

Search and Rescue in the High North

An Air Force Mission?

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There are strange things done in the midnight sun

By the men who moil for gold.

—Robert W. Service



The “Bard of the Yukon” would be surprised at the strange new things in the land of the midnight sun. What wouldn’t surprise him are the things that never change: six months of darkness, constant danger, numbing cold, and adventurers planning to brave all three in search of fame, fortune, or just “a good look around.” Some of their motivations include untapped oil and natural gas deposits, unprecedented (to known history) melting of Arctic ice, a quest for territorial rights, the lure of the fabled Northwest Passage, and “adventure

tourism.” All have resulted in greatly increased human activity—and with that comes the increased risk of human calamity by the unwise, the unprepared, or the unlucky. Capt Melissa Bert, former captain of the port and commander of Coast Guard Sector Juneau, echoes these concerns: “I don’t worry about a war in the Arctic. . . . But I do worry that we’re not prepared to deal with a major disaster there. No one is, but as more people go there, it becomes much more likely.”¹

A Question of Untapped Resources

The 2008 US Geological Survey estimate of High North energy resources, considered the most authoritative survey to date, suggests that 13 percent of the world’s undiscovered oil and 30 percent of its undiscovered natural gas lie in the Arctic.² This amounts to approximately 90 billion barrels of oil; 1,669 trillion cubic feet of natural gas; and 44 billion barrels of liquid natural gas—a total exceeding all other known quantities of oil and natural gas in the Arctic.³ Since most Arctic territory has been claimed, in practical terms the “race” for these exploitable natural resources is just about over. However, economic exploitation via leasing rights and transportation nodes remain as two powerful incentives.

Because many of these resources lie in relatively shallow (500 feet) coastal waters, they are “technically recoverable” but not necessarily “economically recoverable”—that is, no current infrastructure exists to develop offshore oil and gas in the Arctic, particularly in North America. Estimates indicate that a decade or more may pass before both capital and technology are available to begin the extraction process in earnest.⁴ Royal Dutch Shell’s highly publicized and very expensive (more than \$4.5 billion) attempt to be the first to drill extensively in the Chukchi Sea highlights these problems. In 2012 the company drilled only modest exploratory wells, far short of its planned six deep wells, before abandoning efforts as the end of the short season approached. Later, its drill ship ran aground on an uninhabited island 300 miles southwest of Anchorage, and calls for tighter environmental reg-

ulation of offshore exploration increased in the aftermath. Shell has cancelled plans for the coming exploration season, prompting others to take a long look at their proposed plans.⁵ Nevertheless, the lure of this much untapped oil and gas cannot be forestalled for long, despite nagging concerns that similar disasters will occur in the early phases of exploitation and extraction.

The Passages across the Top of the World

The High North also holds the promise of a shorter transit between the Far East and Europe: the centuries-old dream of the Northwest Passage (fig. 1) and the opening of a maritime route across northern Russia. The Northern Sea Route, which closely follows the coastline along Russia's northern tier, has seen far more success in Arctic transshipment than its Canadian counterpart. Forty-six vessels transited this route in 2012, carrying over a million tons of cargo—a 53 percent increase in tonnage from 2011. More ships, aided by Russia's sizable (more than 30) fleet of icebreakers, will probably add to that total in the coming years, and China has announced its first commercial voyage there this summer.⁶ Local maritime traffic supporting drilling operations continues to grow as well. Receding sea-ice coverage in the High North during the summer has made the long-sought-after Northwest Passage an emerging reality—at least in the late summer and early fall. Claims that the route would “rival the Suez Canal” and would be “ice free” by 2015 have grudgingly yielded to more measured assessments of both; yet, the promise of ice-free passage and a shorter sea route to and from Europe and Asia continues to gain traction and international attention.⁷



Figure 1. The Northwest Passage(s) and the Northern Sea Route. (Reprinted from “Arctic Ocean,” in Central Intelligence Agency, *The World Factbook*, accessed 3 September 2013, <https://www.cia.gov/library/publications/the-world-factbook/geos/xq.html>.)

The Northwest Passage actually includes more than one route across the Canadian Archipelago, an expanse of territory consisting of 73 major islands and 18,114 smaller ones encompassing an area roughly the size of Greenland. The more southerly passage has a draft of only 13 meters while the one to the north has an average depth of 200 meters. The more southerly channel, the Union Strait, holds the promise of less ice but may be unavailable to deep-draft vessels. To the north, the recently opened (2007) McClure Strait is deeper but more ice laden.⁸ A Norwegian study of 2011 lists no fewer than seven different routes through the Northwest Passage, explaining that the current navigation channel offers the best sea-ice conditions at the time.⁹

Although some observers use the term *ice free* to describe the Northwest Passage, one should do so with caution because even “open water” can contain icebergs. *Ice free* is a catchphrase for newspaper pundits, but experts prefer the more precise term *ice diminished*.¹⁰ Furthermore, even that descriptor means that ice is still present. Canadian geographer Frédéric Lasserre points to multiseason ice formations (frozen, thawed, and refrozen) that are particularly dense and very difficult to spot as a significant hazard to navigation throughout any “ice free” or “ice-diminished” season.¹¹

