



Arctic Search and Rescue

March 13, 2018

Fiscal Year 2017 Report to Congress



Homeland
Security

Office of the Chief Financial Officer

Foreword

March 13, 2018

I am pleased to present the following report, “Arctic Search and Rescue,” as prepared by the U.S. Coast Guard.

The Joint Explanatory Statement and Senate Report 114-264 accompanying the Fiscal Year 2017 Department of Homeland Security Appropriations Act (P.L. 115-31) require the submission of the Coast Guard’s plans to ensure long-term search and rescue coverage for the Arctic.

Pursuant to congressional requirements, this report is being provided to the following Members of Congress:

The Honorable John R. Carter
Chairman, House Appropriations Subcommittee on Homeland Security

The Honorable Lucille Roybal-Allard
Ranking Member, House Appropriations Subcommittee on Homeland Security

The Honorable John Boozman
Chairman, Senate Appropriations Subcommittee on Homeland Security

The Honorable Jon Tester
Ranking Member, Senate Appropriations Subcommittee on Homeland Security

Please direct inquiries related to this report to me at (202) 447-5751.

Sincerely,



Stacy Marcott
Acting Chief Financial Officer





Arctic Search and Rescue

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I. Legislative Language

This report responds to language in the Joint Explanatory Statement and Senate Report 114-264 accompanying the Fiscal Year 2017 Department of Homeland Security (DHS) Appropriations Act (P.L. 115-31).

The Joint Explanatory Statement states:

Not later than 180 days after the date of enactment of this Act, the Secretary shall submit to the Committees a report on the Coast Guard's plans to ensure long-term search and rescue coverage for the Arctic. This report shall also address the Coast Guard's capability for conducting response missions throughout the Western Alaska Captain of the Port Zone, including the Bering Sea and Arctic Ocean. The report shall provide details on pollution response equipment; spill response organizations; spill prevention and mitigation methods; and response partnerships with federal, state, and local entities.

Senate Report 114-264 states:

BERING SEA AND ARCTIC OCEAN RESPONSE

Not later than 180 days after the date of enactment of this act, the Secretary shall submit to the Committee a report on the plans of the Coast Guard to ensure long-term search and rescue coverage for the Arctic.

II. Background

The U.S. Coast Guard's plans for search and rescue (SAR) coverage in the Arctic are in keeping with the three strategic objectives in the Coast Guard's Arctic Strategy—improving awareness, broadening partnerships, and modernizing governance. To improve awareness and response preparedness, the Coast Guard will continue to maintain continuous major cutter coverage in the Bering Sea as well as employ a mobile, seasonal, scalable approach for deployment of additional air and surface assets in proportion to the level of maritime activity and national security needs, to include risks associated with SAR operations. The Coast Guard also will continue pursuing the recapitalization of polar icebreakers to ensure presence and mission execution in the Arctic.

To broaden partnerships, the Coast Guard will continue engagement with entities such as the Arctic Coast Guard Forum (ACGF) as well as with other federal, state, tribal, and local agencies. These engagements include exercises and training that enhance SAR capabilities, capacities, and experience in the Arctic. To reduce the risk to vessels and people operating in the Arctic, the Coast Guard also will continue to modernize Arctic governance through such venues as the International Maritime Organization (IMO) and continued development of the IMO Polar Code for ships and fishing vessels operating in the Polar Regions. This instrument includes provisions regarding communications, SAR response, and survival craft needs for international shipping in the Polar Regions.

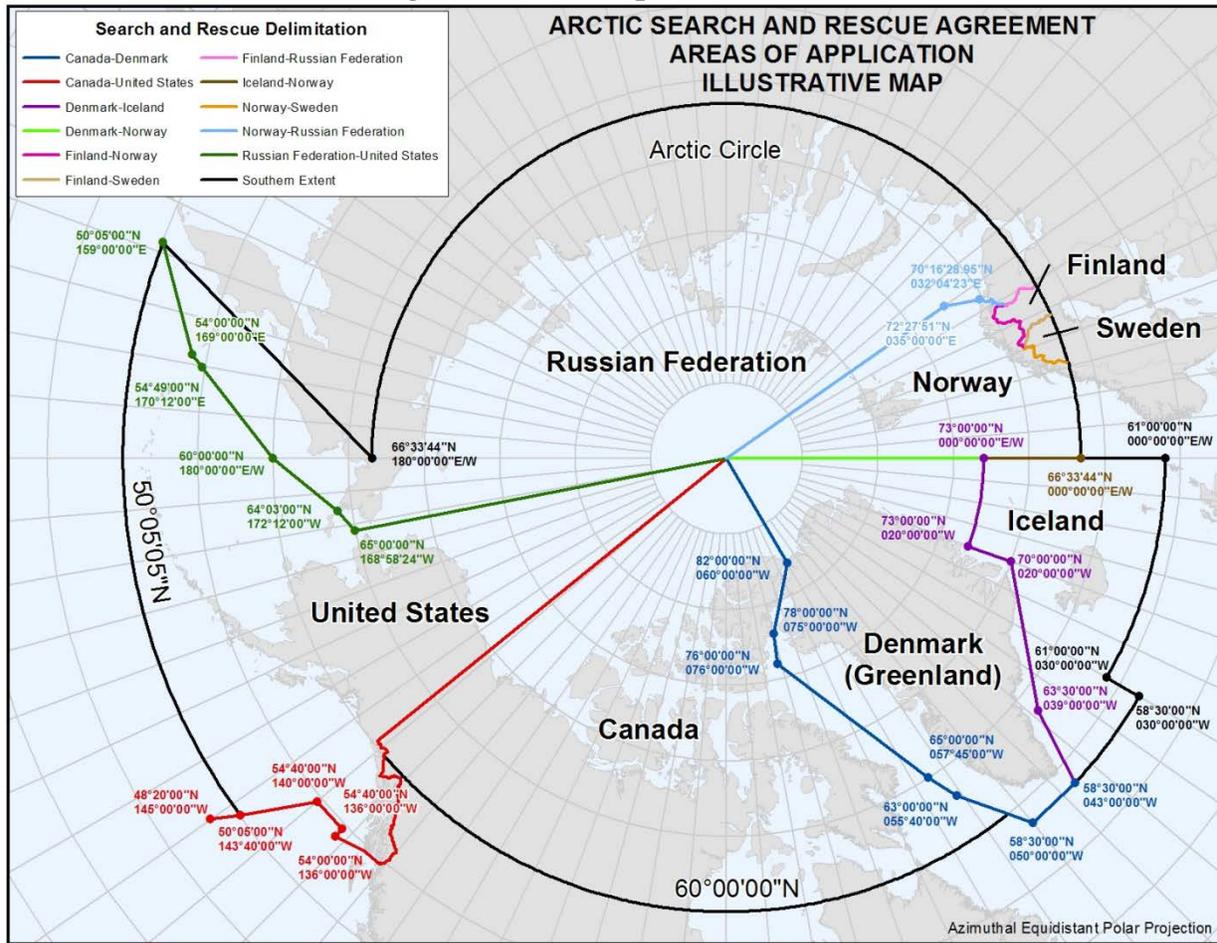
The Coast Guard is committed to long-term SAR coverage in the Arctic. The Coast Guard will continue to identify and test new assets including command, control, and communications systems to measure their effectiveness for deployment in the Arctic. Lessons learned captured from seasonal deployments and international exercises will improve strategies and SAR response effectiveness in the Arctic.

