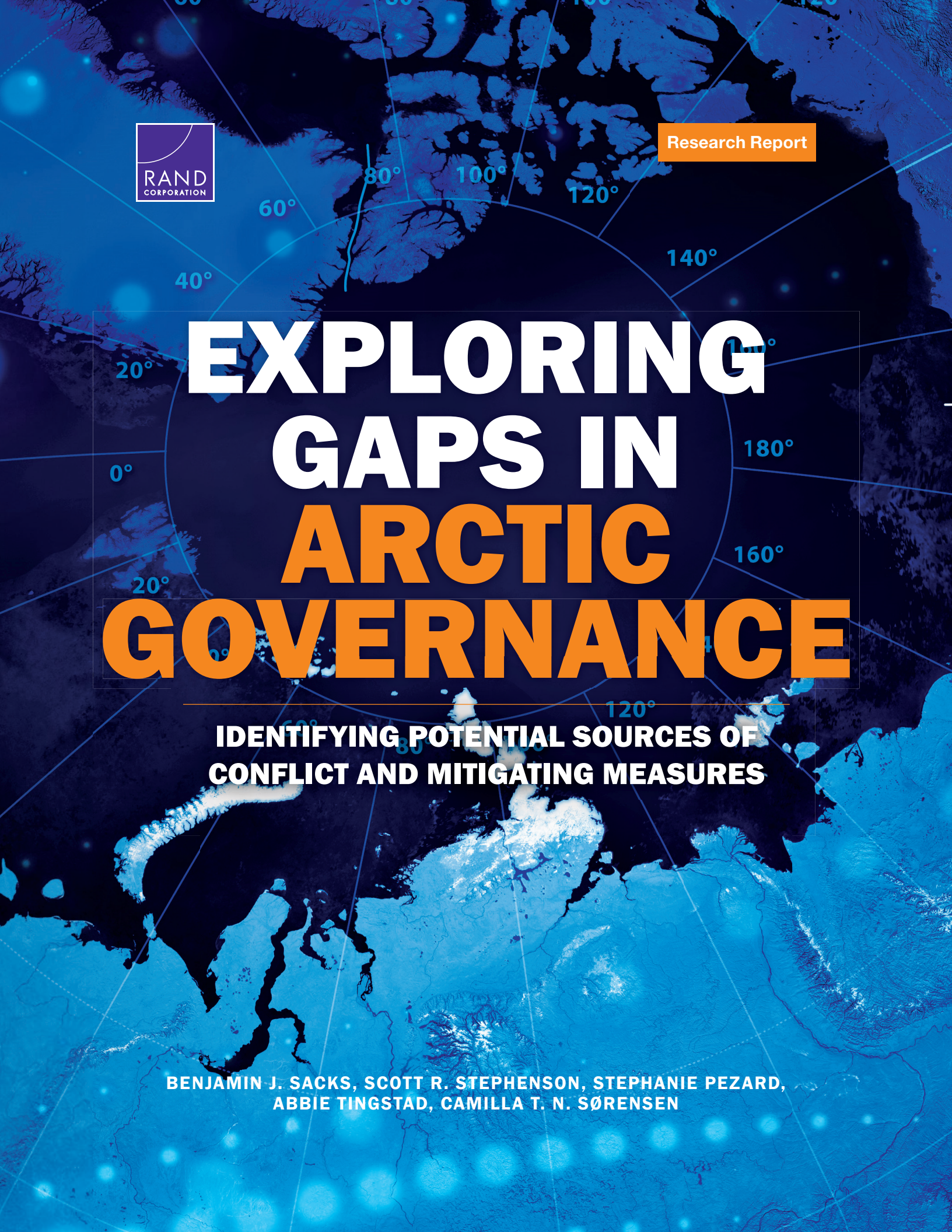

RAND
CORPORATION
Research Report
EXPLORING GAPS IN ARCTIC GOVERNANCE
IDENTIFYING POTENTIAL SOURCES OF CONFLICT AND MITIGATING MEASURES
BENJAMIN J. SACKS, SCOTT R. STEPHENSON, STEPHANIE PEZARD, ABBIE TINGSTAD, CAMILLA T. N. SØRENSEN

For more information on this publication, visit **www.rand.org/t/RRA1007-1**.

Published by the RAND Corporation, Santa Monica, Calif.

Cover: FrankRamspott/Getty Images.

The Arctic has long been a region of cooperation between nations (Staun, 2017, p. 314; Pezard et al., 2017, pp. ix, 2–4; Pezard, 2018; Tingstad, 2019), particularly among the eight states with territory in the region: Canada, Denmark (via Greenland),[1] Finland, Iceland, Norway, Russia, Sweden, and the United States. The vast majority of the Arctic region falls within the existing internationally recognized legal jurisdiction of one of these eight states or in spaces clearly delineated for international use, such as the high seas or international airspace. Generally speaking, Arctic states have pursued peaceful resolutions to the few territorial disputes that remain or have raised objections to each other's policies and actions without resorting to large-scale military activity. Numerous and generally well-accepted international and regional systems and norms, such as the Arctic Council, the Arctic Security Forces Roundtable (ASFR), and the United Nations (UN) Convention on the Law of the Sea (UNCLOS), underpin cooperation and collective decisionmaking about activities in the region. These governance mechanisms have been encouraged by the benefits perceived by stakeholders to their economies, security, and stability (Farré et al., 2014). Russia, for instance, generally abides by these rules, which have sometimes played in its favor, such as with the 2014 UN Commission on

KEY FINDINGS

- The researchers identified six categories of potential conflict catalysts in the Arctic: Russia's central role in Arctic access, increasing safety and environmental risks, the Arctic as a gray zone, challenges to the current rules of Arctic governance, China's increased economic and political involvement in the Arctic, and uncertainty about Greenland's geopolitical future.
- The literature review, interviews, and tabletop exercise conducted for this study revealed three key governance gaps in relation to these catalysts: limited dialogue and transparency on military issues, limited capability to execute governance agreements, and tension between the growing need for inclusivity and Arctic states' interests. Such gaps do not themselves create conflict but could provide an opportunity or a motivation for states to resolve conflicts in ways other than regional cooperation, including military ones.
- To address these gaps, Arctic stakeholders should improve currently limited dialogue and transparency on military issues, update and provide new capabilities to implement existing governance agreements, and enable more inclusivity in Arctic-relevant decisionmaking without challenging the sovereignty of Arctic states.

the Limits of the Continental Shelf recommendations regarding Russia's claim in the Sea of Okhotsk (United Nations Commission on the Limits of the Continental Shelf, 2014).

Arctic states have generally maintained cooperation even when their respective interests, especially those between Russia and the United States, have clashed on other issues. For instance, Arctic peace remained even in the wake of Russia's 2014 unrecognized annexation of Crimea and involvement in Ukraine's civil war, when some observers feared a spillover into the region (Trenin, 2014, p. 24; Baev, 2015, pp. 51–56). In 2015, all eight Arctic states—including Russia—established the Arctic Coast Guard Forum (ACGF) to "foster safe, secure and environmentally responsible maritime activity in the Arctic" (Braynard, 2015). The ACGF has increasingly succeeded, albeit not without problems (Eckstein, 2016), in maintaining cooperation with Russia's Federal Border Service Coast Guard (Sevunts, 2018).

Such cooperation can be partially explained by the fact that, in some respects, the Arctic is a unique geopolitical region. No Arctic state has sought to dominate the entire region. Unlike in the South China Sea, for instance, there exist no major disputes over littoral states' territorial waters or exclusive economic zones (EEZs) (Buchanan and Strating, 2020); instead, there are only outstanding disagreements, including between Arctic states that are part of the North Atlantic Treaty Organization (NATO), over their extended continental shelf boundaries.[2] The region's extreme environment has traditionally limited the size and scale of both military and civilian operations and facilities, historically limiting the risks of escalatory incidents taking place.

This general state of cooperation does not preclude occasional tensions, however. Tense episodes around fishing, for instance, have been recurrent between Norway and Russia around the Svalbard Archipelago (Østhagen, 2018, pp. 101–102, 108–10). Several Arctic states perceived Russia's 2007 planting of its flag on the North Pole seabed as a provocation ("Russia Plants Flag Under N Pole," 2007; Sergunin and Konyshev, 2014, p. 69). These same states have observed with some concern Russia's rebuilding of substantial military capability in its Arctic region (Conley and Rohloff, 2015; Boulègue, 2019; Zysk, 2020, pp. 2–3). Conversely, Russia perceives NATO military activity taking place in its vicinity as a provocation (Associated Press, 2018; Black et al., 2020, pp. vi, 8; Danilov, 2020) and is sensitive to officially non-aligned Sweden and Finland in practice working more closely with NATO (Pezard et al., 2017, pp. 4, 56). As early as 2012, China (an Arctic Council observer member since 2013) began describing itself as a "near-Arctic state" (Bennett, 2015, p. 654) and issued its first formal Arctic policy in 2018 (State Council Information Office, 2018).[3] In remarks before the Arctic Council's May 2019 Rovaniemi, Finland, summit, then–U.S. Secretary of State Mike Pompeo clearly contested China's self-description (Pompeo, 2019). In that same Arctic Council meeting, U.S. reluctance to include language related to global climate change in the Council's common final declaration resulted in the group's failure—for the first time—to adopt one (Johnson, 2019).

The Arctic has also been feeling the effect of tensions born outside the region (Black et al., 2020, p. 7). Since 2014, most high-level military exchanges between Russia and other Arctic states, such as meetings of the ASFR and the Arctic Chiefs of Defense, have been suspended as a result of Russia's invasion of Crimea and ensuing sanctions (Rowe, 2017, p. 26; Tingstad, 2020).[4]

Abbreviations

ACGF	Arctic Coast Guard Forum
ASFR	Arctic Security Forces Roundtable
AZRF	Arctic Zone of the Russian Federation
CAOFA	Central Arctic Ocean Fisheries Agreement
EEZ	exclusive economic zone
GIUK	Greenland–Iceland–United Kingdom
IMO	International Maritime Organization
NATO	North Atlantic Treaty Organization
NSR	Northern Sea Route
SAR	search and rescue
STC	submarine telecommunications cable
UN	United Nations
UNCLOS	United Nations Convention on the Law of the Sea

Although Arctic stakeholders have tended toward cooperation, punctuated by occasional tensions, climate change in the Arctic continues to increase both the global presence in and attention to the region (Palma et al., 2019, p. 215; Dawson et al., 2020, p. 19). Rovaniemi's events led Arctic Centre Director Timo Koivurova, for instance, to question whether the "importance" of the existing set of Arctic governance mechanisms "would diminish" if competition among the United States, Russia, and China continued to escalate (Koivurova, 2019). Now, the question of whether existing mechanisms for cooperation and information-sharing are sufficient for handling future diplomatic challenges must be examined.

In this study, we designed and applied an adaptive four-stage approach for identifying near-term Arctic governance needs and gaps. In Stage I, we developed a knowledge base, organized by region, of historical and contemporary Arctic catalyst issues, mechanisms, and solutions. In Stage II, we developed a robust, but not exhaustive, list of six critical catalyst categories that affect Arctic cooperation and that, when combined in some capacity, could elevate pan-Arctic tensions by 2030. In Stage III, we conducted a controlled tabletop exercise to develop feasible pathways in which a combination of some of these catalysts could escalate Arctic tensions to a brink-of-conflict situation and identified potential mitigating measures. In Stage IV, we synthesized our knowledge base, interviews, and tabletop exercise findings to refine our catalysts and examine appropriate mitigating measures. Further details—including a discussion of the sources used; selection of subject-matter experts; tabletop exercise development, methodology, and execution; and complete scenario details—are provided in the appendix. Our study's findings suggest that, to decrease the risk of unraveling cooperation by 2030, Arctic stakeholders should address three governance gaps:

- limited dialogue and transparency on military issues
- limited capability to execute governance agreements
- tension between the growing need for inclusivity and Arctic states' interests.

Relevant Tools for Arctic Cooperation

A patchwork of forums and mechanisms form the basis for cooperative Arctic dialogue and decisionmaking across a variety of areas and among different stakeholder groups (Pezard et al., 2017, p. 21, Table 2.1). The existing set of Arctic governance mechanisms comprises three pillars: (1) Arctic-specific institutions, including state actor–led organizations, forums, and contact points, such as the Arctic Council, the ACGF, the ASFR, and the Arctic Chiefs of Defense, as well as numerous Arctic indigenous organizations; (2) formal global institutions, such as the UN (via UNCLOS) and the International Maritime Organization (IMO); and (3) various formal and informal modes of cooperation, including regional forums and bilateral discussions between Arctic states, bilateral and multilateral agreements, academic and economic conferences, and multinational civilian and military exercises.[5]

The Arctic Council is the most prominent among Arctic state actor–led organizations.[6] Established in 1996 through the Ottawa Declaration, the Arctic Council supports dialogue and the development of multilateral agreements among the eight states with formally recognized Arctic territory. Through its observer status mechanism, the Arctic Council also permits non-Arctic states and non-state Arctic actors, such as indigenous groups, to maintain awareness and engage in discussions, though without formal decisionmaking power. Since its inception, the Arctic Council has advanced numerous agreements on a variety of non-military issues (Pezard et al., 2017, p. ix). Increasingly, these agreements have resulted in formal treaties signed by Arctic and, in some cases, non-Arctic states, including treaties related to search and rescue (SAR) (2011), oil pollution preparedness and response (2013), scientific research (2017), and the Central Arctic Ocean Fisheries Agreement (CAOFA) (2018).[7] The Ottawa Declaration, however, explicitly excludes discussion of "matters related to military security" from the Arctic Council's purview (Arctic Council, 1996).