University of British Columbia professor Michael Byers agrees, adding that thinning ice produces more icebergs in Eastern Arctic waters as Greenland’s glaciers move more quickly into the sea. Glacial ice is very hard, he explains, and glacier ice “growlers” are particularly dangerous even to “ice-strengthened” ships—those with reinforced hulls but no ice-breaking capability. Nevertheless, the sinking of the ice-strengthened passenger ship *MS Explorer* in the Antarctic in 2007 stands as a stark example of what can happen when even such a vessel meets multiyear ice.¹² The Norwegian assessment paints an even bleaker picture. Refuting the term *ice free*, it contends that “most Arctic shipping experts view this term as meaning ice-infested with icebergs, bergybits and growlers present,” concluding that “from a mariners [*sic*] point of view ‘ . . . with less ice, more icebreaking capacity will be needed.’”¹³

Perhaps the most measured discussion—out of dozens of contrary claims—of impending Arctic ice melt comes from the Center for Climate and Energy Solutions in its paper *Climate Change & International Security: The Arctic as a Bellwether* (2012).¹⁴ That study lists three dates for an ice-free (i.e., 80 percent loss of historical sea ice during the summer) Arctic based on linear and nonlinear extrapolations of minimum sea-ice extent in the summer. Not surprisingly, these projections vary widely from 2025 to 2072.¹⁵ Insurer Lloyds of London, more interested in the bottom line than in bombast, agrees with the midrange scientific forecasts but warns that thinner ice may mean more wave action and

more abrupt destruction of the ice pack, thus adding to the overall uncertainty. In reality the Northwest Passage is a complex dynamic of ice, islands, and changing weather conditions that make transit a challenge and disaster only one poor decision away.

Enthusiasts extol the shorter shipping routes through the Arctic and forecast a renaissance in polar shipping, but this is not the case. Shipping to Asia from Mediterranean ports (Marseilles to Shanghai, for example) provides no distance-based economic advantage while high-latitude to high-latitude destinations—say, Marseilles to Yokohama—do offer such an advantage. An analysis of 20 city-pairs that might use the Northwest Passage or the Northern Sea Route found that only three are shortest through the Northwest Passage.¹⁶ Regardless, the lure of shorter maritime routes to and from the markets of Asia and Europe via the High North continues to draw more attention and increased human activity.

Today, only cruise liners, private adventurers, and a few commercial vessels journey through the Northwest Passage, but a significant uptick in transits (69 [1906–2006]; 40 [2010–11]; and upwards of 30 in 2012) worries search and rescue (SAR) experts who see potential disaster in an unforgiving environment.¹⁷ Experts also point to poor navigational aids as a major contributor to safety concerns along the Northwest Passage. A *Wall Street Journal* article highlights the overarching issue of sea-bed mapping: “Overall, maps of Mars are about 250 times better than maps of the earth’s ocean floor.” Another report warns that at its current rate, completely charting Canadian Arctic waters will take three centuries.¹⁸

The Arctic Council and the Nuuk Search and Rescue Agreement

In 1996 eight nations with territory or clearly defined interests in the region (the United States, Canada, Russia, Finland, Norway, Denmark, Iceland, and Sweden) formed the Arctic Council “to provide a means for promoting cooperation, coordination and interaction among

the Arctic States, with the involvement of the Arctic Indigenous communities and other Arctic inhabitants on common Arctic issues.”¹⁹ The council is unique in that it addresses only nonsecurity issues faced by the Arctic states; the region’s indigenous peoples and observers characterize it as “populated more by scientists and scholars than by statesmen.”²⁰ Mindful of its previous call in 2008 to “further strengthen search and rescue capabilities and capacity around the Arctic Ocean,” the council signed a SAR treaty at Nuuk, Greenland, in 2011—the *Agreement on Cooperation on Aeronautical and Maritime Search and Rescue in the Arctic* (the *Nuuk Agreement*), which states that each party will establish and maintain an “adequate and effective search and rescue capability” within its designated area (fig. 2).²¹ Further, it binds member nations to coordinate SAR efforts in case of a plane crash, cruise ship sinking, oil spill, or other disaster across the High North.²²



Figure 2. Arctic SAR agreement, areas of application. (Based on geographic coordinates in the annex to the *Agreement on Cooperation on Aeronautical and Maritime Search and Rescue in the Arctic*, 12 May 2011, <http://www.ifrc.org/docs/idrl/N813EN.pdf>. Map from “Arctic Search and Rescue Agreement,” Arctic Portal, accessed 3 September 2013, <http://arcticportal.org/features/751-arctic-search-and-rescue-agreement>.)

The United States is responsible for SAR operations in Alaska and a large swath of the approaches to the Bering Strait. This also encompasses the western approaches to the Northwest Passage and the eastern approaches to the Northern Sea Route, paralleling Russia's Kamchatka Peninsula. The United States also has responsibility for SAR in the Beaufort, Chukchi, and Arctic Seas extending to the North Pole. Although not the largest area mentioned in the *Nuuk Agreement*, its size will tax US resources. A key point in the agreement—one that gives SAR planners pause—is that any party may request the assistance of any other party/parties if necessary, ensuring that “assistance be provided to any person in distress.”²³

In spite of increased successful transits of the Northwest Passage, news of three more passenger cruises in 2013 has raised concerns that a major disaster there would be met by a slow response from rescue forces—judged by some as too far away and too few in number to help quickly (fig. 3).²⁴ Placement of Canada's SAR assets highlights this potential dilemma: that country's lone rescue coordination center (RCC) at Trenton, Ontario, encompasses most of the Canadian Arctic, but it is located closer to the northern coast of South America, for example, than to the Canadian Forces Station in Alert, Nunavut.²⁵