Remote Area of Arctic Operations

The Arctic encompasses all U.S. and foreign territory north of the Arctic Circle and all U.S. territory north and west of the boundary formed by the Porcupine, Yukon, and Kuskokwim Rivers, all contiguous seas, including the Arctic Ocean and the Beaufort, Bering, and Chukchi Seas, and the Aleutian chain.¹ However, this report primarily focuses on the area assigned to the United States in the 2011 Agreement on Cooperation on Aeronautical and Maritime SAR in the Arctic (see Figure 1).

¹ Arctic Research and Policy Act of 1984 (P.L. 98-373), as amended.

Figure 1: Arctic Operations Area



Arctic Search and Rescue Challenges:

Coast Guard responsibilities to assist people, vessels, or aircraft in distress are based on humanitarian considerations and established international practice. Specific obligations are found in several international conventions in which the United States is a party or, if not a party, treats certain portions of these conventions as customary international law, including the:

- International Civil Aviation Organization (ICAO) Convention on International Civil Aviation (Annex 12 – Search and Rescue);
- International Convention on Maritime Search and Rescue;
- International Convention for the Safety of Life at Sea; and
- United Nations Convention on the Law of the Sea.

The two guiding international conventions for the coordination and conduct of SAR operations are the Convention on International Civil Aviation and the International Convention on Maritime Search and Rescue. Both conventions require nations with aeronautical and maritime SAR region responsibilities to enter into agreements with neighboring nations to ensure the delimitation of their respective SAR regions and to serve as the basis for future coordination and

cooperation in the conduct of SAR operations. These conventions also identify vital SAR points of contact and serve as a means of ensuring that nations have the necessary SAR resources available in their respective SAR regions.

In the Arctic region, SAR responsibilities are divided between the eight Arctic Council nations: Canada, Denmark, Finland, Iceland, Norway, Russia, Sweden, and the United States. In 2011, the eight nations signed the Arctic Aeronautical and Maritime SAR Agreement (Arctic SAR Agreement). This agreement serves as the foundation for future international SAR cooperation and coordination. In particular, the Arctic SAR Agreement:

- Identifies key basic coordination and cooperation arrangements among participating nations;
- Provides points of contacts for each participating nation for use in coordinating potential assistance in ongoing and future Arctic SAR operations;
- Sets the stage for nations to meet periodically to discuss SAR coordination and cooperation issues, providing an understanding of the unique SAR challenges that each nation faces in the Arctic;
- Provides the impetus for multinational exercises that could be implemented periodically to allow national SAR agencies to practice communication, coordination, and the practical challenges associated with Arctic SAR operations; and
- Formally identifies each nation's Arctic aeronautical and maritime SAR regions.²

Consistent with international law and treaties, U.S. law provides that the Coast Guard may develop, establish, maintain, and operate SAR facilities, and use these facilities to assist other federal and state entities.³ This authority is supplemented by the National Search and Rescue Plan (NSP) of the United States, an interagency agreement signed at the cabinet level by eight federal departments and agencies, including DHS. The NSP authorizes the Coast Guard and other federal agencies to perform or support SAR services.⁴ Pursuant to the NSP, the Coast Guard coordinates aeronautical and maritime SAR services in the U.S. aeronautical and maritime SAR regions. The NSP provides for the effective use of all available resources to conduct SAR missions and enable the United States to satisfy its humanitarian, national, and international legal obligations.