The ACGF, comprising the eight Arctic states' coast guard agencies, mirrors aspects of Arctic Council structure and membership, with a focus

Six indigenous organizations have been granted Permanent Participant status at the Arctic Council, affording full consultation rights in connection with the Council's negotiations and decisions.

on operational safety and stewardship issues commonly faced by the Arctic nations (Conley, Melino, and Østhagen, 2017, p. 22; Dodds, 2020, pp. 262–263; Østhagen, 2020). Additionally, both the ASFR and the Arctic Chiefs of Defense meetings at one time provided an opportunity for strategic information-sharing on military issues in and around the Arctic (Solli, Rowe, and Lindgren, 2013, p. 1), but these dialogues have been interrupted following Russia's invasion of Crimea and subsequent war with Ukraine (Østhagen, 2015; Wishnick, 2017, p. 23; Reinke de Buitrago, 2019, p. 16).[8]

In addition to state actor–led organizations, numerous indigenous organizations—such as the Inuit Circumpolar Council, the Saami Council, and the Arctic Athabaskan Council—are active framers of Arctic governance. Six such organizations have been granted Permanent Participant status at the Arctic Council, affording full consultation rights in connection with the Council's negotiations and decisions (Charron, 2012, p. 767; Duyck, 2015, pp. 25–26; Arctic Council, undated).[9] Others, such as the Alaska Federation of Natives, play important community advocacy roles at the subregional level (Haley, 2004, p. 208; Landreth and Dougherty, 2011–2012, pp. 322–323).

Among formal global organizations, the UN (through UNCLOS) plays an important role in Arctic governance, largely based on its guidance about ice-covered waters (Exner-Pirot, 2016, p. 53). It is important to note, however, that the United States has not formally ratified UNCLOS; even though, practically, the country abides by the norms laid out in the agreement, this limits the United States' ability to formally sit at the table if and when changes about ice-covered waters are discussed (Rosenberg, Titley, and Wiker, 2014, pp. 5–6; Wishnick, 2017, p. 16). The IMO similarly brings together stakeholders on navigation, regulatory, and safety issues. Most prominently, the IMO facilitated the development of a Polar Code covering shipping in polar waters, which went into effect in 2017 (IMO, 2019).[10]

A variety of other formal and informal means of cooperation buttress these formal Arctic and global organizations to establish the existing set of Arctic governance mechanisms. Frequent bilateral and multilateral agreements and discussions have occurred over the past several decades. For example, treaties about protecting polar bears were signed multilaterally, and also separately between Russia and the United States, even during the height of the Cold War (United States and Russian Federation, 2002).[11] Other subregional forums, such as the Barents Euro-Arctic Council (whose members include Norway, Sweden, Finland, Denmark, Iceland, Russia, and the European Union), have also demonstrated success in facilitating cooperation in the environmental protection and economic development domains (Bailes and Ólafsson, 2017, pp. 41, 47–50).[12] Multinational civilian and military live and tabletop exercises have also facilitated cooperation on such issues as SAR. In addition, numerous regular conferences and business forums, such as Arctic Circle, Arctic Dialogues, the Arctic Economic Council, Arctic Frontiers, and the Arctic Shipping Forum, are dedicated to stimulating Arctic investment and research. Research institutions—such as the Norwegian Institute of International Affairs and the Woodrow Wilson International Center for Scholars, among many others—have also sought to facilitate Arctic dialogues. Importantly, these dialogues have served, in some cases, to support Track II (i.e., informal, non-

governmental) discussions on such issues as military security and climate change that have been difficult to host in a formal organization or forum (Stavridis, 2013; Tingstad, 2020).

Generally speaking, these organizations, forums, and mechanisms that support Arctic cooperation can be distinguished from each other in three ways:

1. *specificity*: Arctic-specific versus global or broader regional focus
2. *scope of issue*: focused versus diverse
3. *scope of stakeholders involved*: narrow versus broad.

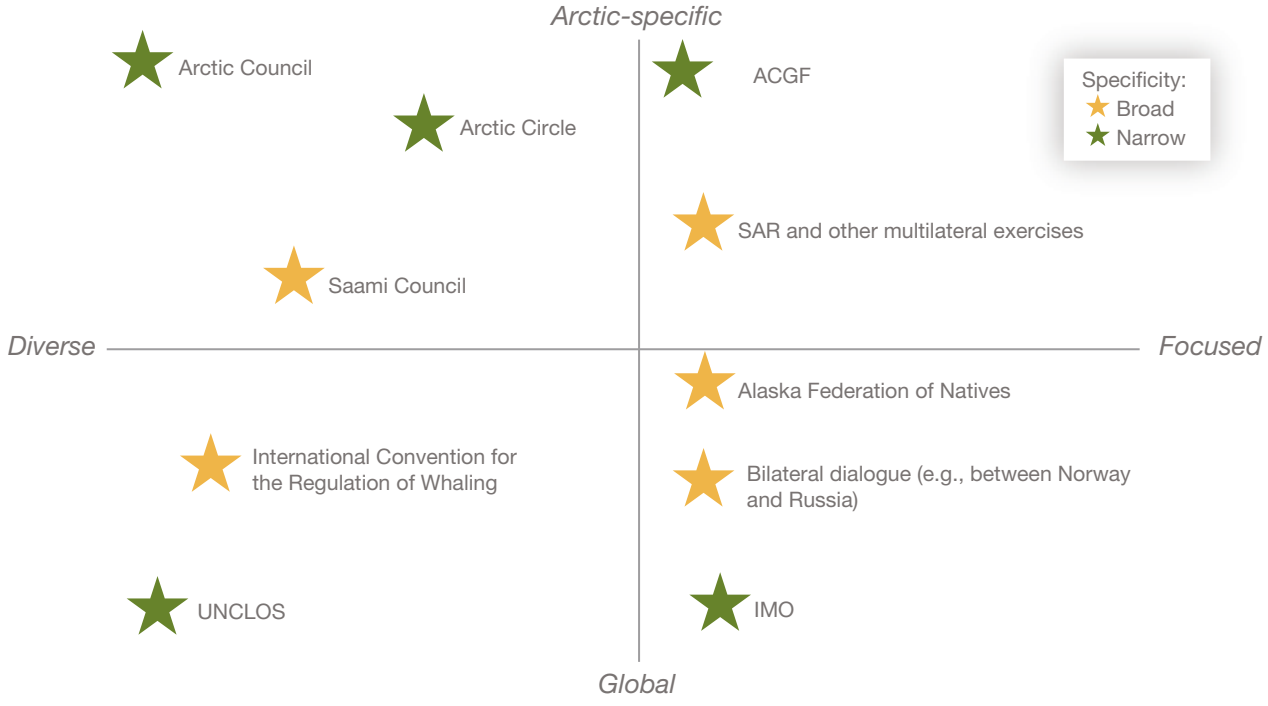
The figure below summarizes some of these forums and frameworks. Some are very specifically focused on Arctic issues and stakeholders (e.g., Arctic Council, Saami Council), whereas others have a broader geographic scope but touch on issues that are directly relevant to the Arctic (e.g., the UN, through UNCLOS; the IMO, primarily through its work on the Polar Code). In addition, some of the mechanisms for cooperation captured in the figure are focused on specific topics, such as SAR exercises or forums that support issues related to native populations. Other mechanisms, such as the Arctic Council or the ACGF, have broad charters to cover a variety of diverse issues as needed.

Methodological Summary

We designed and implemented a four-stage adaptive, mixed-method approach to identify both critical near-term gaps in Arctic governance for which Arctic stakeholders must prepare and an initial set of potential mitigating measures. A detailed discussion of each stage of this approach—including the sources used; the selection of subject-matter experts; the development, methodology, and execution of the tabletop exercise; and complete scenario details—are explained in the appendix.

In Stage I, we reviewed English-language literature and interviewed subject-matter experts to develop a knowledge base of historical and contemporary Arctic conflict issues, governance mechanisms, and existing or potential solutions. In Stage II, we used our knowledge base to develop a matrix of potential catalysts and solutions. We defined a

FIGURE
Selected Arctic-Relevant Forums and Frameworks



catalyst as an issue that could violate at least one of two assumptions that underpin cooperation in general and Arctic cooperation in particular. These two assumptions are as follows:

1. Issue resolution is already guided by stable and durable governance mechanisms.
2. The issue is unlikely by 2030 to represent fundamental disagreements over national interests of sufficient importance that military action would be contemplated.

Of the potential catalysts that we examined, such as pan-Arctic environmental issues and location-specific treaty article disagreements, 23 violated one or both of those assumptions. We reclassified these 23 potential catalysts into a robust but not exhaustive list of six catalyst categories:

- Russia's central role in Arctic access
- increasing safety and environmental risks
- the Arctic as a gray zone
- challenges to the current rules of Arctic governance
- China's increased economic and political involvement in the Arctic
- uncertainty about Greenland's geopolitical future.

Some of these categories are framed from a Western government perspective, given that the inputs to the analysis largely represent those points of view.

In Stage III, we developed a tabletop exercise on the basis of traditional wargaming methods and Decision Making Under Deep Uncertainty methods and then conducted the exercise with an international group of subject-matter experts. Specifically, we employed info-gap decision theory—combining longer-term stressors, short-term shocks, and decision point gaps—to integrate our six catalyst categories into two plausible skeletal near-term scenarios. Both scenarios began with regional tensions that ultimately escalated into a pan-Arctic crisis leading to a *brink-of-conflict* situation, which we defined as an emergency UN Security Council meeting. Scenario A, *Dire Straits*, explored how a combination of regional tensions in the Greenland–Iceland–United Kingdom Gap, including resource competition, cutting of submarine telecommunications cables (STCs), and Chinese investments in an increasingly self-reliant Greenland and elsewhere, could escalate across the Arctic. Scenario B, *Northern Exposure*, explored how a "bungled rescue response" following a commercial airline incident in the Barents Sea, potentially resulting from Arctic electromagnetic interference, could combine with ongoing environmental tensions between Scandinavian countries and other Arctic Council members and observers to escalate tensions. Note that *Dire Straits* and *Northern Exposure* represented only two of many potential plausible scenarios that could be developed using some combination of the six catalyst categories identified in Stage II.

Our exercise participants first determined plausible catalyst pathways, or sequences, for how each scenario could escalate. They next identified existing or potential new governance mechanisms that could evolve or be created to mitigate escalation of such regional tensions.

In Stage IV, we first synthesized our data collected in the literature review, interviews, and tabletop exercise to refine our six catalyst categories and identify key gaps in current Arctic-relevant governance mechanisms. Then, we formulated three ways in which Arctic governance mechanisms might evolve to minimize the potential of these catalysts to escalate tensions.

A Combination of Catalyst Categories Could Bring the Arctic to a Brink-of-Conflict Situation by 2030

Historically, problematic issues arising in the Arctic—from delimitation disputes (such as the now-resolved one between Norway and Russia in the Barents Sea) to disagreements on how to interpret some aspects of UNCLOS—have been resolved below the threshold of armed conflict. We therefore anticipate that this can continue to be accomplished, barring changes to the terms upon which those issues were previously resolved. This may not always be the case, however, given the Arctic's ongoing environmental, economic, and geopolitical changes. Our analysis indicates that the following six catalyst cat-

egories, in some combination with each other, could create or escalate tensions in the Arctic, potentially leading to a brink-of-conflict situation by 2030—particularly if they coincide with worsening tensions elsewhere in the world—unless the existing set of Arctic governance mechanisms evolves to mitigate them. For each catalyst category, we provide background information and outline why the issue might become elevated by 2030. We recognize that this list, which is informed by our review of English-language Arctic security literature, subject-matter expert interviews, and tabletop exercise findings, is robust but not exhaustive. It nonetheless provides an overview of the key factors that might affect the existing governance mechanisms that all Arctic peoples rely on to ensure regional stability.

Russia's Central Role in Arctic Access

Background. Newly increasing connectivity to and through the Arctic has elevated the issue of access: Who should have it and for what purposes? Russia interprets Article 234 of UNCLOS (United Nations, 1982) as protecting Russia's rights to control access through the Northern Sea Route (NSR) along the country's northern coast, which Russia believes should be under its control (Østreng, 2012, pp. 252–253; Dremliuga, 2017, pp. 130–131; Exner-Pirot and Huebert, 2020, pp. 142–143). The United States, in particular, argues instead that the NSR and Northwest Passage constitute "international straits" that should not be subject to such control (Østreng, 2012, pp. 252–253; Fahey, 2018, pp. 163–164; Zukunft, 2019, pp. 3–5).

Russia seeks to maintain exclusive control over the NSR for both economic and national security reasons. The NSR will become an increasingly viable year-round shipping route as ice continues to melt. An ideal transit through the NSR between Europe and China, for instance, is "roughly 3,000 miles shorter and 11 days quicker" than the usual transit via the Suez Canal and the Indian Ocean (Auerswald, 2019b). In 2018, Russian President Vladimir Putin set a goal for 80 million tons of cargo to be transported through the NSR annually by 2024 (Moe, 2020, p. 210; Smirnov, 2020).[13] Russia plans to earn income by collecting transit tariffs, controlling access to the Arctic Zone of the Russian Federation (AZRF), and promoting vast onshore and offshore mineral fields active or in development throughout the AZRF (Moe, 2020, p. 210). More than 40 percent of Russia's annual budget is derived from taxes on hydrocarbon and other mineral extraction and production activities (Rotnem, 2018, p. 3).

The airspace over the Russian Arctic also plays an important role in the commercial airline industry. Many flights use the Arctic polar route, passing through Russian airspace to minimize flight time and fuel burn between several North American and Asian destinations (Sato and Inoue, 2019, p. 1). Russia collects "air navigation fees" on these flights, estimated to amount to $200 million annually (Panin, 2013).

These economic interests are inherently tied to strategic security interests. Russia is deeply sensitive to any perception that its northern border is weak or susceptible to intrusion. It is consequently revitalizing old infrastructure and investing in new installations throughout the AZRF, especially in its Bastion defense zone that protects the bulk of Russia's nuclear deterrent force based throughout the Kola Peninsula. Many of these infrastructure investments are dual use; that is, some facilities that are capable of civilian uses for SAR or customs control in the NSR and AZRF could potentially be put to military uses depending on the geopolitical situation (Boulègue, 2019, pp. 2, 11, 14, 26).

Newly increasing connectivity to and through the Arctic has elevated the issue of access: Who should have it and for what purposes?