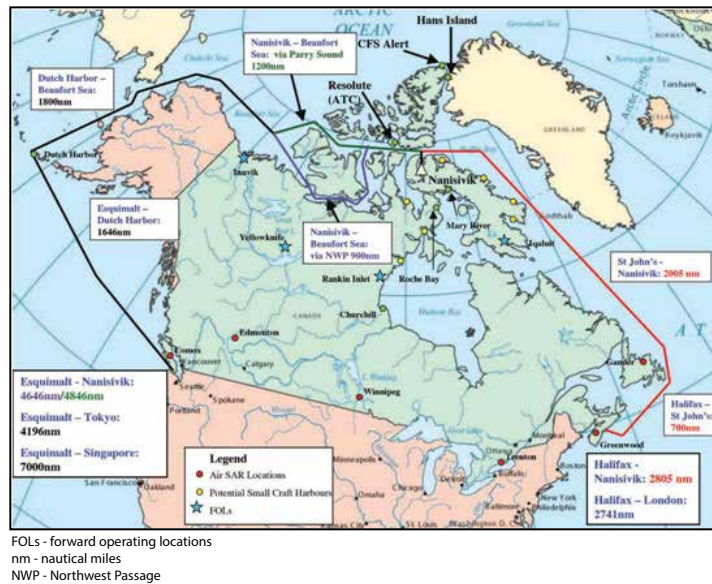


Figure 3. Operational Arctic patrol distances. (Reprinted from Michael Byers and Stewart Webb, *Titanic Blunder: Arctic/Offshore Patrol Ships on Course for Disaster* [Ottawa: Rideau Institute, Canadian Centre for Policy Alternatives, April 2013], 37, http://www.policyalternatives.ca/sites/default/files/uploads/publications/National%20Office/2013/04/Titanic_Blunder.pdf.)

Flight time from Winnipeg to Resolute Bay in the heart of the Northwest Passage via a Canadian C-130H is over five hours; helicopters to the same area from Comox would take more than 11.²⁶ Although a Canadian Forces CC-177 (the Canadian version of the USAF C-17) demonstrated that it can land and take off from Canadian Forces Station Alert's 5,500-foot gravel runway, it is not Canada's primary SAR aircraft and may not always be available for that mission.²⁷ Defenders of the current aircraft-basing concept point out that most rescues occur in southern Canada, not in the High North. However, pressure is growing to expand Canadian Arctic SAR presence northward. Canada's major High North maritime assets—its two icebreakers—confront the daunting task of patrolling the Northwest Passage's 1,200 nautical miles.²⁸ So far, luck has been on their side. In 2010 the 120 passengers on the ice-strengthened “elderly expedition cruise ship” *Clipper Adventurer* were evacuated by a

nearby (two days' sailing) Canadian Coast Guard icebreaker after the cruise ship ran aground in the Beaufort Sea's Coronation Gulf.²⁹ Air and sea traffic is growing rapidly in the High North, increasing the likelihood that mishaps will occur. Given the paucity of Canadian assets—both in quantity and placement—chances that the United States may be asked to assist Canadian rescuers are also growing.

The US Role in High North SAR: It's the Coast Guard's Job

According to the *Nuuk Agreement*, the Coast Guard is the US “competent authority” for SAR efforts. More importantly, it lists both that service and the Department of Defense as the US SAR “agencies.” US RCCs in the agreement include the Aviation Rescue Coordination Center–Elmendorf at Joint Base Elmendorf–Richardson (JBER) and the Joint Rescue Coordination Center–Juneau, Alaska.³⁰ Although the Coast Guard has permanent bases in Alaska, all are located below the Arctic Circle. Coast Guard aircraft are permanently based in Kodiak, about 800 miles south of Point Barrow, requiring transit of the 9,000-foot-high Brooks Range to the North Slope. The nearest major port to Point Barrow is in the Aleutian Islands, another 500 miles south, and this spring the Coast Guard announced that it had no plans to build any shoreside infrastructure in the coming decade.³¹ Draconian cuts to the service's fiscal year 2014 budget request fell heaviest on its aviation assets, limiting its near-term aviation-response options.³²

The *United States Coast Guard High Latitude Region Mission Analysis Capstone Summary* study of 2010 also called for a significantly larger icebreaker fleet to augment the Coast Guard's one medium and one heavy icebreaker, but the fiscal year 2014 budget request includes only \$2 million for design studies for an approximately \$1 billion 10-year project.³³ Building only one won't be enough: three heavy and three medium icebreakers are needed just to meet the Coast Guard's minimum statutory requirements.³⁴ The service's 2013 *Arctic Strategy* lists “broadening partnerships” as one of its strategic objectives but does not specifically detail who these partners will be.³⁵

The year 2014 may prove pivotal in the High North for the Navy's Arctic plans. Its 2009 *Arctic Roadmap* defers any major Arctic force-structure decisions until the 2014 *Quadrennial Defense Review Report*. Even if the Navy proposes an increased Arctic role in that report, funds and equipment will not be available for a decade or more.³⁶ A common thread in the Navy's *Roadmap*, the Coast Guard's *High Latitude Region Summary*, and its new *Arctic Strategy* is the absence of any disaster-response alternatives beyond icebreakers and organic Coast Guard / Navy aviation assets—to the conspicuous exclusion of the Air Force. The latter is briefly mentioned in the Navy's *Roadmap* regarding “existing agreements” as well as “satellite surveillance and weather operations” but is invisible in the Coast Guard's *High Latitude Region Summary* and its *Arctic Strategy*.³⁷

Nevertheless, there remains an overarching requirement that the United States assist signatories of the *Nuuk Agreement* if called upon. Russia, with its 30-plus icebreakers, significant Arctic population, and reawakened Northern Fleet, seems capable of conducting SAR without outside help. Canada, however, may need our assistance in the Northwest Passage to augment its limited resources. Both Canada and Greenland may request US help for SAR on the eastern approaches to the Northwest Passage.