In addition, the Coast Guard engages with the IMO on a full range of maritime safety matters. In particular, the Coast Guard has focused on prior work on passenger ship safety, as well as IMO's current effort to improve the Global Maritime Distress and Safety System (GMDSS) and key aspects of the Polar Code for ships operating in the Polar Regions. For the GMDSS, the Coast Guard SAR mission focus is on sustainment of High Frequency (HF) communications capability,

² These elements are within the scope of matters contemplated by the IMO and ICAO SAR Conventions, and they are also consistent with U.S. statutory authorities of the Coast Guard (*See e.g.*, 14 U.S.C. §§ 2, 88(a) and 142).

³ 14 U.S.C. §§ 2, 88 and 141.

⁴ The National Search and Rescue Committee (NSARC), chaired by the U.S. Coast Guard, is responsible for the provisions of the NSP, and coordinates and provides interagency guidance for its implementation. NSARC is comprised of the Departments of Homeland Security, State, Defense, Transportation, Commerce, and Interior, the Federal Communications Commission, and the National Aeronautics and Space Administration. More information about the NSARC and NSP is available at www.uscg.mil/nsarc.

survival craft locating devices, and incorporation of the Iridium satellite system into the GMDSS to provide true global coverage for voice and data for SAR communications. The Coast Guard was instrumental in expanding provisions of the Polar Code regarding communications, SAR response, and survival craft needs for international shipping in the Polar Regions.

As a global leader in SAR, the Coast Guard is involved actively with the ICAO concerning the sustained growth in cross-polar flights of passenger and cargo aircraft. The Coast Guard has been a key contributor to the development and implementation of ICAO's Global Aeronautical Distress and Safety System (GADSS). The Arctic and high seas were critical requirements for ICAO's implementation of a GADSS global flight tracking capability at 15-minute or better intervals by November 2018, and the autonomous distress tracking (ADT) capability on new aircraft starting no later than January 2021. ADT implementation will improve global SAR distress alerting and routing capability vastly, and it will enhance coordination among the air traffic services and rescue coordination centers greatly, especially in the Arctic region.

The Arctic Challenge

The United States is an Arctic nation that has substantial political, national security, natural resource, environmental, socioeconomic, and other interests in the region.

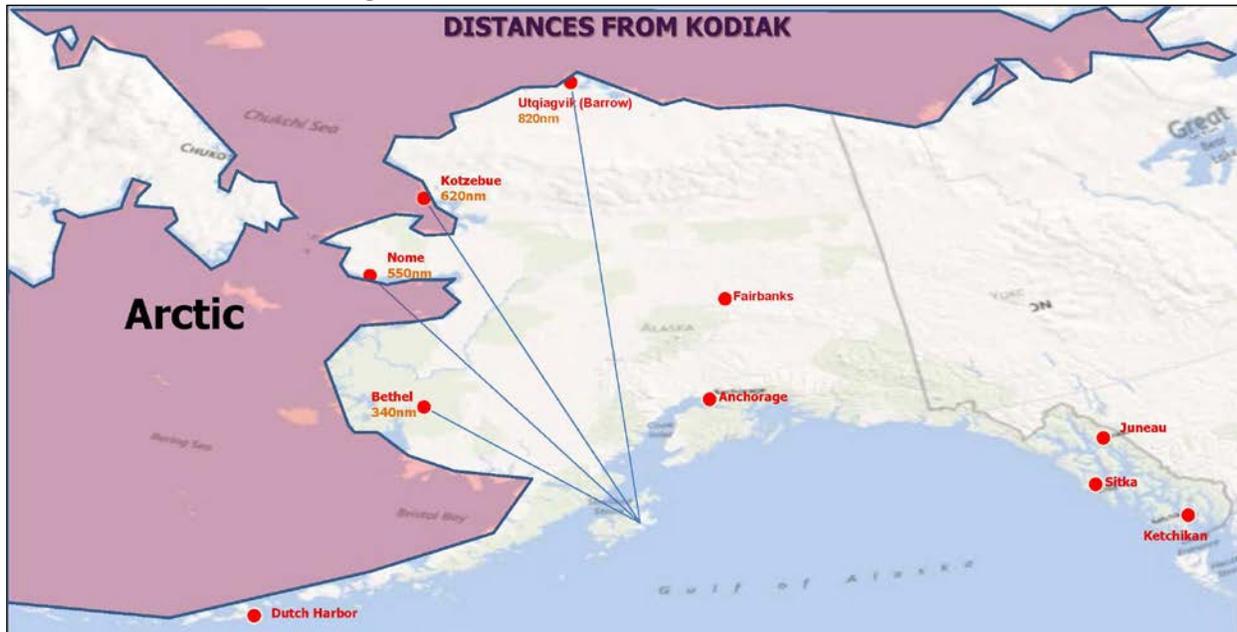
The Coast Guard is responsible for executing the same 11 statutory missions, including SAR, in the Arctic as it performs in other coastal regions around the Nation and in international waters. The Coast Guard is the only response entity in much of this unforgiving region and the only domestic entity that is trained and equipped with maritime rescue helicopters in the Arctic. Therefore, on the basis of its statutory responsibilities, the Coast Guard must have guaranteed access to the U.S. Arctic SAR region throughout the year.

An increase in human activity in the Arctic continues to drive Coast Guard response preparedness activities. The Coast Guard must continue to prepare for high-consequence events, such as an aeronautical or maritime disaster involving large numbers of persons in distress, and other types of SAR including a ship or boat collision, sinking, or grounding; aircraft ditching; missing boaters; or the medical evacuation of persons requiring medical attention.

