the 1970s, FWS promulgated rules, collectively known as the blanket 4(d) rule that extended most of the protections afforded to endangered species to threatened species, unless they were superseded by a species-specific 4(d) rule. The blanket 4(d) rule was modified in 2019, and automatic protections were no longer provided for species listed by FWS after September 26, 2019. NMFS never implemented a similar blanket 4(d) rule, and NMFS issues 4(d) rules on a case by case basis. For more information, see CRS Report R46677, *The Endangered Species Act: Overview and Implementation*, by Pervaze A. Sheikh, Erin H. Ward, and R. Eliot Crafton.

[372] Section 7 of the ESA is at 16 U.S.C. 1536. For more information on Section 7 of the ESA, see CRS Report R46867, *Endangered Species Act (ESA) Section 7 Consultation and Infrastructure Projects*, by Erin H. Ward, R. Eliot Crafton, and Pervaze A. Sheikh.

[373] Incidental taking is defined at 50 C.F.R. 17.3 as it related to the ESA.

[374] For example, see FWS, Fairbanks Fish and Wildlife Office, Biological Opinion for Coastal Plain Oil and Gas Leasing Program Arctic National Wildlife Refuge, Consultation with the Bureau of Land Management, March 13, 2020, at https://ecos.fws.gov/tails/pub/document/16469143.

[375] For example, see NMFS, Alaska Office, Endangered Species Act (ESA) Section 7(a)(2) Biological Opinion Ice Exercise 2020 NMFS Consultation Number: AKRO-2019-02445, at https://repository.library.noaa.gov/view/noaa/24263.

[376] For example, see NMFS, Takes of Marine Mammals Incidental to Specified Activities; Taking Marine Mammals Incidental to U.S. Navy 2020 Ice Exercise Activities in the Beaufort Sea and Arctic Ocean, 85 *Federal Register* 6518, 2/05/2020.

CRS Report RL32838, *Arctic National Wildlife Refuge (ANWR): Votes and Legislative Actions, 96th-114th Congresses*, by Laura B. Comay

CRS Report R45192, *Oil and Gas Activities Within the National Wildlife Refuge System*, by R. Eliot Crafton, Laura B. Comay, and Marc Humphries

CRS Report RL33705, *Oil Spills: Background and Governance*, by Jonathan L. Ramseur

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