“Who Ya Gonna Call?”

Air Force assets already perform SAR missions in Alaska, coordinated through the 11th RCC at JBER, using helicopters and fixed-wing aircraft of the Alaska Air National Guard's 176th Wing.³⁸ All Air Force aircraft in Alaska should be part of any SAR effort, particularly along the Northwest Passage, the approaches to the Bering Strait, and into the Beaufort and Chukchi Seas. Moreover, the Air Force has the resources and ability to reach any High North disaster faster than other surface vessels—US, Canadian, or otherwise—and to provide command, control, and communications support until the crisis is re-

solved. Its approach to SAR in the High North should center on three elements: bases, aircraft, and partnerships.

Bases

Two Air Force bases sit well above 60 degrees, well positioned for launch and recovery of any SAR effort: Eielson AFB at 64° 39'56" N and Thule Air Base (with its 10,000-foot runway), 750 miles north of the Arctic Circle at 74° 31'52" N. South of Eielson is JBER with another 10,000-foot runway as well as the 11th RCC. At the outer edge of the Aleutian Island chain sits Eareckson Air Force Station (formerly Shemya AFB), a contractor-maintained alternate / emergency landing field / refueling location and the site of an Air Force "Cobra Dane" radar installation. Eareckson's 10,000-foot runway and several hangars constitute a far-western basing resource for any SAR operation.

Aircraft

The number and variety of Air Force aircraft available at Eielson and JBER would greatly expand SAR response options. Eielson is home to the 354th Fighter Wing (F-16s) and the Alaska Air National Guard's 168th Air Refueling Wing. JBER hosts the Air National Guard's 176th Wing (C-17s and C-130s as well as HC-130 and HH-60G SAR aircraft). It also hosts the Air Force's 3rd Wing, with C-17s, C-12s, the E-3 Airborne Warning and Control System aircraft, a number of fighters, and two air and space operations centers. Since Canada has shown that C-17s can operate from a 5,500-foot gravel runway in northern Canada, Air Force C-17s could do the same.³⁹

Another SAR asset (outside Alaska), the New York National Guard's ski-equipped 109th Airlift Wing, has extensive experience in the Antarctic and has performed missions for the National Science Foundation in the Arctic. Aircraft rotations to Alaska, much like their Antarctic temporary duties, could augment other assets and bring another option for SAR. Remotely piloted aircraft can play a role as well. The *Navy Arctic Roadmap* called for those platforms to do "data collection, monitoring

and research,” but SAR missions using Global Hawks could add a persistent overwatch asset for the entire region.⁴⁰ Global Hawks could cover an area up to the North Pole and—winds and weather permitting—across the entire length of the Northwest Passage and its approaches.⁴¹

We must emphasize that High North SAR is not a year-round mission despite imminent “ice-free” claims. The peak season for activity—March to early October—will remain predictable for some time to come. In keeping with the Office of the Secretary of Defense’s policy that “SAR . . . is not a force sizing or shaping mission for [the Department of Defense]” but that the department will contribute “when needed and as available,” no new SAR assets would be created.⁴²

Partnerships

Coordination of the Air Force’s SAR efforts may constitute the greatest challenge. For example, the 2011 *Unified Command Plan* realigned areas of responsibility (AOR) in the High North (fig. 4). Previously, US Pacific Command (PACOM) had an area from the Bering Strait to the North Pole and west along the Siberian coast to the Kara Sea. The 2011 realignment kept the Russian Pacific littoral in PACOM’s AOR but nothing further north. Meanwhile, the eastern approaches to the Bering Strait, once a shared responsibility with US Northern Command (NORTHCOM), are NORTHCOM’s alone. PACOM retains responsibility for the extreme western approaches to the Bering Strait and the seas adjacent to Siberian Russia but nothing further north or west. Responsibility for Alaska is now solely NORTHCOM’s.

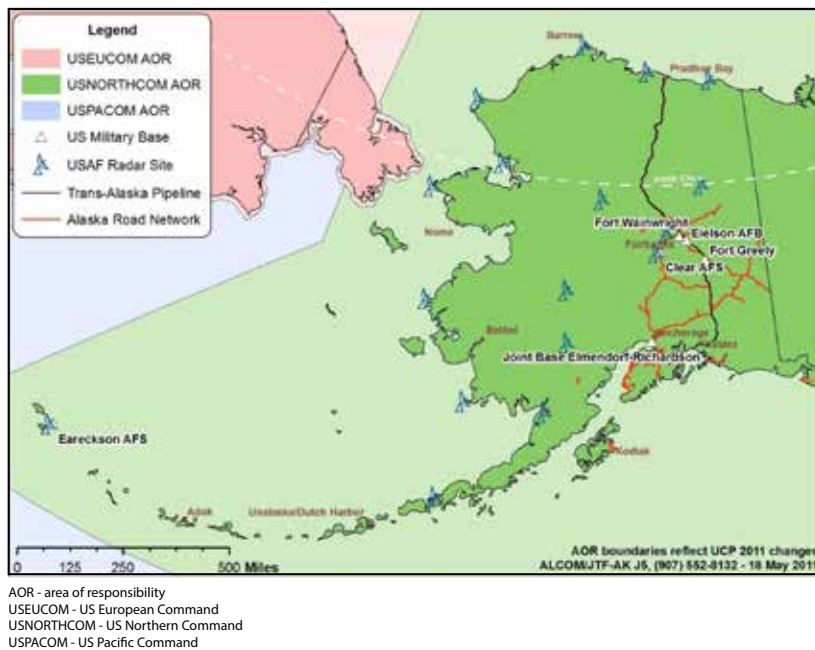


Figure 4. US combatant command areas of responsibility in the High North. (Reprinted from Department of Defense, *Report to Congress on Arctic Operations and the Northwest Passage*, OUSD [Policy] [Washington, DC: Department of Defense, May 2011], 21.)