The Coast Guard is committed to performing its statutory missions, ensuring the sovereignty of the United States, leveraging partnerships, and increasing maritime domain awareness to support safe, secure, and environmentally responsible maritime activity in U.S. Arctic waters. The Coast Guard's current suite of cutters, boats, aircraft, shore infrastructure, and Command, Control, Communications, Computers, and Information Technology, must meet an increasing number of near-term mission demands in this harsh environment.

The Coast Guard currently has limited surface assets capable of transiting the vast ice-covered waters of the Arctic; therefore, aviation assets are the most probable rapid response platforms to incidents in the Arctic. However, the closest Coast Guard Air Station to the Arctic is located in Kodiak, Alaska, approximately 820 nautical miles south of Utqiagvik (Barrow) (see Figure 2), which is nearly the same distance as from Boston, Massachusetts, to Miami, Florida.

Figure 2: Aviation Distances from Kodiak



Although winter sea travel is still severely limited because of extensive ice coverage across the region, record low ice extent in recent summers has made seasonal maritime navigation more feasible, for longer periods of time. The current seasonal ice edge recession rate in the Arctic allows for commercial, subsistence, and recreational maritime activity for about 3 to 5 months each year. The rate of ice recession is forecasted to increase the length of that season, and the Coast Guard is observing increased maritime activity in these dangerous “shoulder” seasons. This increased activity requires an extended Coast Guard presence in the Arctic operating area. Economic development, in the forms of resource extraction, adventure tourism, and trans-Arctic shipping, along with traditional subsistence activities, drives much of the current maritime activity in the region.

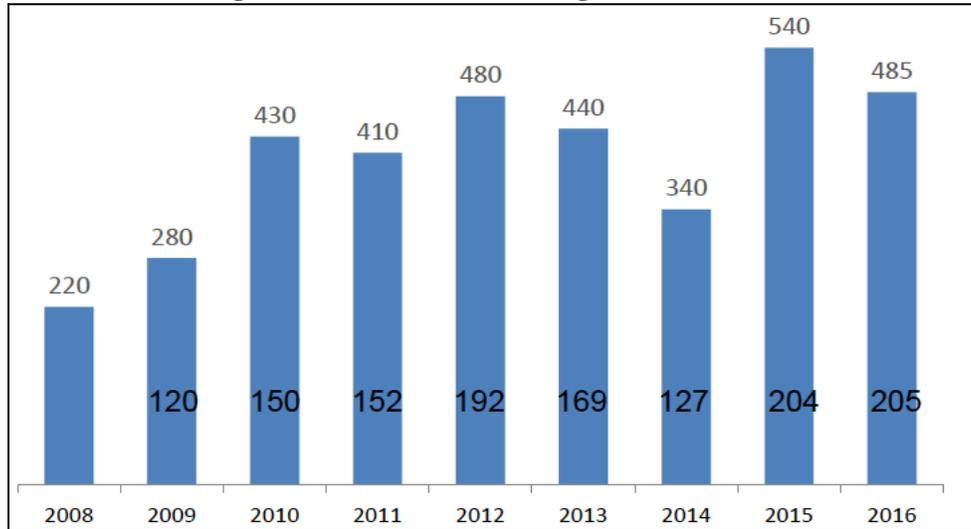
Internationally and nationally, maritime sovereignty claims, commercial shipping, resource exploration, and expanding military operations also are increasing. For example, with increased transportation costs, shipping companies continue to assess the economic feasibility of using transpolar and circumpolar shipping routes, and with the continued increase in the use of polar commercial airline routes, commercial interest in the Arctic is increasing. An increase in commercial traffic, along with increases in marine tourism and passenger vessels operating in Arctic waters, creates an emerging challenge to existing Coast Guard SAR policy and capabilities.

Arctic Maritime Traffic

Arctic marine traffic, including cargo and tanker traffic along the Northern Sea Route and passenger and commercial traffic along the Northwest Passage, is projected to increase in the near and offshore Arctic waters. The Coast Guard has been collecting Automatic Identification System data to assess the level of risk from increased maritime traffic. The Coast Guard found

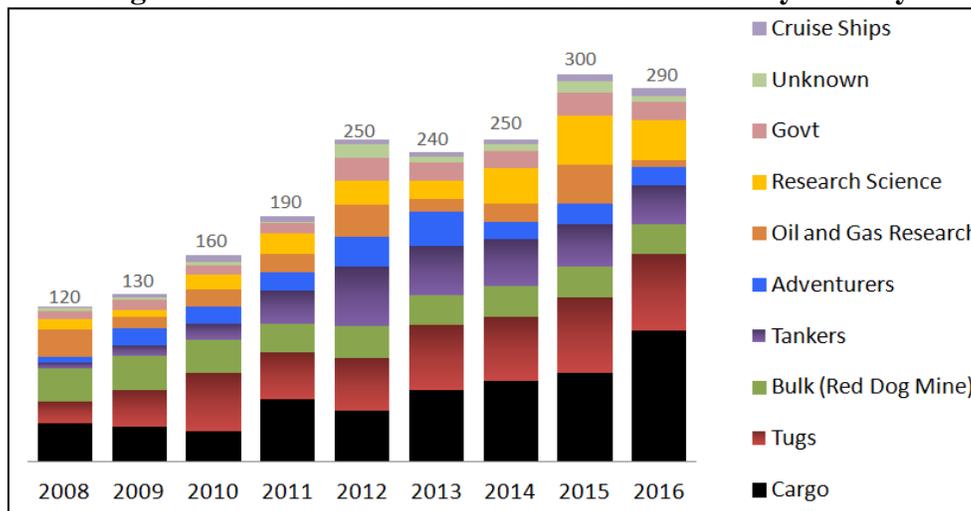
that the number of vessels operating in the Bering Strait as well as the total number of transits have increased notably over the past decade (see Figure 3).