Together, these linked economic and security interests are intertwined with the populist narrative, promoted by President Putin, that extols the AZRF as a "pillar" of "modern Russian nationalism" (Melino and Conley, undated). Hannes Hansen-Magnusson has argued that the Russian Arctic is promoted as a source for three broader tenets of contemporary Russian nationalist messaging: the "heroic explorer;" the Russian "conquest" of the Arctic's harsh environment; and the region's critical role in Russia's industrial, technological, and scientific development (Hansen-Magnusson, 2019).

Why might this issue become elevated by 2030? Article 234, which underpins Russia's position, permits littoral states to enact enhanced control measures within their EEZs when year-round ice is present to both protect the fragile marine environment and ensure navigational safety (United Nations, 1982, Article 234, pp. 115–116). As rising sea temperatures continue to melt sea ice, however, this argument becomes less relevant, elevating the risk that Russia will act to ensure its continued control (Clarke-Sather et al., 2017). Such action could take the form of restricted access to, or even a closure of, the NSR to vessels that are not Russian-flagged or Russian-owned.[14] This could catalyze conflict with China, which increasingly identifies the NSR as a promising route as part of the country's Belt and Road Initiative and is developing its commercial Arctic shipping capabilities. Any U.S. action to contest Russian control over the NSR, such as a freedom-of-navigation operation, could quickly escalate tensions (Auerswald, 2019b). The last two times the United States attempted such an operation in the NSR—in 1965 and 1967—it was turned back by the Russian military (Pincus, 2019). Conducting a near-term freedom-of-navigation operation as Russian concerns mount over melting sea ice and Article 234—and, consequently, Russia perceives that its Arctic border is increasingly insecure—could be especially risky (Pezard et al., 2017, p. 10; Pincus, 2019).

Although there is no anticipation that the use of, and need for, transiting through Russian airspace will change in the near future, Russia could use this access as leverage on other issues. Russia's closure of its airspace as a diplomatic and coercive tool could elevate tensions (Smith, 2017, p. 33) and is not without precedent: Throughout the Cold War, the Soviet Union employed such measures, forcing North American and Western European airlines into circuitous, multi-stop routes to reach Asia. Soviet forces routinely intercepted any aircraft violating Soviet airspace, leading in one instance to Soviet forces shooting down Korean Air Lines Flight 007 in 1983, killing all 269 aboard (Morgan, 1985, p. 231; Grzybowski, 1987, pp. 68–70; Jacobson et al., 2012, p. 710).[15]

Increasing Safety and Environmental Risks

Background. Current Arctic cooperation is based on the recognition that such issues as safety and proper stewardship of the region represent physical and technical challenges that cannot be undertaken by states individually and instead require pooling of resources, information exchange, and sharing of best practices. Yet the Arctic still represents an extreme environment where small incidents can quickly turn deadly, raising at least two potential issues if a major crisis—such as an environmental crisis, a major ship or aircraft collision, or a tourist ship sinking—were to occur there (Conley et al., 2013, pp. 45–50). The first issue is that decisions about the resolution of the crisis could raise tensions between Arctic states. The second is that, if they perceived the crisis to be met with an inadequate response, non-Arctic states might (1) question Arctic states' claims that they can effectively manage the region and (2) take action to increase their own presence there.

Why might this issue become elevated by 2030? Investment and traffic in Arctic waterways have expanded as the Arctic continues to warm. Melting sea ice increases both the geographical and temporal extent of maritime operations, enabling access to more areas of previously ice-covered ocean for longer periods of time. In the medium term, this enhanced access is expected to increase the range and frequency of military vessel operations, such as domain awareness exercises, and the congestion of commercial marine traffic and therefore the risk of collision (Kraska, 2016, pp. 596–597). A collision within a country's EEZ could escalate ten-

sions, particularly if that country decided to seize the offending vessel or its crew. This risk is elevated in areas under Russian control or where Russian ships are particularly present, such as the Barents Sea, the NSR, and the Bering Strait. Such accidents have occurred before and become publicly known. In 1992 and again in 1993, for instance, Russian and U.S. submarines collided in the Barents Sea (Åtland, 2011, p. 270). A commercial ship running aground or an environmental crisis, such as an oil spill resulting from such a collision, could escalate to a military miscalculation if there are misunderstandings between Russia and the United States over the cause of the accident or the appropriate way to resolve it, particularly if exacerbated by a combination of extreme weather conditions and poor communication. A nuclear accident caused by a submarine or an offshore nuclear power plant is also a possibility. Finally, inadequate Arctic SAR efforts more generally heighten the risk of military assets being deployed in their place by Arctic and non-Arctic countries to ensure that a SAR capability is available, thereby potentially militarizing any such incidents (Sydnes, Sydnes, and Antonsen, 2017).[16]

The Arctic as a Gray Zone

Background. A variety of intentional or accidental political-military events below the threshold of armed conflict could, especially in combination with each other, escalate Arctic tensions.[17] Such tensions already exist as a result of military activities that have been perceived as provocations or shows of force. Russia, for instance, has conducted simulated attacks against Norwegian targets on several occasions (O'Dwyer, 2019; Nilsen, 2019) and in recent years has disrupted NATO's exercises in the region through Global Positioning System interference (O'Dwyer, 2019; Coultrup, 2020). The North American Aerospace Defense Command routinely has to intercept Russian patrols wandering too close to the North American coast (Dickstein, 2019; Browne, 2019). Russia, for its part, routinely accuses NATO of operating too close to Russia's vast Arctic air and sea space (Sergunin and Konyshev, 2014, p. 75; Sevunts, 2020).

A commercial ship running aground or an environmental crisis could escalate to a military miscalculation if there are misunderstandings over the cause of the accident or the appropriate way to resolve it.

Why might this issue become elevated by 2030? Melting sea ice could open up the central Arctic Ocean to militarization, especially increased submarine activity and dual-use assets, which would elevate the risk of miscalculation or an accident that could escalate tensions. This could provoke a Russia already sensitive to any perceived erosion of security in the AZRF, which, as previously discussed, is vital for Russia's economic, security, and domestic nationalist interests (Pezard et al., 2017, p. 10).

One important issue in that regard relates to STCs, which are especially important in the Arctic, as polar electromagnetic interference often disrupts broadcast and satellite communications (Delaunay, 2017; Tingstad et al., 2018, p. xi; U.S. Coast Guard, 2019, p. 29). Apart from their long-standing military use (Clark, 2016, pp. 234–237), STCs provide critical high-speed internet access to communities throughout the Arctic (Davenport, 2012; Delaunay, 2017, pp. 259–268). U.S. and NATO policymakers are increasingly worried, however, that the deliberate or accidental cutting of STCs or the tapping of such cables, especially at multiple points simultaneously, could escalate Arctic tensions and sow confusion (Soames, 2019, p. 5; Public-Private Analytic Exchange

Program, 2017, pp. 6, 11–12; Smith and Hendrix, 2017, pp. 4–6, 8, 10; Kraska, 2020). A 2019 NATO investigation, for instance, concluded that Russian submarines had begun "detailed monitoring and targeting activities in the vicinity of North Atlantic" STCs (Soames, 2019, p. 5; Public-Private Analytic Exchange Program, 2017, pp. 6, 11–12). Meanwhile, China's proposed "digital silk road," expected to become operational by 2030, would potentially provide the country with enhanced control over critical Arctic telecommunications network infrastructure (Public-Private Analytic Exchange Program, 2017, pp. 11–12; Goodman and Freese, 2018; Delaunay and Landriault, 2020, pp. 232–233, 238–241; Klasa et al., 2020, p. 351).

Finally, deliberately or accidentally cutting or tapping STCs, especially at multiple points simultaneously, could expose limitations in the ability of existing Arctic governance mechanisms to regulate security-related issues, especially if the culprit cannot be conclusively identified. A 2017 tabletop exercise suggested that, in such a scenario, NATO members might have difficulties agreeing on a likely culprit, exposing divisions that an adversary could exploit (Smith and Hendrix, 2017, pp. 4–6, 8, 10).

Several Svalbard Treaty signatories have contested Norway's self-declared fisheries protection zone around the Svalbard archipelago and could become more vocal as fish become an increasingly scarce resource for the global food supply.

Challenges to the Current Rules of Arctic Governance

Background. Governance in the Arctic region relies on the wide acceptance, by all actors involved, of rules outlined in various authorities, such as treaties and customary international law. In May 2008 in Ilulissat, Greenland, the five Arctic coastal states issued a declaration reaffirming their commitment to UNCLOS in Arctic governance and to the absence of any need for a different, Arctic-specific legal framework (Canada, Denmark, Norway, the Russian Federation, and the United States, 2008) (The United States is technically not a signatory to UNCLOS but nonetheless respects its norms). This commitment has so far extended to other Arctic nations and to nations involved in Arctic issues, such as China.

Why might this issue become elevated by 2030? By 2030, these generally agreed-upon rules could be challenged on several issues. For example, it is likely that the UN Commission on the Limits of the Continental Shelf will have issued most of its recommendations related to overlapping claims by Arctic states regarding extensions of their continental shelves, as per Article 76 of UNCLOS. States faced with recommendations that do not grant them the additional seabed that they have claimed could contest these decisions (Pezard et al., 2018, pp. 3–6).

As importantly, by 2030, fears over the future scarcity of fish—because of, among other factors, the migration of species further north, driven by global climate change—could fuel tensions. Several Svalbard Treaty signatories, including Russia, have contested Norway's self-declared fisheries protection zone around the Svalbard archipelago and could become more vocal as fish become an increasingly scarce resource for the global food supply (Pedersen, 2006, p. 339).[18] Multiple fishing incidents between Norway and Russia have already occurred (Østhagen, 2018, pp. 101–102, 108–110). The gover-

nance issue could become elevated if underground resources in the continental shelf surrounding Svalbard were found to be particularly valuable and relatively easy to exploit. The Bering Strait could also become a zone of fishing tensions. Concern over a loss of fishing revenue is at the core of threats by Russian officials to stop honoring the 1990 maritime boundary treaty delimiting the Bering Strait border between the then–Soviet Union and the United States (United States and Soviet Union, 1990). A 2002 Russian State Duma resolution, for instance, argued that Russia had lost two EEZ areas totaling 23,700 km^2 and 7,700 km^2, respectively; 43,600 km^2 of its continental shelf; and up to 1.9 million tons of fish during the 1990s (Konyshev and Sergunin, 2014, pp. 63–64). In June 2020, the Russian government unveiled plans to open industrial fisheries in the Chukchi Sea, immediately north of the Bering Strait; such a move could increase the number of Russian fishing, coast guard, and naval vessels operating near the U.S. EEZ (Rosen, 2020). Finally, another key issue relates to the CAOFA, which is due to expire in 2034. Some scholars have already argued that its renegotiation will likely expose deep divisions between China (with its long-distance fishing fleet plans) and Arctic states (Hong, 2020, pp. 22–24).

China's Increased Economic and Political Involvement in the Arctic

Background. Several non-Arctic states and organizations have increased their strategic involvement in the Arctic in anticipation of future economic development and transport opportunities. Since 2013, China, the European Union, France, Germany, Japan, the Netherlands, South Korea, Spain, and the United Kingdom (plus Scotland independently) have all issued official Arctic strategies or policies. China, India, Italy, Japan, Singapore, South Korea, and Switzerland have joined France, Germany, the Netherlands, Poland, Spain, and the United Kingdom as Arctic Council observer states. Companies in many of these non-Arctic states are increasingly investing in diverse Arctic infrastructure development, especially in critical energy (de Witt, Stefánsson, and Valfells, 2020), transportation, fishing, and communication sectors (Raspotnik and Østhagen, 2019). The sheer scale of China's Belt and Road Initiative and the country's global ambitions more generally increasingly fuel Arctic states' concerns over China's longer-term ambitions in the region (Auerswald, 2019a).

Why might this issue become elevated by 2030? Arctic governance largely revolves around Arctic states, even though there has been some modicum of opening over time—for instance, with the inclusion of observers in the Arctic Council. This situation, however, might become untenable as non-Arctic states' presence and interests increase in the region (Bennett, 2015, p. 653; Bertelsen, 2020, p. 65). Such countries have sought more involvement in Arctic governance, as evidenced by the increasing number of requests to become an observer in the Arctic Council. In addition, to a greater extent than any other non-Arctic state, China has been investing in Arctic energy; land, air, and sea transportation infrastructure; research and technology infrastructure; and Arctic states' corporate activities, and China envisions the Arctic as an important part of its global Belt and Road Initiative, although significant returns have yet to materialize outside of Russia (Bennett, 2015, pp. 645, 650; Olesen and Sørensen, 2019, p. 10; Pincus, 2020, p. 45).

So far, the United States has flatly rejected China's self-identification as a "near Arctic state" (Pompeo, 2019). Meanwhile, Russia holds ambivalent views toward an increased Chinese presence in the Arctic. Although Russia and China currently collaborate on some major investments, particularly in the Yamal Peninsula, longer-term Chinese Arctic geostrategic objectives may antagonize Russia, especially if China seeks to gain formal Arctic power on par with Russia (Rahbek-Clemmensen, 2016, p. 2; Sørensen and Klimenko, 2017, pp. 41–42; Pezard, 2018, p. 7; Pincus, 2020, pp. 49–52).

Uncertainty About Greenland's Geopolitical Future

Background. Greenland has gradually developed its own voice in international affairs over the past decade.[19] Greenland's long-term goal is to achieve

full independence.[20] Its main barriers are a weak economy still heavily dependent on annual Danish block grants (Danmarks Nationalbank, 2019; Rahbek-Clemmensen, 2020a, p. 181) and a widely dispersed small population with poor infrastructure, communications, and transportation connections. To deal with these developmental challenges, the Greenlandic government seeks to increase foreign investors' focus on Greenland; for example, since 2015, the government has held annual trade and investment promotion events in China. The Greenlandic economy's primary industry is fishing, which is already linked to the Chinese market and is expected to become even more so in the future (Naalakkersuisut, 2019, pp. 42–43).[21] No substantial Chinese presence or investment, however, yet exists in Greenland, partly because of Danish and U.S. resistance (Townsend, 2019).[22] Greenland, however, continues to see potential economic development opportunities in improving relations with China, especially in fishing, tourism, and mining, and has proposed opening a Greenlandic diplomatic representation in Beijing in 2021 (Wenger, 2020).[23] In response, the United States has increased its own attention toward Greenland. In 2019, the United States reopened its diplomatic representation in Greenland's capital, Nuuk, and in April 2020 offered a $12 million aid package (Breum, 2020). It has also shown increased interest in investing in Greenlandic infrastructure and mining, primarily to counteract Chinese efforts (Sørensen, 2019, pp. 448–450).