However, Air Force assets in Alaska are primarily owned by Pacific Air Forces (PACAF) (PACOM). This dichotomy means that NORTHCOM / Joint Task Force–Alaska must use Alaska-based PACAF (PACOM) aircraft to deter aggression, defend airspace, respond to natural and man-made disasters in the region, and conduct SAR. Simultaneously, PACAF must prepare these same Alaska-based resources to carry out PACOM’s peacetime taskings and wartime training.⁴³ The eastern approaches to the Northwest Passage adjacent to Greenland and Canada’s east coast are in US European Command’s AOR, and NORTHCOM would have to coordinate with that command if any SAR request from that heavily traveled region came to the Department of Defense.⁴⁴ Further, the Air Force must form a strong partnership with the Coast Guard so that each can understand the other’s mission and

capabilities for conducting SAR. This synergy should benefit both organizations. Similarly, Canadian Forces and the Air Force must forge a working relationship for High North SAR, perhaps via North American Aerospace Defense Command. Finally, the Air Force should engage in a dialogue on Arctic issues with the newly formed Arctic Regional Studies Group at the Naval War College.

The Air Force must be prepared to assist in all High North SAR efforts in keeping with the *Nuuk Agreement*. However, this is no way implies that airpower can free an icebound ship or break pack ice ahead of an oil tanker headed to Nome. But the Air Force's resources (personnel, facilities, and aircraft) are available in an emergency—and because they *are* available, they should not be ignored.

The Future of the High North

The High North will see an increasing amount of international interest, activity, and investment in the coming decades. It possesses natural resources in abundance, but extracting them from an inhospitable environment will come at great cost. A navigable Northwest Passage is an accomplished fact, but it is a harrowing journey for the unwary and the unprepared. Its economic usefulness as a shortcut between Asia and Europe will grow over time, but those who travel it today may need assistance if not outright rescue. Increased traffic in the Bering Strait will challenge the abilities of Russian and US authorities to maintain safe passage.

The Arctic Council has proven that it can manage the region through consent of its members, yet other nations outside the region will test its self-imposed limits of authority for the benefit of their own agendas. The United States will become chairman of the Arctic Council when Canada's term expires in 2015 and will face more human activity in the region than in all previous decades combined. At the same time, the probability that some of the ventures listed above will come to grief will rise each summer season.

Current/projected North American SAR forces are inadequate to the task because of distance and available resources. Using all of the latter to effect a rescue is not only wise but also imperative. Consequently, both the US Coast Guard and the Department of Defense may be called upon to help our neighbor. Framing all of this is the *Nuuk Agreement*, which requires signatory nations to extend SAR help to any nation that requests it. The current silence by Coast Guard and Navy planners, as well as their reliance on surface rescues using scarce resources, is not consistent with the realities of time and distance. The Air Force is postured to help, but mounting a SAR effort without prior planning and coordination is not wise. It's time to add the weight of the Air Force to the effort, begin the coordination process, and prepare to assist. ✪

Notes

1. Peter Apps, "Melting Arctic May Redraw Global Geopolitical Map," Reuters, 3 April 2013, <http://www.reuters.com/article/2012/04/03/us-arctic-resources-idUSBRE8320DR20120403>. Captain Bert is currently chief of the Maritime and International Law Division at Headquarters US Coast Guard, Washington, DC.

2. US Geological Survey appraisal as quoted in standard briefing, Directorate-General for External Policies of the Union, Directorate B, Policy Department, European Parliament, subject: The Geopolitics of Arctic Natural Resources, 31 August 2010, 4, <http://www.tepsa.eu/download/Valur%20Ingimundarson.pdf>. See also US Geological Survey, "GIS Data: Circum-Arctic Resource Appraisal (North of the Arctic Circle) Assessment Units," 2009, <http://energy.usgs.gov/RegionalStudies/Arctic.aspx#3886226-gis-data>.

3. Seven areas in the Arctic contain about 87 percent of the known gas and oil reserves. Two are astride Greenland, three more hug the northern Russian coast and its adjacent waters, and the last two lie along the coast of Alaska and Canada's Yukon Territory. Most of the undeveloped natural gas lies in Asian Russia while the Arctic Alaska Basin is estimated to hold over 40 percent (29.96 billion barrels) of the entire total of undiscovered Arctic oil—more than three times as much as the next-largest field (the Amerasia Basin). All of this supposed bounty should be tempered by cold reality: oil and gas experts report that even if fully exploited, the Arctic fields will not replace the resources and capacity of the Middle East. Hobart King, "Oil and Natural Gas Resources of the Arctic," Geology.com, accessed 12 August 2013, <http://geology.com/articles/arctic-oil-and-gas/>.