Figure 3: Number of Bering Strait Transits⁵



Likewise, the number of cruise vessels and cargo vessels operating in the Arctic also has increased (see Figure 4). Increased commercial vessel activity, including fishing, transshipment, and tourism, will stress the Coast Guard’s current SAR capabilities. As the lead federal agency for maritime SAR, the Coast Guard relies on its limited surface and air fleets along with communication, cooperation, training, and outreach to fulfill its SAR mission requirements in the challenging Arctic region.

Figure 4: Total Number of Vessels in the Arctic by Activity

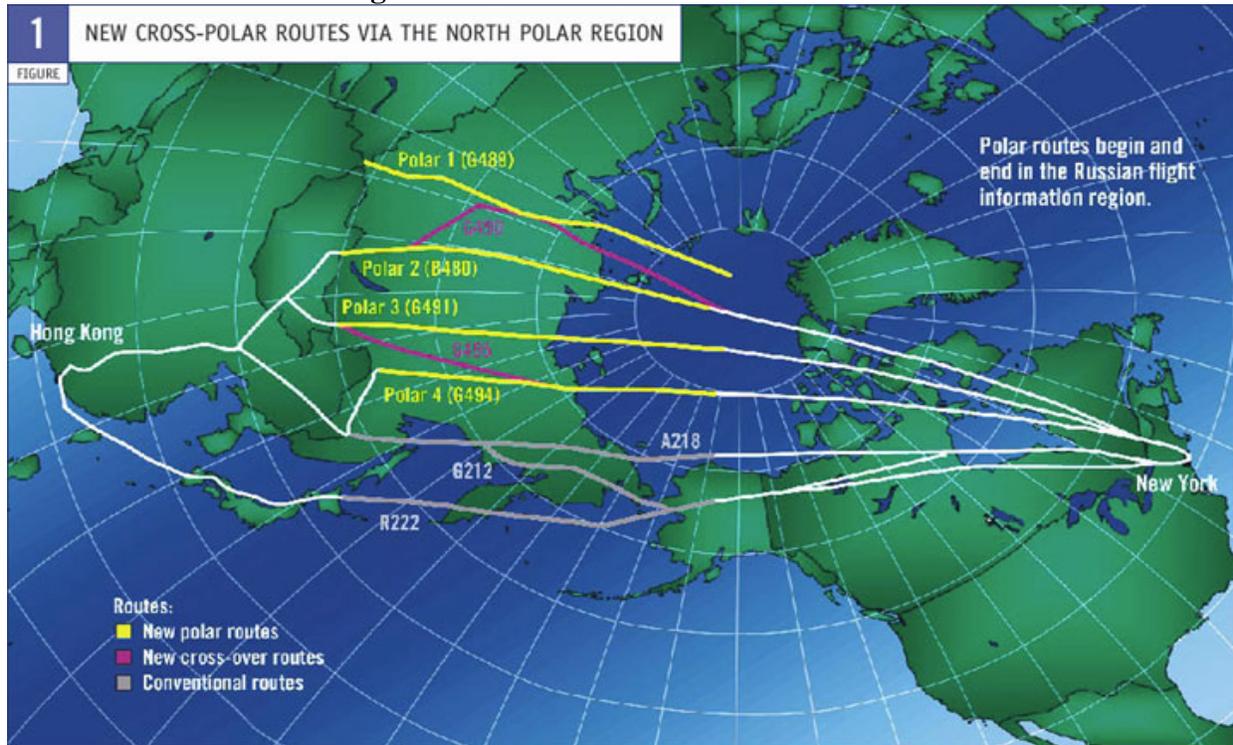


⁵ The number imposed in each graph bar represents the number of vessels that made a Bering Strait transit. Data for 2008 are missing because the Coast Guard began capturing those data in 2009. The number at the top of each bar is the total number of transits by year.

Arctic Aviation Traffic

Although there is significant focus on the use of the Arctic Region as a shipping and maritime transshipment route, aircraft exploit transpolar routes for efficient travel between North America and Asia. As shown in Figure 5 below, the majority of air traffic through the U.S. Arctic SAR region moves through nine primary routes.

Figure 5: Cross-Polar Air Traffic Routes



The polar routes, indicated by yellow, and the conventional routes, indicated by grey, cross over the U.S. Arctic SAR region.⁶ Measured by the number of passengers, polar route 2 is the most frequently used route. Polar routes 3 and 4 cross directly over the U.S. SAR region. Finally, even though conventional routes are not classified as polar routes, conventional flights still fly in airspace above what is outlined by the 2011 SAR Agreement.⁷

Use of polar routes to transport people and cargo continues to be a Coast Guard SAR response planning and preparedness consideration. Unlike maritime activity, the aircraft flights are not seasonal but rather continuous throughout the year. As Figure 6 reflects, from January 1 to December 31, 2015, there were a total of 16,821 cross-polar flights that transited through the U.S. Arctic SAR region.⁸ In 2015, the number of cross-polar flights per month ranged from