Why might this issue become elevated by 2030? Greenland is geopolitically important to the United States. Apart from Greenland's sheer geographical proximity and the presence of the U.S. military's Thule Air Base, Greenland potentially has the "largest deposits of rare earth minerals outside China, many of which are thought to be critical to U.S. national security and [the U.S.] economy" (Government of Denmark, 2011, pp. 27–28; Stephenson, 2019). Washington therefore sees any substantial Chinese presence in Greenland as unacceptable. Even with the recent U.S. commitment of development aid, Greenland may continue to seek Chinese investments with the ultimate goal of independence. If that is the case, tensions will only grow as the United States, Denmark, and China all seek to maintain influence in a territory that might be closer to full independence by 2030 (Christensen, 2020, p. 3; Rahbek-Clemmensen, 2020b).[24] Greenland could also become more deeply embroiled in U.S.-Russia tensions, as Thule Air Base could become the target of Russian operations, especially from installations undergoing upgrades in the Russian Arctic archipelagos (Boulègue, 2019, p. 13).

How Might Arctic Governance Evolve to Minimize the Risk of Conflict?

As noted earlier, our literature review, interviews, and tabletop exercise revealed three key governance gaps in relation to these catalysts: limited dialogue and transparency on military issues, limited capability to execute governance agreements, and tension between the growing need for inclusivity and Arctic states' interests. Such gaps do not themselves create conflict but could provide an opportunity or a motivation for states to resolve conflicts in ways other than regional cooperation, including military ones. We recommend that Arctic stakeholders address these gaps in the following ways:

- Improve currently limited dialogue and transparency on military issues.
- Update and provide new capabilities to implement existing governance agreements.
- Enable more inclusivity in Arctic-relevant decisionmaking without challenging the sovereignty of Arctic states.

We examine each of these areas in turn as examples of gaps where the Arctic Council and other pillars of the existing governance mechanisms described in this report provide no clear means to resolve future potential tensions. For each area, we present several options suggested in the literature, our interviews, and our tabletop exercise that Arctic states and stakeholders might consider for closing these gaps and mitigating the impact of the conflict catalysts we identified.

Improve Currently Limited Dialogue and Transparency on Military Issues

Why is it a gap? In the Arctic, two key issues must be dealt with in the near term: (1) military messaging and misperceptions and (2) the possibility of accidental miscalculation resulting in escalation. Both could be well served by encouraging additional transparency and dialogue, but in what context and between which government or military echelons? The ASFR and Arctic Chiefs of Defense meetings would appear to have a mandate to engage on traditional security matters where the Arctic Council does not. However, the practical utility of these mechanisms is limited without Russian participation. Meanwhile, military security issues are explicitly excluded from the purview of the Arctic Council.

How can it be addressed? A debate is ongoing among Arctic security experts regarding the shape that a potential new Arctic security forum might take. Proponents of a dedicated hard security issue mechanism argue that entwining dialogue on military and non-military matters within an existing single forum could stall progress on non-military issues if tensions on military issues were to escalate (Stephen, 2016). Opponents of a separate mechanism for Arctic military security dialogue argue that it is critical to connect political and military security with broader environmental and economic issues (Zandee, Kruijver, and Stoetman, 2020). Yet others acknowledge that, although it may not be possible to discuss all security issues at the pan-Arctic level, it would nonetheless be productive to have a forum in which to establish pan-Arctic standards for transparency over military exercises, planning, and deployments to help prevent misinterpretations and miscalculations (Schaller, 2016). This is also a foundational principle of a theoretical Arctic Military Code of Conduct that would seek, in part, to create "a dialogue mechanism that would promote greater transparency and lay the ground for a less conflict-prone relationship between NATO and Russia in the region" (Depledge et al., 2019). The ACGF may be the closest, inclusive, currently existing mechanism that serves a purpose similar to, if not fully aligned with, this approach.

Even without a comprehensive Military Code of Conduct, it is critical for governments at the strategic level to continue tacitly or overtly supporting tactical dialogues among their respective forces that operate in the Arctic. Ongoing dialogues and hotlines between the Norwegian and Russian militaries could serve as a model for this level of transparency,[25] and standardized modes of information-sharing and dissemination could be implemented as exemplified through such consortia as BarentsWatch.[26] Increased dialogue and transparency on military issues could alleviate some of the risks related to Russia's concern over maintaining control over the NSR, by ensuring, for instance, that Russia is not surprised by the presence of foreign vessels in the route's vicinity and by reducing the risks of collision between military ships. More dialogue and transparency could also help normalize military relations between states and reduce the occurrence of gray-zone activities seen in the Arctic, such as simulated attacks, shows of force, and disruption of military exercises. Yet transparency needs dialogue, and, as of early 2021, dialogue between Russia and other Arctic states was still severely limited by the tensions born from Russia's invasion and annexation of Crimea in 2014.

More dialogue and transparency could help normalize military relations between states and reduce the occurrence of gray-zone activities seen in the Arctic, such as simulated attacks and disruption of military exercises.

Update and Provide New Capabilities to Implement Existing Governance Agreements

Why is it a gap? Vessels operating without sufficiently robust regulations and norms increase the risks of collisions, groundings, fuel spills, SAR incidents, military miscalculation (when naval ships are involved), and other events that could lead to conflict. Increasing surface ship traffic, and its diversity, creates a need for rules and procedures that were previously not necessary (Hansen et al., 2016, pp. 15, 69–70; Marchenko et al., 2018, p. 113; St. Peter, 2020). Arctic countries and other stakeholders have addressed this issue through multiple initiatives, such as the IMO's Polar Code, the Arctic Council's SAR and oil pollution preparedness and response treaties, and the agreement "on the Prevention of Incidents on and over the High Seas" (commonly known as INCSEA) signed by the United States and the Soviet Union in 1972 and still enforced today (Gosnell, 2016). Although these are arguably the most-significant multilateral agreements to address Arctic marine safety and environmental protection to date, additional steps are needed to ensure that such rules are adequately addressing the safety needs of a fast-evolving environment—and that Arctic stakeholders have adequate means to implement such rules.

Future environmental and political uncertainties, in addition to an anticipated increase in maritime traffic in the Arctic, demand more-robust structures and procedures for handling incidents at sea.

How can it be addressed? To address these issues, there should first be a continuing review of existing plans and agreements that examines their relevance for current and future Arctic conditions. Future environmental and political uncertainties, in addition to an anticipated increase in commercial and possibly military maritime traffic in the Arctic, demand more-robust structures and procedures for handling incidents at sea. This will require moving beyond delimiting zones of responsibility and revitalizing and strengthening points of contact for coordination, toward formulating a pan-Arctic emergency response *system* with demonstrated interoperational capabilities. Updates to existing agreements may include new provisions and partners. The incidents-at-sea agreement, for instance, could evolve to accommodate changes in Russian and U.S. military capabilities and tactics, as well as the potential need to incorporate other parties (Gosnell, 2016).

Second, existing agreements may require specific implementation steps or enforcement mechanisms to ensure that states can effectively comply with the commitments they made to SAR efforts or pollution prevention. For example, the Arctic Council SAR agreement delimits zones of responsibility for emergency response but lacks formal requirements for states to demonstrate response capabilities. As a first step toward addressing this gap, this agreement and others requiring coordinated response efforts across borders (e.g., for oil pollution preparedness and response) could be amended to include (1) a requirement that Arctic states regularly demonstrate capabilities for handling a variety of specific potential emergencies and (2) a binding responsibility to follow standardized operational guidelines developed by the Arctic Council's Emergency Preparedness, Prevention, and Response Working Group if an emergency occurs. Enforcement could be achieved through an arbitration mechanism similar to that identified in Norway and Russia's 2010 border delimitation agreement (Kingdom of Norway and the Russian Federation, 2010, especially Article 4, Clause 2; Annex I, Articles 1, 3–4; and Annex II; see

also Østhagen, 2018, p. 112). States could formulate timelines for developing infrastructure to address capability gaps and negotiate with neighboring states on interim response plans while capabilities are being developed. The Arctic Council and the ACGF would be appropriate forums in which to begin these negotiations in an open and transparent way.

Surface maritime issues are but one of many issues for which updates, increased transparency, and follow-through on strategic promises could close identified gaps. In response to polar electromagnetic interference and STC concerns, for example, Arctic states could pursue an international agreement to guarantee the security of STCs. Except between Australia and New Zealand, no such agreement currently exists anywhere in the world. The installation and upkeep of these cables are the responsibility of commercial entities. Consequently, the issue of who has the authority to manage disputes and practices around cables passing through state territorial waters remains unresolved. A multilateral agreement, modeled on Australia and New Zealand's successful bilateral agreement, could reclassify cable maintenance and protection as a pan-Arctic security concern and the STCs and the waters immediately surrounding them as "cable protection zones" (Carter and Burnett, 2015, pp. 252–253; Burnett and Carter, 2017, pp. 14, 21, 60). Routine monitoring of cables could be jointly managed by commercial and other civil actors in coordination with militaries. Provided that such activities are conducted according to standardized, transparent protocols, involving military actors may serve as a deterrent to rogue activity while avoiding risks that other states will misperceive the intentions of the activities. Such agreements could include non-Arctic states that have equities in the Arctic, providing them with a concrete mechanism to engage Arctic states on security issues. Improving states' ability to implement current Arctic governance rules would have a mitigating effect on all catalysts described in this report—except possibly for those in the category related to Greenland's geopolitical future—by making the operating environment safer and more predictable.

Enable More Inclusivity in Arctic-Relevant Decisionmaking Without Challenging the Sovereignty of Arctic States

Why is it a gap? The Arctic will increasingly contend with the challenges of becoming both more connected and more significant to stakeholders that do not have legally recognized state territory in the region. At their 2008 Ilulissat summit, Arctic Council members rejected the idea of implementing an Antarctica-style treaty system to manage stakeholders' interests and collaboration.[27] Yet, in the long term, broader multilateral engagement of non-Arctic states, as well as private and indigenous Arctic stakeholders, will be necessary in order to manage a wide variety of still-uncertain conflict catalysts. Because numerous catalysts are likely to directly involve these actors, relegating security matters to Arctic states alone would leave important gaps in knowledge, capabilities, and priorities unaddressed.

How can it be addressed? Arctic states have recognized, at various levels, the need for more inclusivity in Arctic forums. This is the logic behind, for instance, the Emergency Preparedness, Prevention, and Response Working Group, which aims to promote pan-Arctic collaboration, capacity-building, and information-sharing related to Arctic emergencies across public and private domains (Emergency Prevention, Preparedness and Response, undated). Because both military and civil actors may contribute to or be affected by the escalation of a security-related issue (albeit in different ways), planning for future conflict de-escalation must include inputs from both domains. This is also why, over the years, the Arctic Council has been welcoming an increasing number of non-Arctic observer states.

Yet Arctic states still need to find other ways to more actively consider the collective interest and influence of non-Arctic states whose individual and collective role in Arctic shipping, natural resource extraction, communications and technology, and scientific research is on course to have great impact on the region's future (Ikeshima, 2016, p. 459). Particularly relevant could be the potential for China, Japan, South Korea, and other states with interest

in Arctic governance to leverage their membership in international forums (such as the IMO) to influence—either individually or via negotiating blocs—international policies that affect the Arctic. For example, China was active through the IMO on Polar Code negotiations; at one point, it supported U.S. opposition to a Russian proposal regarding national shipping regulations (Eiterjord, 2020).

For this reason, Arctic states should increasingly consider how to incorporate the interests and needs of non-Arctic states into decisionmaking in ways that are compatible with Arctic states' own sovereignty and interests in the region. One potential means of moving closer to this complex goal is to learn from the CAOFA precedent and use the Arctic Council as a venue to negotiate multilateral agreements with non-Arctic states concerning topics of interest.

Finally, all efforts to balance future interests of Arctic and non-Arctic actors must better involve indigenous actors. The Arctic Council's recognition of six indigenous representative groups as Permanent Participants, with full membership short of voting rights, has been rightly lauded as an overdue step forward, but more can be done (Charron, 2012, p. 767; Duyck, 2015, pp. 25–26). Arctic stakeholders should more fully acknowledge highly diverse indigenous communities, cultures, economies, needs, and levels of independence and further integrate them into the complete spectrum of Arctic formal and informal forums and conflict resolution mechanisms. As a first, tangible step, Arctic Council member states could (1) significantly increase logistical and operational funding to the Council's indigenous Permanent Participants to ensure their active participation at all meetings and (2) develop and undertake larger-scale initiatives benefiting Arctic indigenous communities (Arctic Council Indigenous Peoples' Secretariat, 2001).

Improving inclusivity in the Arctic would contribute to addressing most of the catalysts described in this report. For instance, it could help secure further buy-in for Arctic governance mechanisms and make it less likely that states or other actors will contest those mechanisms. Better inclusion of indigenous populations into bodies and mechanisms that make safety rules could ensure that those groups' extensive local knowledge is incorporated into such rules. And although the foreign policy of a fully independent Greenland remains speculative, it would likely prioritize human development and indigenous empowerment over traditional security issues and great-power politics, which would further tilt the dominant mode of operation in the Arctic toward cooperation rather than conflict.

Conclusion

We have argued that, although cooperation in the Arctic continues to be strong, new and continuing changes in the region necessitate rethinking the mechanisms to support continued cooperation. By 2030, tensions related to six conflict catalyst categories could emerge that cannot be fully resolved through the existing Arctic governance mechanisms. These catalyst categories are Russia's central role in Arctic access; increasing safety and environmental risks; the Arctic as a gray zone; challenges to the current rules of Arctic governance; China's increased economic and political involvement in the Arctic; and uncertainty about Greenland's geopolitical future. Failure to address conflict catalysts in these categories could lead to severe tensions by 2030.