4. Yue Wang, "Experts: Arctic Drilling for Security," UPI, 16 July 2012, http://www.energy-daily.com/reports/Experts_arctic_drilling_for_security_999.html.

5. Tom Fowler, "For Shell, Wait 'til Next Year in the Arctic," *Wall Street Journal*, 31 October 2012, B10, <http://online.wsj.com/article/SB10001424052970204789304578086770366680196.html>. The oil company Statoil of Norway announced it would delay its operations for at least a year while French oil giant Total said that environmental risks were too high to continue exploration in the Arctic. See also Tom Fowler and Ben Lefebvre, "Shell Puts Off Drilling in Alaska's Arctic," *Wall Street Journal*, 27 February 2013, B7, <http://online.wsj.com/article/SB10001424127887324662404578330423854552576.html>.

6. Trude Pettersen, "China Starts Commercial Use of Northern Sea Route," *Barents Observer*, 14 March 2013, <http://barentsobserver.com/en/arctic/2013/03/china-starts-commercial-use-northern-sea-route-14-03>.

7. Some selected headlines reinforce this notion of early ice melting: "Northwest Passage Channel Appears Free of Ice," *Fierce Homeland Security*, 16 August 2012; "Study Predicts Arctic Shipping Quickly Becoming a Reality," *Calgary Globe and Mail*, 4 March 2013; "Open Seas: The Arctic Is the Mediterranean of the 21st Century," *ForeignPolicy.com*, 29 October 2012; and (as late as May 2013) "White House Warned on Imminent Arctic Death Spiral," *Guardian*, 2 May 2013.

8. Frédéric Lasserre, "High North Shipping: Myths and Realities," in *Security Prospects in the High North: Geostrategic Thaw or Freeze?*, NDC Forum Paper 7, ed. Sven G. Holtmark and Brooke A. Smith-Windsor (Rome: NATO Defense College, May 2009), 195, http://www.google.com/url?sa=t&rct=j&q=high%20north%20shipping%3A%20myths%20and%20realities&source=web&cd=1&ved=0CCoQFjAA&url=http%3A%2F%2Fmercury.ethz.ch%2Fserviceengine%2FFiles%2FISN%2F102391%2Fipublicationdocument_singledocument%2F517b6a62-3f36-40be-a577-1f3a9337124c%2Fen%2Ffp_07.pdf&ei=nZoDUvq1OcugyQGGuqoCIAw&usq=AFQjCNGyNDWmyKCgLYMfHVHUA5rk13aHw&bvm=bv.50500085,d.aWc. Canada claims that the entire Northwest Passage falls within Canadian territory and must follow Canadian guidelines for passage, including asking permission. The United States, among others in the international community, contends that the entire passage is in international waters. This is not a "Fifty-Four Forty or Fight" type of dispute between the United States and Canada, but it does—on occasion—strain diplomatic relations.

9. Karl Magnus Eger, *Marine Traffic in the Arctic: A Report Commissioned by the Norwegian Mapping Authority*, ARHC2-04C (Oslo: Analyse & Strategi AS, 15 August 2011), 7–8, http://www.iho.int/mtg_docs/rhc/ArHC/ArHC2/ARHC2-04C_Marine_Traffic_in_the_Arctic_2011.pdf.

10. Ronald O'Rourke, *Changes in the Arctic: Background and Issues for Congress*, CRS Report for Congress R41153 (Washington, DC: Congressional Research Service, 24 July 2013), 58, <http://www.fas.org/sgp/crs/misc/R41153.pdf>. The report's 2012 data showed more polar ice melting at a faster rate, intensifying scientific discussion (*ibid.*, 12).

11. Lasserre, "High North Shipping," 194.

12. Michael Byers, "Canada's Not Ready to Have the World in the Arctic," *Globe and Mail*, 15 August 2012, <http://www.theglobeandmail.com/commentary/canadas-not-ready-to-have-the-world-in-the-arctic/article4481519/>.

13. Eger, *Marine Traffic in the Arctic*, 8.

14. Rob Huebert et al., *Climate Change & International Security: The Arctic as a Bellwether* (Arlington, VA: Center for Climate and Energy Solutions, May 2012), <http://www.c2es.org/publications/climate-change-international-arctic-security/>.

15. *Ibid.*, 11–12. Another interesting fact is that physics-based climate models show that the rate of ice loss will likely slow before the Arctic progresses to an ice-free state, which could cause an overestimation of the rate of future ice loss.

16. Lasserre, “High North Shipping,” 192–95. Three others are roughly equidistant through either it or the Northern Sea Route.

17. Of all the transits of the Northwest Passage in 2012, only two were made by commercial vessels—the ice-strengthened tanker *Gotland Carolina* and the ice-strengthened passenger ship *Hanseatic*. “Alluring Northwest Passage—the Transit Tally So Far,” *Sail-World.com*, 25 February 2013, <http://www.sail-world.com/CruisingAus/index.cfm?SEID=2&Nid=106937&SRCID=0&ntid=0&tickeruid=0&tickerCID=0>. Although this site indicated 24 transits, Canadian Coast Guard officials tallied 30 crossings of the Northwest Passage in 2012.

18. “U.S. Draws Map of Rich Arctic Floor ahead of Big Melt,” *Wall Street Journal*, 31 August 2007, <http://online.wsj.com/article/SB118848493718613526.html#articleTabs%3Darticle>. An article of 2012 points out that only about 10 percent of Canadian Arctic waters are charted “to a modern standard.” See K. Joseph Spears and Michael K. P. Dorey, “Arctic Cruise Ships: The Pressing Need for Search and Rescue,” *Canadian Sailings*, 17 October 2012, <http://www.canadiansailings.ca/?p=4830&print=1>. See also Byers, “Canada’s Not Ready.”