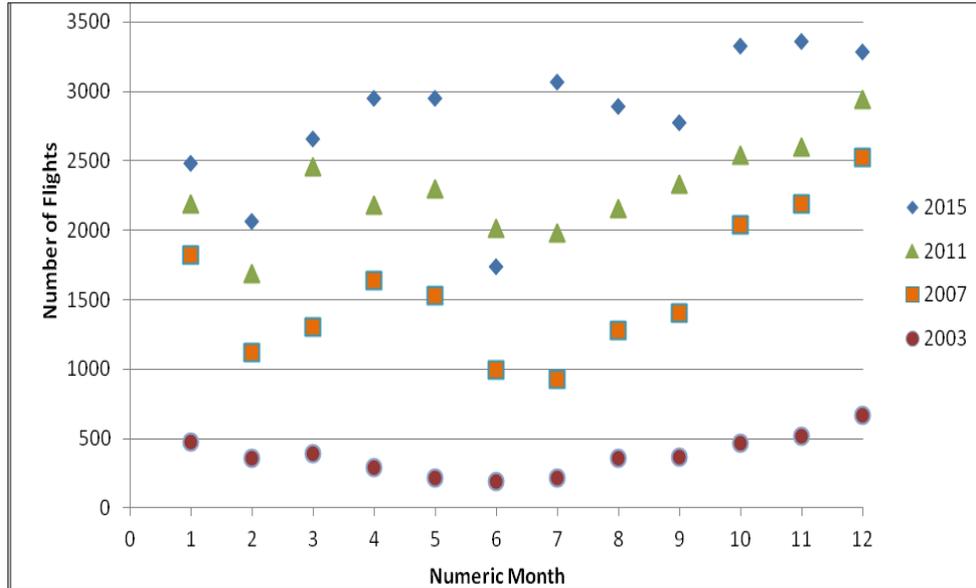
⁶ A cross-polar flight is defined as a flight in which the aircraft crosses north of 78° latitude.

⁷ Most flights are from east to west or west to east and seldom transverse the Polar Region in a north-to-south flow. Although the conventional routes used to connect U.S. cities to China, particularly New York to Hong Kong, are not considered polar flights, they transverse over the U.S. Arctic SAR region and are why Russia Far East (RFE) flights are included when determining transpolar flights through the U.S. Arctic SAR region.

⁸ This averages to approximately 1,400 flights per month (50 flights per day).

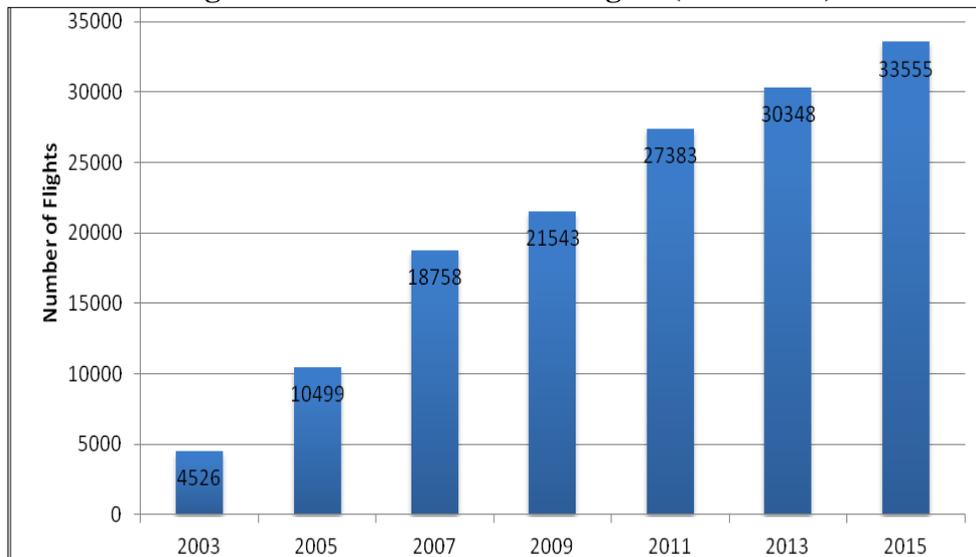
approximately 900 to 1,650. The greatest number of flights occurred in October, and the fewest number occurred in June.

Figure 6: Monthly Distribution of Cross-Polar Flights (2003–2015)



In addition, when analyzing both the number of cross-polar and RFE flights, the numbers increase significantly. As Figure 7 reflects, in 2015 there was a total of 33,555 flights that transited through these regions. Figure 7 clearly reflects the growth in cross-polar flights that has occurred since 2003.