To mitigate these risks, we suggest prioritizing three mitigating measures: improving dialogue and transparency on military issues; updating and providing capabilities to implement existing governance agreements; and enabling more inclusivity in Arctic-relevant decisionmaking without challenging the sovereignty of Arctic states. The table on the next page illustrates which of these avenues can help solve which of the potential key challenges that could lead to conflict.

We suggest that ensuring resilience in Arctic cooperation should be accomplished in a way that considers the variety of mechanisms—formal and informal, broad and narrow in scope—collectively, because each tool within this diverse group has an important role to play. The approach presented in this report provides an overview of which mechanisms can evolve and how, based on a better understanding of the assumptions that have underpinned

TABLE

Which Changes to Governance Mechanisms Can Mitigate the Potential Emergence of Conflict Catalysts

	Change to Governance Mechanisms		
Catalyst Category	**Improve Dialogue and Transparency on Military Issues**	**Update and Provide Capabilities to Implement Existing Governance Agreements**	**Enable More Inclusivity in Arctic-Relevant Decisionmaking**
Russia's central role for Arctic access	✓	✓	
Increasing safety and environmental risks	✓	✓	✓
The Arctic as a gray zone	✓	✓	✓
Challenges to the current rules of Arctic governance		✓	✓
China's increased economic and political involvement in the Arctic		✓	✓
Uncertainty about Greenland's geopolitical future			✓

Arctic stability so far but that could be violated by 2030. We deliberately designed this approach to be adaptable to a variety of Arctic state-, regional-, and local-level purposes. In so doing, we recognize that our results may vary based, for instance, on the background of the stakeholders interviewed or the extent of local-language literature consulted. Yet the conflict catalyst categories we identified through this approach are pan-Arctic and, if not addressed through appropriate mitigating measures, likely will affect all Arctic peoples in the near term. By improving dialogue and transparency on military issues, increasing capabilities and enforcement, and recognizing that pressure for more inclusivity will only increase and thus needs to be addressed, Arctic stakeholders can mitigate some of the most-worrisome tensions that might otherwise emerge by the 2030 horizon.

APPENDIX

Methodology

In Stage I, we developed a knowledge base of historical and contemporary Arctic geopolitical, socioeconomic, and military catalysts and governance mechanisms, as well as existing or potential solutions. As noted in the main report, we defined a *catalyst* as an issue that could violate at least one of two assumptions that underpin cooperation in general and Arctic cooperation in particular. These assumptions are as follows:

1. Issue resolution is already guided by stable and durable governance mechanisms.
2. The issue is unlikely by 2030 to represent fundamental disagreements over national interests of sufficient importance that military action would be contemplated.

We collected the following resources to develop our knowledge base: Arctic and non-Arctic states' most-recent official Arctic policies, strategies, or other official government documents; reports, articles, and op-eds from major think tanks, foreign policy institutions, and Arctic-focused organizations produced within the past five years (based on our search in April 2020); and, where applicable, articles from major national newspapers produced within the past five years. We also examined major peer-reviewed journals and books published within the past ten years. We were unable to review literature in languages other than English, owing to project resource limitations.

For each document, we identified (1) the author and any prominent individuals identified; (2) any potential conflict catalysts identified or discussed, such as collision of military assets and climate change issues; and (3) any potential conflict catalyst solutions, including existing or new mechanisms, institutions, or protocols. In a central database, we listed each catalyst, which author(s) discussed the catalyst, and in what context to identify where agreement or disagreement occurred for a potential conflict catalyst. We also noted where no solution was mentioned.

We supplemented this literature database with expert interviews covering a variety of Arctic issues. We developed a matrix comprising the 100 authors and prominent individuals identified in the literature database, and we considered these individuals to be potential interviewees. We first classified these potential interviewees by institutional category: think tanks and academia, including, where applicable, retired U.S. and foreign government and military officials (51); current U.S. government and military officials (27); current foreign government and military officials (16); and other, including from the private sector (e.g., the energy industry) and local-level administration (6). We next classified each potential interviewee by standardized area(s) of Arctic-relevant expertise. Those categories were Russia, China, the European Union, the United States, NATO, law, energy, climate science, fisheries, indigenous issues, infrastructure (including transportation, shipping, and urban development), diplomacy, and military issues.

We next developed a shortlist of priority potential interviewees. We defined a *priority potential interviewee* as an individual who demonstrated expertise in one or more of the most-discussed potential conflict catalysts identified in the central database. We balanced the priority potential interviewee list to represent diverse institutional affiliations, areas of expertise, and countries of expertise. We invited each priority potential interviewee to provide insights, from their respective area(s) of expertise, about possible trajectories toward conflict in the Arctic and how such trajectories may be avoided. Eighteen invitees from Canada, Denmark, France, Greenland, Iceland, Norway, the United Kingdom, and the United States agreed to be interviewed, representing a variety of academic, administrative, and military backgrounds. We did not invite any Russian or Chinese nationals, because of potential national security issues.

Using the literature database, we developed a standardized interview questionnaire comprising ten questions, plus up to five optional follow-up questions. We integrated each interviewee's responses into the central database, noting, as before, any potential conflict catalysts identified or discussed and any potential solutions, to harmonize information obtained from both the document analysis and interviews.

In Stage II, we used our knowledge base to develop a potential catalyst and solutions matrix. Of

the potential catalysts we identified, 23—such as pan-Arctic environmental issues and location-specific treaty article disagreements—did not possess a clear solution within existing Arctic governance mechanisms. We organized these 23 potential catalysts into a robust but not exhaustive list of six catalyst categories:

- Russia's central role in Arctic access
- increasing safety and environmental risks
- the Arctic as a gray zone
- challenges to the current rules of Arctic governance
- China's increased economic and political involvement in the Arctic
- uncertainty about Greenland's geopolitical future.

In Stage III, we developed a controlled tabletop exercise on the basis of formal wargaming methods and Decisionmaking Under Deep Uncertainty methods, and we then conducted the exercise with an international group of subject-matter experts. Decisionmaking Under Deep Uncertainty is a collection of formal adaptive methods that includes Dynamic Adaptive Policy Pathways or adaptive planning,[28] info-gap decision theory (Ben-Haim, 2006), scenario-based planning, and analytic gaming (Bartels, 2019), including Red Teaming that "challenges assumptions and bias" and "encourages dissent or divergence in thought."[29]

To ensure that our tabletop exercise represented diverse institutional affiliations, areas of expertise, and nationalities, we invited selected interviewees and additional subject-matter experts whom we had earlier listed as priority individuals and who represented expertise, professional backgrounds, and points of view that we identified as underrepresented in the interviewees' responses. Nineteen individuals from Canada, China (Hong Kong), Denmark, France, Greenland, Iceland, Norway, the United Kingdom, and the United States agreed to participate.

We divided the 19 participants into four breakout teams representing a variety of professional backgrounds, nationalities, and areas of expertise, and each breakout team was moderated by a RAND team member. One non-RAND team member acted as a fifth "roving" moderator, moving among the four teams to ensure that each was operating according to the exercise's requirements, gather insights, and mitigate potential bias from the U.S.-based RAND team.

As noted in the main report, for the tabletop exercise, we employed info-gap decision theory—combining longer-term stressors, short-term shocks, and decision point gaps—to integrate our six catalyst categories into two plausible skeletal near-term scenarios. Both scenarios began with regional tensions that ultimately escalated into a pan-Arctic crisis leading to a *brink-of-conflict* situation, which we defined as an emergency UN Security Council meeting. The scenarios—*Dire Straits* and *Northern Exposure*—represented only two of many potential plausible scenarios that could be developed involving the six catalyst categories.

We simultaneously executed the same scenario in two independent groups in order to compare and contrast their respective findings. Groups 1 and 3 were tasked with the *Dire Straits* scenario, which was described as follows:

> By 2028, there is increasing maritime traffic of surface ships, fishing fleets, and tourism vessels in and through the Arctic, and in particular transiting through the Greenland–Iceland–United Kingdom (GIUK) Gap, making this an acute focal point for competition over strategic control and resource access. Newly extended fiber-optic communications cables under the Arctic Ocean have rapidly enhanced bandwidth and reduced latency in communications between parts of Asia, Europe, and North America. Greenland is becoming increasingly self-reliant financially. China invests heavily in Greenland and elsewhere in the Arctic. Problems with maritime safety, environmental protection, and illegal fishing begin to weigh on limited law enforcement resources. A number of non-Arctic states argue that a security void is emerging in the Arctic. Then, in 2030, some Arctic-based fiber communications, particularly central to Japan's connectivity, experience unexplained and severe outages. Japan accuses China of orchestrating this disruption in response to continued disputes in the East China Sea. Both countries make the diplomatic decision to increase presence in the GIUK gap. Arctic communities are also

angry that their newly high-speed connectivity has been taken away. Led by Greenland, several indigenous groups submit complaints through domestic and international channels about what news outlets dub "becoming collateral damage to tensions created by outsiders." Russia extends a call for peace and stability amidst a growing security crisis throughout the Arctic. The UN Security Council, encouraged to act by Russia, calls an emergency meeting to address the rapidly deteriorating situation in the Arctic even as NATO countries react warily to Russian-led diplomacy.

Groups 2 and 4 were tasked with the *Northern Exposure* scenario, which was described as follows:

> By 2028, Russia and NATO increasingly trade airspace "fly-bys," especially in the Arctic. High-frequency radio communications and space-based navigation experience periodic interference, which scientists suggest is most likely due to unusually frequent severe geomagnetic storms. Among other issues, these communications and navigation problems may have played a role in a commercial airline accident over the Arctic Ocean, and in the subsequent slow rescue attempt. Countries blame each other for bungling the rescue response, leading to questions about whether there is an emerging security void in the region. Some indigenous communities complain that much-needed resources for search and rescue along the coast are being diverted toward the prevention and mitigation of incidents further at sea. The accident also serves as a justification for periodically limiting civilian airline flights over the region, which then becomes a mechanism for applying pressure in tense geostrategic times. The Arctic Council has also found itself increasingly besieged with challenging diplomatic situations: Norway, Sweden, Finland, and Iceland are leading the global charge on emissions reductions and accuse other Arctic Council stakeholders, including such observers as China and Japan, of failing to do their part in this. The UN Security Council calls an emergency meeting in 2030 to address the rapidly deteriorating situation in the Arctic after a military aircraft collision over the Bering Strait.

Each breakout group was tasked with three activities during the exercise. In the first activity, *forensic analysis*, participants debated and further developed the skeletal narrative to identify key stakeholders and sequence adverse conditions, actions, or events representing plausible paths for getting from the starting conditions to the crisis conclusion. In the second activity, *role identification analysis*, participants examined (1) the role that existing diplomatic, coordination, and information-sharing mechanisms may have traditionally played in defusing tension prior to the crisis scenario; (2) where they fell short in defusing scenario tensions; and (3) whether the mechanisms could still be employed to mitigate the crisis scenario. Each group produced an identified mechanism gap list, prioritized by mechanisms that could still help resolve the crisis scenario.

In the third activity, *gap prioritization analysis*, participants proposed ways to supplement or complement existing mechanisms with improved or new diplomatic, coordination, or information-sharing mechanisms to increase the likelihood that the crisis scenario could have been prevented or mitigated before escalating to a UN Security Council emergency meeting. Each group produced a list of its five most-effective conflict mitigation options, classifying at least one potential solution as an agreement, one as a new or enhanced engagement, and one as an investment to reflect the diversity of mechanisms that historically have maintained Arctic peace and collaboration.

In Stage IV, we synthesized our data that were collected in the knowledge base (literature review and interviews) and tested in our tabletop exercise to identify three key gaps in current Arctic governance mechanisms that could lead to an opportunity or a motivation for states to resolve potential conflicts in ways other than regional cooperation, including military ones. From these gaps, we derived three ways in which Arctic governance mechanisms might evolve to minimize the potential of these six catalyst categories to escalate tensions (see main report).

Notes

[1] Greenland is largely autonomous but is still politically and especially economically tied to Denmark, particularly in foreign, security, and defense affairs.

[2] There are also very minor territorial disputes between Canada and Denmark over Hans Island and between the United States and Canada on the Beaufort Sea boundary.

[3] Although the United States in particular has interpreted China's interest in the Arctic as a military threat, the connections to the Arctic implied in this phrase currently largely or entirely refer to economic interests. See, for example, reviews of Chinese Arctic policy, such as Kopra, 2020.

[4] NATO officials interviewed for a 2020 RAND report "consider[ed] the most significant threat [to the Arctic] to be horizontal escalation of a crisis or conflict emanating from another region" (Black et al., 2020, p. 7).

[5] Vylegzhanin, Young, and Berkman (2020, p. 1) adopt the definition of an *international regime complex* from Alter and Raustiala (2018, pp. 329, 332–333) to describe the existing set of Arctic governance mechanisms.

[6] In their Arctic policies or strategies, Arctic and non-Arctic states generally acknowledge the Arctic Council's central role in the existing Arctic governance framework. For a selection of these individual policies and strategies, see Finland Prime Minister's Office, 2013, p. 14; High Representative of the Union for Foreign Affairs and Security Policy, 2016, p. 13; Office of the Undersecretary of Defense for Policy, 2016, p. 6; State Council Information Office, 2018; UK Polar Regions Department, 2018, p. 7; France Ministry for the Armed Forces, 2019, p. 4; Government of Canada, 2019; and Government of Norway, 2021.

[7] Officially the Agreement to Prevent Unregulated High Seas Fisheries in the Central Arctic Ocean, the CAOFA is a binding 16-year fishing moratorium in international Arctic waters that was signed in 2018 by six Arctic states, the European Union, China, Japan, and South Korea. On the CAOFA's role as part of the broader set of Arctic governance mechanisms, see Vylegzhanin, Young, and Berkman, 2020.

[8] Some dialogue has continued to take place, absent Russia.

[9] Charron argues that Permanent Participant status provides indigenous groups in the Arctic with "a role more significant than usually afforded them at the UN and other multilateral meetings" (Charron, 2012, p. 767). For indigenous groups' Arctic Council voices in the context of Arctic state sovereignty questions, see O'Leary, 2014, p. 130.