19. “About the Arctic Council,” Arctic Council, 7 April 2011, <http://www.arctic-council.org/index.php/en/about-us/arctic-council/about-arctic-council>. Denmark also represents Greenland and the Faroe Islands on the council.

20. Crocker Snow Jr., “Analysis: The Arctic Council, Lead Sled Dog of the High North,” *GlobalPost*, 4 October 2012, <http://www.globalpost.com/dispatch/news/regions/americas/121003/analysis-the-arctic-council-lead-sled-dog-the-high-north>.

21. *The Ilulissat Declaration*, Arctic Ocean Conference, Ilulissat, Greenland, 27–29 May 2008, 2, http://www.oceanlaw.org/downloads/arctic/Ilulissat_Declaration.pdf; and the *Agreement on Cooperation on Aeronautical and Maritime Search and Rescue in the Arctic [Nuuk Agreement]*, 12 May 2011, preamble and art. 3, par. 3, <http://www.ifrc.org/docs/idrl/N813EN.pdf>. In drawing the boundaries of those areas, the *Declaration* was careful not to assert that those boundaries won’t be used as precedents for an unresolved boundary disputes (art. 3, par. 2).

22. Arctic Council, *Nuuk Declaration on the Occasion of the Seventh Ministerial Meeting of the Arctic Council, 12 May 2011, Nuuk, Greenland*, <http://www.arctic-council.org/index.php/en/document-archive/category/5-declarations>. Note that the 2011 *Nuuk Declaration* announced the 2011 *Nuuk Agreement* on SAR, among other things. This is the Arctic Council’s first international treaty.

23. *Ibid.*, art. 7, pars. 3 (d) and (e). The *Nuuk Agreement* also details each nation’s “Competent Authority” (appendix 1), SAR agencies (appendix 2), and rescue coordination center (RCC) locations (appendix 3).

24. This includes transit of the world’s largest private yacht (a floating condominium aptly named the *World*) in 2012. For a scathing attack on current Canadian plans for Arctic/offshore patrol boats, see Michael Byers and Stewart Webb, *Titanic Blunder: Arctic/Offshore Patrol Ships on Course for Disaster* (Ottawa: Rideau Institute, Canadian Centre for Policy Alternatives, April 2013), http://www.policyalternatives.ca/sites/default/files/uploads/publications/National%20Office/2013/04/Titanic_Blunder.pdf.

25. “The Arctic Is a Long Way from Canada’s Search and Rescue Techs,” *Nunatsiaq Online*, 3 November 2010, http://www.nunatsiaqonline.ca/stories/article/556011_the_arctic

_is_a_long_way_from_canadas_search_and_rescue_techs/. The original article indicated that Trenton, Ontario, was closer to Quito, Ecuador, than to Nunavut, but that distance was calculated via “flat-earth” Mercator maps. Plots using Google Earth extend the distance to a line just below Panama, bisecting Venezuela and through the northern part of Colombia.

26. Michelle Zilio, “Someday ‘Your Number Is Going to Come Up’: Lagging Arctic SAR Risks Much; Experts,” iPolitics, 3 January 2013, <http://www.ipolitics.ca/2013/01/03/someday-your-number-is-going-to-come-up-lagging-arctic-sar-risks-much-experts/>.

27. Lt Jill Strelieff, “Canadian Forces High Arctic Operation Furthest Northern Patrol for Canadian Rangers” (national defense and Canadian Forces news release), Marketwire, 26 April 2010, <http://www.marketwire.com/press-release/canadian-forces-high-arctic-operation-furthest-northern-patrol-for-canadian-rangers-1153921.htm>.

28. This is the distance from a point in the Beaufort Sea off Canada’s Yukon Territory to Nanisivik, near the entrance of Baffin Bay on Canada’s east coast via Parry Sound and the McClure Strait. Using the shallower passage via the Union Strait reduces the sailing distance to approximately 900 nautical miles. See Byers and Webb, *Titanic Blunder*, map insert. Using the Norwegian model, one reckons the Northwest Passage to be 2,400 kilometers.

29. “JHC Navigating Limits Sub-Committee: Recent Incidents, 29.8.2010, Cruise Ship Runs Aground in Canadian Arctic,” Lloyd’s Market Association, accessed 8 August 2013, http://www.lmalloyds.com/Web/Market%20Places/_nbsp__nbsp_Marine/Joint_Hull/Navigating_Limits/Web/market_places/marine/JHC_Nav_Limits/Navigating_Limits_Sub-Committee.aspx.

30. *Nuuk Agreement*, appendices 1, 2, and 3, respectively. Joint Rescue Coordination Center–Juneau (USCG D17 RCC), staffed by the Coast Guard, is responsible for the SAR region corresponding to the panhandle of Alaska, the Aleutian chain, and the waters off the Alaska coast. The Alaska RCC is an Air Force mission encompassing the land mass of the Alaska mainland north of 58 degrees north latitude and west of 141 degrees west longitude. See “Frequently Asked Questions,” Joint Base Elmendorf–Richardson, accessed 13 August 2013, <http://www.jber.af.mil/shared/media/document/AFD-120314-029.html>.