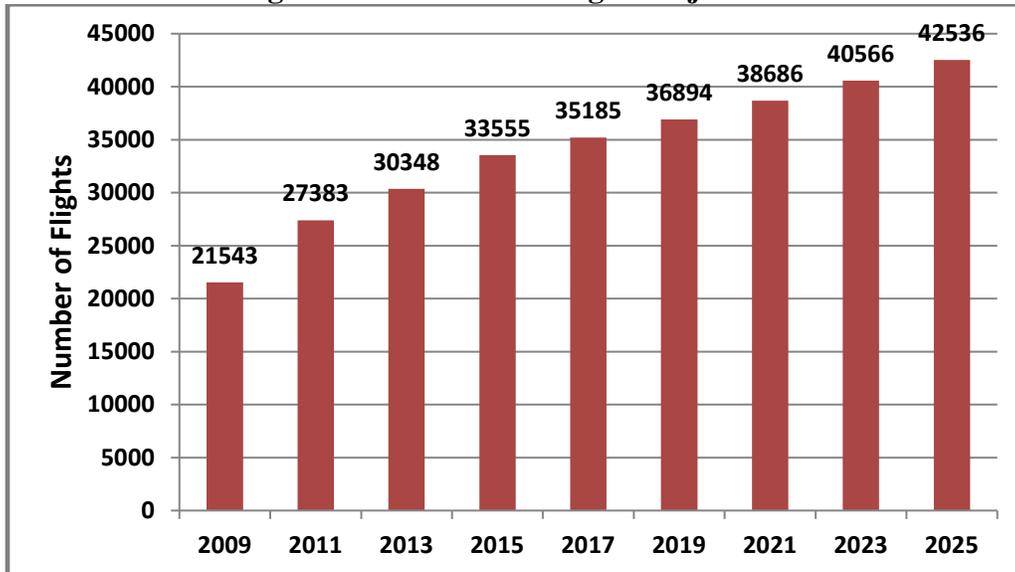
Figure 7: Total Cross-Polar Flights (2003–2015)



From 2011 to 2013, and again from 2013 to 2015, the number of cross-polar and RFE transpolar flights increased by 11 percent, demonstrating a steady growth trend in the Arctic region. If the

frequency of cross-polar and RFE flights continues to grow at the projected rate of 2.4 percent per year, there will be approximately 42,500 cross-polar and RFE flights by the year 2025.

Figure 8: Cross-Polar Flight Projections



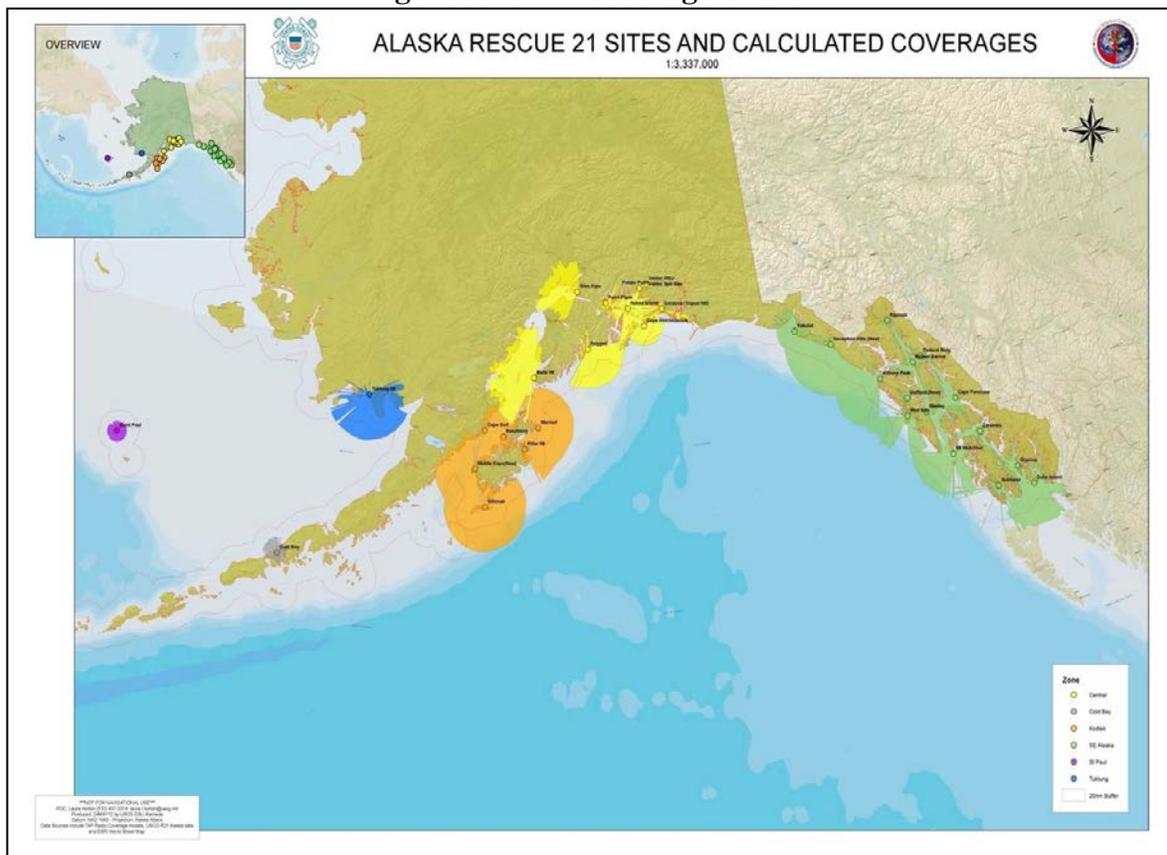
As long as airline passenger traffic worldwide maintains its current upward trend, airlines likely will increase overall flight traffic to keep up with demand. Cross-polar air traffic is likely to increase over the next 5 years commensurate to the industry as a whole. Given that polar routes provide time and fuel savings, leading to reduced operating costs, lower emissions levels, and lower fares, airlines likely will seek to make greater use of them.

Arctic Communications Challenges

The Coast Guard is challenged to communicate with its own assets deployed to the high latitudes, as well as the maritime public. The Coast Guard primarily communicates via very high frequency (VHF), ultra-high frequency (UHF), and HF bands.