[10] The United States, among other Arctic and non-Arctic state actors, has acknowledged the IMO's important Arctic role. See Office of the Undersecretary of Defense for Policy, 2016, p. 12.

[11] The Russian-U.S. agreement was originally signed in 1973 and has been updated since.

[12] Bailes and Ólafsson (2017, p. 49) identify the Barents Euro-Arctic Council as a successful subregional "microcosm" and "a local test-place for the Russia-West relationship" in Arctic and near-Arctic relations.

[13] Some have questioned this goal. Smirnov, for instance, estimates that 45–50 million tons will pass through the NSR by 2024. See Smirnov, 2020, p. 4.

[14] Indeed, Russia is already considering legislation to this effect. See Moe, 2020, pp. 4–5.

[15] Russia did not re-open its airspace until 1998.

[16] This issue is compounded by Arctic states' varied and complex SAR-military relationships.

[17] We adopt the definition of *gray zone* as described in Morris et al., 2019.

[18] The Svalbard Treaty (1920) grants its 44 signatories the right to engage in nondiscriminatory commercial activities while recognizing Norway's full sovereignty over the archipelago.

[19] Though part of the North American continent, Greenland is an autonomous territory within the Danish Realm. The Greenlandic government maintains control over internal affairs, including such policy areas as research, natural resources, and infrastructure, while Denmark retains control over foreign, security, and defense matters. Denmark must, however, consult Greenland in such matters.

[20] This goal is supported by nearly all parties in the Greenlandic Parliament.

[21] Japan is another important market for fish exports from Greenland.

[22] To date, Chinese stakeholders have unsuccessfully sought to invest in Greenlandic mining, real estate, and transportation and communication infrastructure (Sørensen, 2018).

[23] If Greenland opens diplomatic representation in Beijing, it will be the country's fourth such office, alongside those in Brussels, Reykjavik, and Washington, D.C.

[24] Thus far, Denmark has handled the question of Chinese activities in Greenland on an ad hoc basis, partly because any major institutional and legal initiatives require a complicated and likely politically sensitive and costly negotiation process with Greenland's government. Chinese activities—such as rare earth mining, construction of airports and other infrastructure, and building of Chinese research facilities in Greenland—have fallen within policy areas in which the Greenlandic government has leverage over decisions, according to the constitutional arrangement in the Kingdom of Denmark; however, the activities have clear security and defense policy implications.

[25] Experts in Arctic military and diplomatic matters, economy, law enforcement, and climate science, interview with the authors, April–May 2020.

[26] BarentsWatch is a Norwegian consortium of ten ministries and 29 administrative agencies that promotes open data and information-sharing throughout the North Atlantic, Barents, and central Arctic marine areas (BarentsWatch, 2018).

[27] Antarctica is governed by the Antarctic Treaty, in force since 1961. It freezes all territorial claims, bars all nonscientific research activity and settlement, and protects the region's natural environment. See Secretariat of the Antarctic Treaty, undated.

[28] Dynamic Adaptive Policy Pathways, or adaptive planning, is a Decisionmaking Under Deep Uncertainty method that develops "alternative routes into the future that are informed by a planner's strategic vision, short-term actions, and Adaptation Tipping Points" (Haasnoot et al., 2013).

[29] Tingstad, Wong, and Savitz, 2020, p. 4. Red Teaming is sourced from Zenko, 2015, pp. 116–141, 168; University of Foreign Military and Cultural Studies, 2019, p. 3; Wong et al., 2019, p. 94.

References

Alter, Karen J., and Kal Raustiala, "The Rise of International Regime Complexity," *Annual Review of Law and Social Science*, Vol. 14, October 2018, pp. 329–349.

Arctic Council, "Permanent Participants," webpage, undated. As of February 25, 2021: https://arctic-council.org/en/about/permanent-participants

———, "Declaration on the Establishment of the Arctic Council: Joint Communique of the Governments of the Arctic Countries on the Establishment of the Arctic Council," Ottawa, Canada, September 19, 1996.

Arctic Council Indigenous Peoples' Secretariat, *Terms of Reference and Procedural Guidelines*, Espoo, Finland, November 3, 2001.

Associated Press, "Russia Threatens Response to Huge NATO Exercise, Says Its New Weapons Will Be Unrivaled Anywhere," *Military Times*, October 25, 2018.

Åtland, Kristian, "Russia's Armed Forces and the Arctic: All Quiet on the Northern Front?" *Contemporary Security Policy*, Vol. 32, No. 2, August 2011, pp. 267–285.

Auerswald, David, "China's Multifaceted Arctic Strategy," *War on the Rocks*, May 24, 2019a.

———, "Now Is Not the Time for a FONOP in the Arctic," *War on the Rocks*, October 11, 2019b.

Baev, Pavel K., "Russia's Arctic Aspirations," in Juha Jokela, ed., *Arctic Security Matters*, Paris: European Union Institute for Security Studies, 2015, pp. 51–56.

Bailes, Alyson J. K., and Kristmundur Þ. Ólafsson, "The EU Crossing Arctic Frontiers: The Barents Euro-Arctic Council, Northern Dimension, and EU-West Nordic Relations," in Nengye Liu, Elizabeth A. Kirk, and Tore Henriksen, eds., *The European Union and the Arctic*, Amsterdam: Brill, 2017, pp. 40–62.

BarentsWatch, "About Us," webpage, February 23, 2018. As of May 3, 2021: https://www.barentswatch.no/en/about/

Bartels, Elizabeth, "Getting the Most out of Your Wargame: Practical Advice for Decision-Makers," *War on the Rocks*, November 19, 2019.

Ben-Haim, Yakov, *Info-Gap Decision Theory: Decisions Under Severe Uncertainty*, 2nd ed., Oxford, United Kingdom: Academic Press for Elsevier, 2006.

Bennett, Mia M., "How China Sees the Arctic: Reading Between Extraregional and Intraregional Narratives," *Geopolitics*, Vol. 20, No. 3, April 2015, pp. 645–668.

Bertelsen, Rasmus Gjedssø, "Arctic Security in International Security," in Gunhild Hoogensen Gjørv, Marc Lanteigne, and Horatio Sam-Aggrey, eds., *Routledge Handbook of Arctic Security*, London: Routledge, 2020, pp. 57–68.

Black, James, Stephen Flanagan, Gene Germanovich, Ruth Harris, David Ochmanek, Marina Favaro, Katerina Galai, and Emily Ryen Gloinson, *Enhancing Deterrence and Defence on NATO's Northern Flank: Allied Perspectives on Strategic Options for Norway*, Santa Monica, Calif.: RAND Corporation, RR-4381-NMOD, 2020. As of May 3, 2021: https://www.rand.org/pubs/research_reports/RR4381.html

Boulègue, Mathieu, *Russia's Military Posture in the Arctic: Managing Hard Power in a "Low Tension" Environment*, London: Chatham House, June 28, 2019.

Braynard, Katie, "Establishment of the Arctic Coast Guard Forum," *Coast Guard Compass*, October 30, 2015.

Breum, Martin, "The US Aid Package to Greenland Marks a New Chapter in a Long, Complex Relationship," *Arctic Today*, April 29, 2020.

Browne, Ryan, "US Intercepts Russian Bombers, Fighter Jets off the Coast of Alaska," CNN, May 22, 2019.

Buchanan, Elizabeth, and Bec Strating, "Why the Arctic Is Not the 'Next' South China Sea," *War on the Rocks*, November 5, 2020.

Burnett, Douglas R., and Lionel Carter, *International Submarine Cables and Biodiversity of Areas Beyond National Jurisdiction: The Cloud Beneath the Sea*, Leiden, Netherlands: Brill, 2017.

Canada, Denmark, Norway, the Russian Federation, and the United States, "The Ilulissat Declaration," Ilulissat, Greenland, May 28, 2008.

Carter, Lionel, and Douglas R. Burnett, "Subsea Telecommunications," in Hance D. Smith, Juan Luis Suárez de Vivero, and Tundi S. Agardy, *Routledge Handbook of Ocean Resources and Management*, London: Routledge, 2015, pp. 352–353.

Charron, Andrea, "Canada and the Arctic Council," *International Journal*, Vol. 67, No. 3, Summer 2012, pp. 765–783.

Christensen, Jan Top, *The Kingdom of Denmark: Battleground for Great Power Competition over Control of the Arctic Region*, Calgary, Canada: Canadian Global Affairs Institute, May 2020.

Clark, Bryan, "Undersea Cables and the Future of Submarine Competition," *Bulletin of the Atomic Scientists*, Vol. 72, No. 4, 2016, pp. 234–237.

Clarke-Sather, Afton, Britt Crow-Miller, Jeffrey M. Banister, Kimberley Anh Thomas, Emma S. Norman, and Scott R. Stephenson, "The Shifting Geopolitics of Water in the Anthropocene," *Geopolitics*, Vol. 22, No. 2, 2017, pp. 332–359.

Conley, Heather A., Matthew Melino, and Andreas Østhagen, *Maritime Futures: The Arctic and the Bering Strait Region*, Washington, D.C.: Center for Strategic and International Studies, 2017.

Conley, Heather A., David L. Pumphrey, Terence M. Toland, and Mihaela David, *Arctic Economics in the 21st Century: The Benefits and Costs of Cold*, Washington, D.C.: Center for Strategic and International Studies, July 2013.

Conley, Heather A., and Caroline Rohloff, *The New Ice Curtain: Russia's Strategic Reach to the Arctic*, Washington, D.C.: Center for Strategic and International Studies, August 2015.

Coultrup, Alexandra, "GPS Jamming in the Arctic Circle," Aerospace Security project, Center for Strategic and International Studies, March 31, 2020.

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

Danmarks Nationalbank, *Analyse: Grønlandsk Økonomi* [*Analysis: Greenlandic Economy*], Copenhagen, October 31, 2019.

Davenport, Tara, "Submarine Communications Cables and Law of the Sea: Problems in Law and Practice," *Ocean Development and International Law*, Vol. 43, No. 3, August 2012, pp. 201–242.

Dawson, Jackie, Natalie Carter, Nicolien van Luijk, Colleen Parker, Melissa Weber, Alison Cook, Kayla Grey, and Jennifer Provencher, "Infusing Inuit and Local Knowledge into the Low Impact Shipping Corridors: An Adaptation to Increased Shipping Activity and Climate Change in Arctic Canada," *Environmental Science and Policy*, Vol. 105, March 2020, pp. 19–36.

de Witt, Magnus, Hlynur Stefánsson, and Ágúst Valfells, "Energy Security in the Arctic," in Gunhild Hoogensen Gjørv, Marc Lanteigne, and Horatio Sam-Aggrey, eds., *Routledge Handbook of Arctic Security*, London: Routledge, 2020, pp. 91–101.

Delaunay, Michael, "Submarine Cables: Bringing Broadband Internet to the Arctic, a Life Changer for Northerners?" in Lassi Heininen, Heather Exner-Pirot, and Joël Plouffe, eds., *2017 Arctic Yearbook—Change and Innovation*, Rovaniemi, Finland: Northern Research Forum, 2017, pp. 259–268.

Delaunay, Michael, and Mathieu Landriault, "Connectivity and Infrastructure—the Arctic Digital Divide," in Joachim Weber, ed., *Handbook on Geopolitics and Security in the Arctic*, Cham, Switzerland: Springer Nature Switzerland, 2020, pp. 231–248.

Depledge, Duncan, Mathieu Boulègue, Andrew Foxhall, and Dmitriy Tulupov, "Why We Need to Talk About Military Activity in the Arctic: Towards an Arctic Military Code of Conduct," in Lassi Heininen, Heather Exner-Pirot, and Justin Barnes, eds., *Arctic Yearbook 2019—Redefining Arctic Security*, Akureyri, Iceland: Arctic Portal, 2019, pp. 83–86.

Dickstein, Corey, "US, Canadian Fighters Intercept Russian Bombers off Alaskan Coast," *Stars and Stripes*, August 8, 2019.

Dodds, Klaus, "Geopolitics, Security, and Governance," in Gunhild Hoogensen Gjørv, Marc Lanteigne, and Horatio Sam-Aggrey, eds., *Routledge Handbook of Arctic Security*, London: Routledge, 2020, pp. 258–269.

Dremliuga, Roman, "A Note on the Application of Article 234 of the Law of the Sea Convention in Light of Climate Change: Views from Russia," *Ocean Development and International Law*, Vol. 48, No. 2, March 2017, pp. 128–135.

Duyck, Sébastien, "Polar Environmental Governance and Nonstate Actors," in Rebecca Pincus and Saleem H. Ali, eds., *Diplomacy on Ice: Energy and the Environment in the Arctic and Antarctic*, New Haven, Conn.: Yale University Press, 2015, pp. 13–40.

Eckstein, Megan, "Zukunft: Arctic Coast Guard Forum Supports Positive Relationship with Russian Counterpart," *USNI News*, June 13, 2016.

Eiterjord, Trym Aleksander, "Arctic Technopolitics and China's Reception of the Polar Code," Arctic Institute Center for Circumpolar Security Studies, May 26, 2020.

Emergency Prevention, Preparedness and Response, homepage, undated. As of May 3, 2021:
https://eppr.org

Exner-Pirot, Heather, "Beyond the Arctic Council: Cooperation Needs and Gaps in the Arctic Region," in John Higginbotham and Jennifer Spence, eds., *North of 60: Toward a Renewed Canadian Arctic Agenda*, Waterloo, Canada: Centre for International Governance Innovation, 2016, pp. 51–55.

Exner-Pirot, Heather, and Rob Huebert, "Arctic Security: The Canadian Context," in Gunhild Hoogensen Gjørv, Marc Lanteigne, and Horatio Sam-Aggrey, eds., *Routledge Handbook of Arctic Security*, London: Routledge, 2020, pp. 140–151.

Fahey, Sean, "Access Control: Freedom of the Seas in the Arctic and the Russian Northern Sea Route Regime," *Harvard National Security Journal*, Vol. 9, No. 2, 2018, pp. 154–200.