31. David Perera, “Papp: Coast Guard Plans No Arctic Shoreside Infrastructure,” Fierce Homeland Security, 22 May 2013, <http://www.fiercehomelandsecurity.com/story/papp-coast-guard-plans-no-arctic-shoreside-infrastructure/2013-05-22>.

32. Coast Guard aviation assets were slashed by 92.24 percent in the House Appropriations Committee’s markup for fiscal year 2014. Overall, the Coast Guard’s FY 2014 budget request was cut by more than 13 percent over the previous year. David Perera, “2014 Budget Request: Coast Guard,” Fierce Homeland Security, 11 April 2013, <http://www.fiercehomelandsecurity.com/node/89222/print>.

33. A third US-owned icebreaker does exist, but it isn’t part of the Department of Defense or even Homeland Security. The National Science Foundation will have its own light-duty icebreaker, the *Sikuliaq*, in 2014, earmarked for scientific missions in the Gulf of Alaska and southern Bering Sea. House, *Testimony of Dr. Kelly Falkner, Deputy Director, Office of Polar Programs, National Science Foundation, before the House Committee on Transportation and Infrastructure, Subcommittee on Coast Guard and Maritime Transportation*, 112th Cong., 1st sess., 1 December 2011, http://www.nsf.gov/about/congress/112/kf_coastguard_arctic_111201.jsp. See also ABS Consulting, *United States Coast Guard High Latitude Region Mission Analysis Capstone Summary* (Arlington, VA: ABS Consulting, July 2010), 15, <http://assets.fiercemarkets.com/public/sites/govit/hlsummarycapstone.pdf>. See also Ronald

O'Rourke, *Coast Guard Polar Icebreaker Modernization: Background and Issues for Congress*, CRS Report for Congress RL 34391 (Washington, DC: Congressional Research Service, 24 July 2013), "Summary," <http://www.fas.org/sgp/crs/weapons/RL34391.pdf>.

34. O'Rourke, *Polar Icebreaker Modernization*, 9. The Coast Guard needs several more icebreakers beyond the 3 + 3 model to achieve a continuous presence in the Arctic and the Antarctic.

35. US Coast Guard, *United States Coast Guard Arctic Strategy* (Washington, DC: Headquarters US Coast Guard, May 2013), 31–32, <https://www.hsdl.org/?view&did=736969>. The strategy calls for "force multipliers" under a "whole of government" approach to the Arctic.

36. Task Force Climate Change / Oceanographer of the Navy, *U.S. Navy Arctic Roadmap* (Washington, DC: Department of the Navy, October 2009), 11, 14, 17, http://www.navy.mil/navydata/documents/USN_artic_roadmap.pdf. The *Roadmap* calls for a review of existing agreements with the Air Force, among others, but nowhere does it solicit that service for additional support. The Navy's study refers to the Army more than it does the Air Force.

37. Task Force Climate Change / Oceanographer of the Navy, *U.S. Navy Arctic Roadmap*, 11, 23. The US Coast Guard's *Arctic Strategy* (see note 35) mentions its SAR obligations and the requirement for burden sharing with other Arctic nations but only touches on any future strategy. It may forward-deploy assets to Barrow, Alaska, in the summer months. Other than planning for more icebreakers to aid in SAR, the *Strategy* is silent regarding future plans.

38. In testimony before Congress, Alaska's lieutenant governor called the 176th "America's front-line for search and rescue in the Arctic Ocean," observing that "Coast Guard response is based much further away." House, "America is Missing the Boat," *Statement for the Record, the Honorable Mead Treadwell, Lieutenant Governor, State of Alaska, before the United States House of Representatives Committee on Transportation and Infrastructure, Subcommittee on Coast Guard and Maritime Transportation*, 112th Cong., 1st sess., 1 December 2011, 9, http://housemajority.org/joule/pdfs/27/hjr0034_treadwell_testimony.pdf.

39. To put it mildly, command and control of these assets is confusing, but unity of command is a separate issue from a lack of vision regarding use of Air Force SAR assets in the High North. For a full discussion of command and control issues and recommendations for change, see Peter Ohotnicky, Braden Hisey, and Jessica Todd, "Improving U.S. Posture in the Arctic," *Joint Force Quarterly*, issue 67 (4th Quarter 2012): 56–62, http://www.ndu.edu/press/lib/pdf/jfq-67/JFQ-67_56-62_Ohotnicky-Hisey-Todd.pdf.

40. Task Force Climate Change / Oceanographer of the Navy, *U.S. Navy Arctic Roadmap*, 25, action item 5.11.

41. "RQ-4 Global Hawk," fact sheet, US Air Force, 16 October 2008, <http://www.af.mil/AboutUs/FactSheets/Display/tabid/224/Article/104516/rq-4-global-hawk.aspx>. This profile assumes a nominal range of 2,500 nautical miles, flown from Eielson AFB.

42. Department of Defense, *Report to Congress on Arctic Operations and the Northwest Passage*, OUSD (Policy) (Washington, DC: Department of Defense, May 2011), 14, http://www.defense.gov/pubs/pdfs/tab_a_arctic_report_public.pdf.

43. The following year, NORTHCOM's commander designated Alaska a "key focus area" and identified deficiencies in several areas, including SAR-enabling capabilities.

44. For a view of the rise of commercial maritime traffic between the West Coast of Greenland and Canada adjacent to the Northwest Passage, see Jane Kokan, "Greenland:

Canada's Arctic Neighbour," *FrontLine Defence* 9, no. 1 (January/February 2012): 23–27, http://www.frontline-canada.com/downloads/12-1_RAdmKudsk.pdf.



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