Farré, Albert Buixadé, Scott R. Stephenson, Linling Chen, Michael Czub, Ying Dai, Denis Demchev, Yaroslav Efimov, Piotr Graczyk, Henrik Grythe, Kathrin Keil, Niku Kivekäs, Naresh Kumar, Nengye Liu, Igor Matelenok, Mari Myksvoll, Derek O'Leary, Julia Olsen, Sachin Pavithran, Edward Petersen, Andreas Raspotnik, Ivan Ryzhov, Jan Solski, Lingling Suo, Caroline Troein, Vilena Valeeva, Jaap van Rijckevorsel, and Jonathan Wighting, "Commercial Arctic Shipping Through the Northeast Passage: Routes, Resources, Governance, Technology, and Infrastructure," *Polar Geography*, Vol. 37, No. 4, September 2014, pp. 298–324.

Finland Prime Minister's Office, *Finland's Strategy for the Arctic Region 2013*, Helsinki: Prime Minister's Office Publications, 2013.

France Ministry for the Armed Forces, *France and the New Strategic Challenges in the Arctic*, Paris, 2019.

Goodman, Sherri, and Elisabeth Freese, "China's Ready to Cash In on a Melting Arctic," *Foreign Policy*, May 1, 2018.

Gosnell, Rachael, "It's Time to Update INCSEA," *U.S. Naval Institute Blog*, September 23, 2016.

Government of Canada, "Canada's Arctic and Northern Policy Framework," webpage, November 18, 2019. As of December 9, 2020:
https://www.rcaanc-cirnac.gc.ca/eng/1560523306861/1560523330587

Government of Norway, *The Norwegian Government's Arctic Policy*, Oslo, January 26, 2021.

Governments of Denmark, Greenland, and the Faroe Islands, *Kingdom of Denmark Strategy for the Arctic 2011–2020*, Copenhagen, 2011.

Grzybowski, Kazimierz, *Soviet International Law and the World Economic Order*, Durham, N.C.: Duke University Press, 1987.

Haasnoot, Marjolijn, Jan. H. Kwakkel, Warren E. Walker, and Judith ter Maat, "Dynamic Adaptive Policy Pathways: A Method for Crafting Robust Decisions for a Deeply Uncertain World," *Global Environmental Change*, Vol. 23, No. 2, April 2013, pp. 485–498.

Haley, Sharman, "Institutional Assets for Negotiating the Terms of Development: Indigenous Collective Action and Oil in Ecuador and Alaska," *Economic Development and Cultural Change*, Vol. 53, No. 1, October 2004, pp. 191–213.

Hansen, Cartsen Ørts, Peter Grønsedt, Christian Lindstrøm Graversen, and Christian Hendriksen, *Arctic Shipping: Commercial Opportunities and Challenges*, Copenhagen: Copenhagen Business School Maritime, January 2016.

Hansen-Magnusson, Hannes, "Arctic Geopoetics: Russian Politics at the North Pole," *Cooperation and Conflict*, Vol. 54, No. 4, 2019, pp. 466–487.

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*, Brussels: European Commission, April 27, 2016.

Hong, Nong, *China's Role in the Arctic: Observing and Being Observed*, New York: Routledge, 2020.

Ikeshima, Taisaku, "Japan's Role as an Asian Observer State Within and Outside the Arctic Council's Framework," *Polar Science*, Vol. 10, No. 3, September 2016, pp. 458–462.

IMO—*See* International Maritime Organization.

International Maritime Organization, "International Code for Ships Operating in Polar Waters (Polar Code)," London, 2019. As of December 5, 2020: https://www.imo.org/en/MediaCentre/HotTopics/Pages/polar-default.aspx

Jacobson, Mark Z., Jordan T. Wilkerson, Sathya Balasubramanian, Wayne W. Cooper, Jr., and Nina Mohleji, "The Effects of Rerouting Aircraft Around the Arctic Circle on Arctic and Global Climate," *Climatic Change*, Vol. 115, April 2012, pp. 709–724.

Johnson, Simon, "Pompeo: Russia Is 'Aggressive' in Arctic, China's Work There Also Needs Watching," Reuters, May 6, 2019.

Kingdom of Norway and the Russian Federation, "Treaty Between the Kingdom of Norway and the Russian Federation Concerning Maritime Delimitation and Cooperation in the Barents Sea and the Arctic Ocean," September 16, 2010.

Klasa, Katarzyna, Hannag Birge, Kamreul Hossain, Stefan Kirchner, José Palma-Oliveira, Myriam Merad, Robert Steven Silverstein, Adam Stepien, and Saumya Priya, "Challenges in Establishing Legal Frameworks and Governance Options That Promote Arctic Cyber Resilience," in Benjamin D. Trump, Kamrul Hossain, and Igor Linkov, eds., *NATO Science for Peace and Security Series—D: Information and Communication Security*, Vol. 58: *Cybersecurity and Resilience in the Arctic*, Clifton, Va.: IOS Press, 2020, pp. 321–360.

Koivurova, Timo, "Is This the End of the Arctic Council and Arctic Governance as We Know It?" *Polar Connection*, December 11, 2019.

Konyshev, Valery, and Alexander Sergunin, "Russia's Policies on the Territorial Disputes in the Arctic," *Journal of International Relations and Foreign Policy*, Vol. 2, No. 1, March 2014, pp. 55–83.

Kopra, Sanna, "China and Its Arctic Trajectories: The Arctic Institute's China Series 2020," Arctic Institute Center for Circumpolar Security Studies, March 17, 2020.

Kraska, James, "Russian Maritime Security Law Along the Northern Sea Route: Giving Shape to Article 234 in the Law of the Sea Convention," in Myron H. Nordquist, John Norton Moore, and Ronán Long, eds., *Challenges of the Changing Arctic: Continental Shelf, Navigation, and Fisheries*, Leiden, Netherlands: Brill, 2016, pp. 593–612.

———, "Submarine Cables in the Law of Naval Warfare," *Lawfare*, July 10, 2020.

Landreth, Natalie, and Erin Dougherty, "The Use of the Alaskan Native Claims Settlement Act to Justify Disparate Treatment of Alaska's Tribes," *American Indian Law Review*, Vol. 36, No. 2, 2011–2012, pp. 321–346.

Marchenko, Nataliya A., Natalia Andreassen, Odd Jarl Borch, Svetlana Kuznetsova, Valur Ingimundarson, and Uffe Jakobsen, "Arctic Shipping and Risks: Emergency Categories and Response Capabilities," *TransNav: The International Journal on Marine Navigation and Safety of Sea Transportation*, Vol. 12, No. 1, March 2018, pp. 107–114.

Melino, Matthew, and Heather A. Conley, "The Ice Curtain: Russia's Arctic Military Presence," Center for Strategic and International Studies, undated. As of May 14, 2021: https://www.csis.org/features/ice-curtain-russias-arctic-military-presence

Moe, Arild, "A New Russian Policy for the Northern Sea Route? State Interests, Key Stakeholders and Economic Opportunities in Changing Times," *Polar Journal*, Vol. 10, No. 2, August 2020, pp. 209–227.

Morgan, Craig A., "The Downing of Korean Air Lines Flight 007," *Yale Journal of International Law*, Vol. 11, 1985, pp. 231–257.

Morris, Lyle J., Michael J. Mazarr, Jeffrey W. Hornung, Stephanie Pezard, Anika Binnendijk, and Marta Kepe, *Gaining Competitive Advantage in the Gray Zone: Response Options for Coercive Aggression Below the Threshold of Major War*, Santa Monica, Calif.: RAND Corporation, RR-2942-OSD, 2019. As of May 3, 2021: https://www.rand.org/pubs/research_reports/RR2942.html

Naalakkersuisut [Government of Greenland], *Udenrigspolitisk Redegørelse 2019* [*Foreign Policy Report 2019*], Nuuk, September 27, 2019.

Nilsen, Thomas, "11 Russian Fighter Jets Make Mock Attack on Norwegian Arctic Radar," *Barents Observer*, February 12, 2019.

O'Dwyer, Gerard, "Norway Accuses Russia of Jamming Its Military Systems," *Defense News*, March 8, 2019.

Office of the Undersecretary of Defense for Policy, *Report to Congress on Strategy to Protect United States National Security Interests in the Arctic Region*, Washington, D.C.: U.S. Department of Defense, December 2016.

O'Leary, Caitlin, "The New Ice Age: The Dawn of Arctic Shipping and Canada's Fight for Sovereignty over the Northwest Passage," *University of Miami Inter-American Law Review*, Vol. 46, No. 1, Fall 2014, pp. 117–134.

Olesen, Mikkel Runge, and Camilla Tenna Sørensen, *Intensifying Great Power Politics in the Arctic—Points for Consideration by the Kingdom of Denmark: From an Analysis of Assessments and Strategies in Finland, Norway and Iceland*, Denmark: Danish Institute for International Studies, 2019.

Østhagen, Andreas, "Arctic Security: Hype, Nuances and Dilemmas," Arctic Institute Center for Circumpolar Security Studies, May 27, 2015.

———, "Managing Conflict at Sea: The Case of Norway and Russia in Svalbard Zone," *Arctic Review on Law and Politics*, Vol. 9, No. 1, 2018, pp. 100–123.

———, "Arctic Coast Guards: Why Cooperate?" in Gunhild Hoogensen Gjørv, Marc Lanteigne, and Horatio Sam-Aggrey, eds., *Routledge Handbook of Arctic Security*, London: Routledge, 2020, pp. 283–294.

Østreng, Willy, "Shipping and Resources in the Arctic Ocean: A Hemispheric Perspective," in Lassi Heininen, ed., *Arctic Yearbook 2012*, Akureyri, Iceland: Northern Research Forum, 2012, pp. 247–280.

Palma, David, Alix Varnajot, Kari Dalen, Ilker K. Basaran, Charles Brunette, Marta Bystrowska, Anastasia D. Korablina, Robynne C. Nowicki, and Thomas A. Ronge, "Cruising the Marginal Ice Zone: Climate Change and Arctic Tourism," *Polar Geography*, Vol. 42, No. 4, 2019, p. 215–235.

Panin, Alexander, "Overflight Fees to Remain after 2014," *Moscow Times*, September 4, 2013.

Pedersen, Torbjørn, "The Svalbard Continental Shelf Controversy: Legal Disputes and Political Rivalries," *Ocean Development and International Law*, Vol. 37, No. 3–4, 2006, pp. 339–358.

Pezard, Stephanie, "The New Geopolitics of the Arctic: Russia's and China's Evolving Role in the Region," testimony presented before the Standing Committee on Foreign Affairs and International Development of the Canadian House of Commons on November 26, 2018, Santa Monica, Calif.: RAND Corporation, CT-500, 2018. As of May 3, 2021: https://www.rand.org/pubs/testimonies/CT500.html

Pezard, Stephanie, Abbie Tingstad, and Alexandra Hall, *The Future of Arctic Cooperation in a Changing Strategic Environment: Insights from a Scenario-Based Exercise Organised by RAND and Hosted by NUPI*, Santa Monica, Calif.: RAND Corporation, PE-268-RC, 2018. As of May 3, 2021: https://www.rand.org/pubs/perspectives/PE268.html

Pezard, Stephanie, Abbie Tingstad, Kristin Van Abel, and Scott R. Stephenson, *Maintaining Arctic Cooperation with Russia: Planning for Regional Change in the Far North*, Santa Monica, Calif.: RAND Corporation, RR-1731-RC, 2017. As of May 3, 2021: https://www.rand.org/pubs/research_reports/RR1731.html

Pincus, Rebecca, "Rushing Navy Ships into the Arctic for a FONOP Is Dangerous," *Proceedings: U.S. Naval Institute*, Vol. 145, January 2019.

———, "Three-Way Power Dynamics in the Arctic," *Strategic Studies Quarterly*, Vol. 14, No. 1, Spring 2020, pp. 40–63.

Pompeo, Michael R., "Looking North: Sharpening America's Arctic Focus," remarks at the Arctic Council ministerial meeting, Rovaniemi, Finland, May 6, 2019.

Public-Private Analytic Exchange Program, *Threats to Undersea Cable Communications: Examining Strategies Public and Private Entities Can Pursue to Contain Such Threats*, Washington, D.C.: U.S. Department of Homeland Security and Office of the Director of National Intelligence, September 28, 2017.

Rahbek-Clemmensen, Jon, "The Ukraine Crisis Moves North: Is Arctic Conflict Spill-Over Driven by Material Interests?" *Polar Record*, Vol. 53, No. 1, November 2016, pp. 1–15.

———, "Denmark and Greenland's Changing Sovereignty and Security Challenges in the Arctic," in Gunhild Hoogensen Gjørv, Marc Lanteigne, and Horatio Sam-Aggrey, eds., *Routledge Handbook of Arctic Security*, London: Routledge, 2020a, p. 176–187.

———, "Denmark Walks a Tightrope in Greenland," in Center for Strategic and International Studies, *Geopolitics and Neglected Arctic Spaces: Three Northern Perspectives on Balancing External Interests*, Washington, D.C., November 2020b, pp. 6–8.

Raspotnik, Andreas, and Andreas Østhagen, "What About the Arctic? The European Union's Geopolitical Quest for Northern Space," *Geopolitics*, October 6, 2019, pp. 1–25.

Reinke de Buitrago, Sybille, "Risk Representations and Confrontational Actions in the Arctic," *Journal of Strategic Security*, Vol. 12, No. 3, 2019, pp. 13–36.

Rosen, Yereth, "Russia Is Poised to Open the First-Ever Commercial Pollock Fishery in Chukchi Sea," *Arctic Today*, June 25, 2020.

Rosenberg, Elizabeth, David Titley, and Alexander Wiker, *Arctic 2015 and Beyond: A Strategy for U.S. Leadership in the High North*, Washington, D.C.: Center for a New American Security, December 2014.

Rotnem, Thomas E., "Putin's Arctic Strategy: Collaboration or Conflict after Ukraine?" *Problems of Post-Communism*, Vol. 65, No. 1, 2018, pp. 1–17.

Rowe, Elana Wilson, "The Arctic in Moscow," in Robert W. Orttung, ed., *Sustaining Russia's Arctic Cities: Resource Politics, Migration, and Climate Change*, New York: Berghahn Books, 2017, pp. 25–41.

"Russia Plants Flag Under N Pole," BBC News, August 2, 2007.

Sato, Kazutoshi, and Jun Inoue, "Relationship Between Transpolar Flights over the Arctic and the Upper Atmospheric Circulation," *Okhotsk Sea and Polar Oceans Research*, Vol. 3, No. 1, 2019, pp. 1–6.

Schaller, Benjamin, "An Arctic Forum for Security Co-Operation?" in Lassi Heininen, Heather Exner-Pirot, and Joël Plouffe, eds., *Arctic Yearbook 2016—The Arctic Council: 20 Years of Regional Cooperation and Policy-Shaping*, Akureyri, Iceland: Northern Research Forum, 2016, pp. 483–487.

Secretariat of the Antarctic Treaty, "The Antarctic Treaty," webpage, undated. As of January 11, 2021: https://www.ats.aq/e/antarctictreaty.html

Sergunin, Alexander, and Valery Konyshev, "Russia in Search of Its Arctic Strategy: Between Hard and Soft Power?" *Polar Journal*, Vol. 4, No. 1, 2014, pp. 69–87.

Sevunts, Levon, "Arctic Nations Develop Coast Guard Co-operation," *Barents Observer*, March 13, 2018.

———, "U.S., NATO and Russia Engage in Cat-and-Mouse Game During Arctic Training," Radio Canada International, March 11, 2020.

Smirnov, Aleksey, "The Northern Sea Route Cargo Transportation Development," *E3S Web of Conferences*, Vol. 157, 2020, pp. 1–6.

Smith, Julianne, and Jerry Hendrix, *Forgotten Waters: Minding the GIUK Gap: A Tabletop Exercise*, Washington, D.C.: Center for a New American Security, May 2017.

Smith, Timothy William James, *Search and Rescue in the Arctic: Is the U.S. Prepared?* dissertation, Pardee RAND Graduate School, Santa Monica, Calif.: RAND Corporation, RGSD-382, 2017. As of May 3, 2021: https://www.rand.org/pubs/rgs_dissertations/RGSD382.html

Soames, Nicholas, *Evolving Security in the North Atlantic*, Brussels: North Atlantic Treaty Organization, Parliamentary Assembly, October 13, 2019.

Solli, Per Erik, Elana Wilson Rowe, and Wrenn Yennie Lindgren, "Coming into the Cold: Asia's Arctic Interests," Oslo: Norwegian Institute for International Affairs, Policy Brief 11, 2013.

Sørensen, Camilla T. N., "China Is in the Arctic to Stay as a Great Power: How China's Increasingly Confident, Proactive and Sophisticated Arctic Diplomacy Plays into Kingdom of Denmark Tensions," in Lassi Heininen and Heather Exner-Pirot, eds., *Arctic Yearbook 2018—Arctic Development: In Theory and Practice*, Special Section: *China and the Arctic*, Akureyri, Iceland: Northern Research Forum, 2018, pp. 43–58.

———, "Intensifying U.S.-China Security Dilemma Dynamics Play Out in the Arctic: Implications for China's Arctic Strategy," in Lassi Heininen, Heather Exner-Pirot, and Justin Barnes, eds., *Arctic Yearbook 2019—Redefining Arctic Security*, Akureyri, Iceland: Arctic Portal, 2019, pp. 442–456.

Sørensen, Camilla T. N., and Ekaterina Klimenko, *Emerging Chinese-Russian Cooperation in the Arctic: Possibilities and Constraints*, Stockholm: Stockholm International Peace Research Institute, Policy Paper 46, June 2017.

St. Peter, Erin, "Arctic Shipping Activity Heating Up Despite Uncertainty and Challenges," University of Pennsylvania, Wharton School of Business Risk Management and Decision Processes Center, October 1, 2020.

State Council Information Office, *China's Arctic Policy*, white paper, Beijing: People's Republic of China, January 26, 2018.

Staun, Jørgen, "Russia's Strategy in the Arctic: Cooperation, Not Confrontation," *Polar Record*, Vol. 53, No. 3, May 2017, pp. 314–332.

Stavridis, James, "High North or High Tension? How to Head Off War in the Last Frontier on Earth," *Foreign Policy*, October 21, 2013.

Stephen, Kathrin, "An Arctic Security Forum? Please, No!" Arctic Institute Center for Circumpolar Security Studies, May 26, 2016.

Stephenson, Scott R., "Engaging with Greenland," *RAND Blog*, September 23, 2019. As of December 13, 2020: https://www.rand.org/blog/2019/09/engaging-with-greenland.html

Sydnes, Are Kristoffer, Maria Sydnes, and Yngve Antonsen, "International Cooperation on Search and Rescue in the Arctic," *Arctic Review on Law and Politics*, Vol. 8, No. 1, September 2017, pp. 109–136.

Tingstad, Abbie, "Climate Change and U.S. Security in the Arctic," testimony presented before the House Homeland Security Committee, Subcommittee on Transportation and Maritime Security on September 19, 2019, Santa Monica, Calif.: RAND Corporation, CT-517, 2019. As of May 3, 2021: https://www.rand.org/pubs/testimonies/CT517.html

———, "Today's Arctic Diplomacy Can't Handle Tomorrow's Problems," *Defense One*, January 29, 2020.

Tingstad, Abbie, Scott Savitz, Kristin Van Abel, Dulani Woods, Katherine Anania, Michelle Darrah Ziegler, Aaron C. Davenport, and Katherine Costello, *Identifying Potential Gaps in U.S. Coast Guard Arctic Capabilities*, Santa Monica, Calif.: RAND Corporation, RR-2310-DHS, 2018. As of May 3, 2021: https://www.rand.org/pubs/research_reports/RR2310.html

Tingstad, Abbie, Yuna Huh Wong, and Scott Savitz, *How Can the Coast Guard Use Gaming?* Santa Monica, Calif.: RAND Corporation, PE-A148-1, September 2020. As of May 3, 2021: https://www.rand.org/pubs/perspectives/PEA148-1.html

Townsend, Jim, "Here's How Trump Should Have Approached Greenland," *Foreign Policy*, August 24, 2019.

Trenin, Dmitri, *The Ukraine Crisis and the Resumption of Great-Power Rivalry*, Moscow: Carnegie Moscow Center, July 2014.

UK Polar Regions Department, *Beyond the Ice: UK Policy Towards the Arctic*, London: Foreign and Commonwealth Office, 2018.

United Nations, *Convention on the Law of the Sea*, New York, December 10, 1982.

United Nations Commission on the Limits of the Continental Shelf, *Summary of Recommendations of the Commission on the Limits of the Continental Shelf in Regard to the Partial Revised Submission Made by the Russian Federation in Respect of the Sea of Okhotsk on 28 February 2013*, New York: United Nations, March 11, 2014.

United States and Russian Federation, *Agreement with Russian Federation Concerning Polar Bear Population*, Washington, D.C.: U.S. Government Printing Office, Treaty Document 107-10, July 11, 2002.

United States and Soviet Union, "Agreement Between the United States of America and the Union of Soviet Socialist Republics on the Maritime Boundary, 1 June 1990," June 1, 1990.

University of Foreign Military and Cultural Studies, *The Red Team Handbook: The Army's Guide to Making Better Decisions*, Version 9.0, Fort Leavenworth, Kan.: U.S. Army Training and Doctrine Command, 2019.

U.S. Coast Guard, *Arctic Strategic Outlook*, Washington, D.C.: U.S. Department of Homeland Security, April 2019.

Vylegzhanin, Alexander N., Oran R. Young, and Paul Arthur Berkman, "The Central Arctic Ocean Fisheries Agreement as an Element in the Evolving Arctic Ocean Governance Complex," *Marine Policy*, Vol. 118, August 2020, pp. 1–10.

Wenger, Michael, "Greenland Plans Representation in Beijing from 2021 On," *Polar Journal*, September 10, 2020.

Wishnick, Elizabeth, *China's Interests and Goals in the Arctic: Implications for the United States*, Carlisle, Pa.: U.S. Army War College Strategic Studies Institute, March 2017.

Wong, Yuna Huh, Sebastian Joon Bae, Elizabeth M. Bartels, and Benjamin Michael Smith, *Next-Generation Wargaming for the U.S. Marine Corps: Recommended Courses of Action*, Santa Monica, Calif.: RAND Corporation, RR-2227-USMC, 2019. As of May 3, 2021: https://www.rand.org/pubs/research_reports/RR2227.html

Zandee, Dick, Kimberley Kruijver, and Adája Stoetman, *The Future of Arctic Security: The Geopolitical Pressure Cooker and the Consequences for the Netherlands*, Amsterdam: Clingendael Institute, Netherlands Institute of International Relations, April 2020.

Zenko, Micah, *Red Team: How to Succeed by Thinking Like the Enemy*, New York: Basic Books, 2015.

Zukunft, Paul, "Navigating the Fourth Coast," in Rachel Ellehuus, ed., *Shifting Currents in the Arctic: Perspectives from Three Arctic Littoral States*, Washington, D.C.: Center for Strategic and International Studies, May 2019, pp. 3–5.

Zysk, Katarzyna, *Russia's Military Build-Up in the Arctic: To What End?* Arlington, Va.: CNA, September 2020.

About the Authors

Benjamin J. Sacks is an associate policy researcher at the RAND Corporation and a professor at the Pardee RAND Graduate School. He employs mixed-method approaches to examine the political geography, public diplomacy, history, and networks of major-power competition. He holds a Ph.D. in history.

Scott R. Stephenson is a physical scientist at the RAND Corporation and a professor at the Pardee RAND Graduate School. His research utilizes geospatial modeling and analysis to investigate issues related to climate change, linked natural and human systems, and critical infrastructure. He holds a Ph.D. in geography.

Stephanie Pezard is a senior political scientist at the RAND Corporation. Her work focuses on European and Arctic security, security cooperation, deterrence, and gray zone threats. She holds a Ph.D. in international relations.

Abbie Tingstad is a senior scientist at the RAND Corporation. Her research focuses on a variety of topics, including Arctic planning, military operations and intelligence, and environmental change. She holds a Ph.D. in geography.

Camilla T. N. Sørensen is an associate professor at the Royal Danish Defense College's Institute for Strategy. She conducts research on an array of Arctic issues, especially those involving Denmark, Greenland, and China. She holds a Ph.D. in international relations.

Acknowledgments

We thank CGRS's Advisory Board, King Mallory, Robin Meili, and Casey Bouskill for their generous support in making this project possible. We also thank Michael Spirtas, associate director of RAND's International Security and Defense Policy Center, for his support and insight throughout this project.

We are grateful to the numerous experts whose contributions were critical to the genesis of this report. In particular, we acknowledge the generous input of the following participants in a virtual tabletop exercise conducted in October 2020: David Auerswald, Mia Bennett, Paul Berkman, Mathieu Boulègue, Lawson Brigham, Duncan Depledge, Klaus Dodds, Magnus de Witt, Sherri Goodman, Rasmus Leander Nielsen, Andreas Østhagen, Jon Rahbek-Clemmensen, Elana Wilson Rowe, Benjamin Schaller, Jorgen Staun, Yun Sun, Jim Townsend, Elizabeth Wishnick, and Katarzyna Zysk.

We would also like to thank our reviewers—Elana Wilson Rowe, senior research fellow at the Norwegian Institute of International Affairs, and Stephen Watts, senior political scientist and associate program director of the Arroyo Center's Strategy, Doctrine, and Resource Program at the RAND Corporation—for their thoughtful and insightful comments.

About This Report

In this report, RAND researchers propose and implement an adaptive, four-stage approach to identify potential Arctic conflict catalysts; determine, confirm, and prioritize the catalysts that cannot currently be solved through existing Arctic governance mechanisms; and identify potential governance mechanisms that can evolve to mitigate identified risks.

Funding

Funding for this effort was provided by the generous contributions of the RAND Center for Global Risk and Security Advisory Board.

RAND Center for Global Risk and Security and RAND National Security Research Division

The research described in this report was conducted within the Center for Global Risk and Security (CGRS), part of International Programs at the RAND Corporation, and within the International Security and Defense Policy (ISDP) Center of the RAND National Security Research Division (NSRD). CGRS is RAND's in-house incubator that investigates pressing future systemic risks and practical responses that seize opportunities and mitigate threats. NSRD conducts research and analysis for the Office of the Secretary of Defense, the U.S. Intelligence Community, the U.S. State Department, allied foreign governments, and foundations.

For more information about the RAND Center for Global Risk and Security, visit www.rand.org/international/cgrs or contact the center director (contact information is provided on the center's webpage).

For more information on the RAND International Security and Defense Policy Center, visit www.rand.org/nsrd/isdp or contact the center director (contact information is provided on the center's webpage).

The eight recognized Arctic states—Canada, Denmark (via Greenland), Finland, Iceland, Norway, Russia, Sweden, and the United States—have long cooperated in the Arctic region, even when their respective interests, especially those between Russia and the United States, have clashed on other matters. They have done so because each state perceives that it benefits from the current state of cooperation, which occurs through a set of international, regional, and subregional governance mechanisms. But conditions in the Arctic are evolving—driven by such factors as climate change, economics, and geopolitics—and thus its governance mechanisms must also evolve in order to mitigate new risks before they potentially escalate into conflict. What are these risks? How should existing governance mechanisms evolve to mitigate those risks? In this report, researchers propose and implement an adaptive, four-stage approach to identify potential Arctic conflict catalysts; determine, confirm, and prioritize the catalysts that cannot be solved through existing Arctic governance mechanisms; and identify potential governance mechanisms that can evolve to mitigate identified risks. The researchers conclude that, to decrease the risk of unraveling cooperation by 2030, Arctic stakeholders should work toward resolving gaps in Arctic governance in three ways: improving currently limited dialogue and transparency on military issues, updating and providing new capabilities to implement existing governance agreements, and enabling more inclusivity in Arctic-relevant decisionmaking without challenging the sovereignty of Arctic states.

www.rand.org

RR-A1007-1