VHF coverage, as of 2017, is effective over approximately only 20 percent of the coast of Alaska because of geography, distances from communications centers, and atmospheric interference. The majority of this coverage is centered on southern Alaska. The Coast Guard's northernmost permanent VHF site is located at Tuklung Mountain, well south of the Arctic Circle. There are three approved VHF sites in Nome, Kotzebue, and Utqiagvik, but they have not been developed. There are no permanent VHF sites above the Tuklung Mountain. However, some Arctic communities maintain limited VHF sites for monitoring local communications.

Figure 9: VHF Coverage Chart



The Coast Guard’s northernmost permanent HF site is located at Nome, Alaska, and it is part of the Geo-diverse Over the Horizon Automatic Link Establishment Matrix (GOTHAM). All GOTHAM sites remote back to Communications Detachment Kodiak, Alaska, for monitoring. UHF/Military Satellite Communications (MILSAT) have been tested, though coverage north of the 68th parallel is inconsistent and unreliable. The current MILSAT system is nearing its end of life with degrading availability and capacity as full termination nears in 2024.

Search Planning Challenges in Polar Regions

Lower latitude SAR uses traditional search patterns. During traditional searches, Coast Guard units generate specific search patterns as a series of waypoints from a compact pattern specification. That information then is entered into the unit’s navigation system.

In the Polar Regions, however, polar navigation typically requires the use of great circle navigation. Consequently, Arctic SAR presents challenges for Coast Guard planning and execution. To date, no methods have been developed for search patterns on the basis of great circle navigation, and it is unclear that the patterns generated from great circle navigation will produce adequate results. In addition, the Coast Guard’s SAR Optimal Planning System may require significant upgrades to generate effective, efficient, high-latitude great circle search patterns. The Coast Guard is working actively to investigate and evaluate solutions to address these challenges.

III. Discussion

Arctic Concept of Operations (CONOPS)

To achieve effective SAR presence in the Arctic, the Coast Guard undertakes planning and outreach activities throughout the year and employs mobile command-and-control platforms such as polar icebreakers; large multimission cutters; ocean-going, ice-strengthened buoy tenders; and seasonal air and communications capabilities through leased or deployable assets and facilities. This mobile, seasonal, scalable surge is part of the Coast Guard's Operation *Arctic Shield*. The *Arctic Shield* objectives are: (1) enhance Arctic Marine Domain Awareness, (2) broaden partnerships, (3) excel in operations, and (4) conduct Coast Guard missions to support increased Arctic maritime activities while preparing for the future.

Considering the limited infrastructure and resource constraints, *Arctic Shield* is proportional to the current level of maritime activity and risks associated with SAR operations. The seasonal, scalable, and mobile presence also enables the Coast Guard to adapt to the Arctic's dynamic and evolving operational environment to address risks with securing the maritime border, collecting critical intelligence, responding to potential disasters, and protecting the marine environment. The Coast Guard conducts the SAR mission in the Arctic with cooperative support from the Department of Defense, State of Alaska, tribal, and local (professional and volunteer) resources. The Coast Guard must provide effective SAR capabilities when either self-rescue options or responses from local agencies and entities are not sufficient.

Coast Guard District 17 performs SAR response operations throughout Alaskan waters, to include SAR operations overseen by Coast Guard Sector Juneau, Coast Guard Sector Anchorage, and Joint Rescue Coordination Center Juneau. During certain times of the year and in certain Alaskan waters, Coast Guard District 17 also operates forward operating locations (FOL) to mitigate risks such as higher fishing vessel activity and extreme heavy weather.

In FY 2017, Coast Guard District 17 responded to 579 SAR cases. Twenty-nine of those SAR cases were performed in the Arctic region—a more than two-fold increase to the nine SAR cases that the Coast Guard responded to in the Arctic region in FY 2013.

Given the projected increase in maritime and air traffic, the Coast Guard intends to maintain its scalable CONOPS in the Arctic region in the near term, commensurate with risks posed by increasing activity that directly supports the Coast Guard's Arctic Strategy. This approach entails deploying a mix of aviation and flight deck-equipped cutters to the region and positioning these assets on the basis of known risks.

Maintaining an effective maritime presence is essential to improving awareness and reinforcing safe, secure, and environmentally responsible maritime activity in Arctic waters. An effective presence in the Arctic enables the Coast Guard to respond to vessels in distress, save lives, prevent attacks, defend our sovereign interests, and protect against pollution. Effective presence requires the right assets and capabilities to be in the right places at the right times. An integrated surface and air presence yields critical, real-time information and enhances SAR response.

In addition to the response capabilities, the Coast Guard has implemented an array of prevention-based activities such as boating safety training and vessel examinations. These activities reduce the SAR demand among both recreational and commercial fleets.

The Coast Guard was instrumental in the development of the IMO Polar Code—a suite of safety and environmental protection regulations adopted in 2015. Since the Polar Code came into effect on January 1, 2017, the Coast Guard has taken active steps to guarantee compliance to prevent maritime accidents in the Polar Regions.

The Coast Guard is building critical international partnerships to enhance SAR planning and operations in the Arctic. In 2011, the eight Arctic Council nations signed a binding agreement on cooperation for aeronautical and maritime SAR in the Arctic. The agreement coordinates international SAR coverage and response in the Arctic and establishes the area of SAR responsibility for each party. In 2016, the United States sponsored the Arctic Chinook mass rescue exercise to test this agreement with participation from other Arctic nations and many stakeholders to refine coordination mechanisms and to evaluate SAR coordination and response in a remote Arctic location. This 5-day exercise tested the effectiveness of resources and illuminated vulnerabilities. It was a major step toward understanding our relationships, challenges, and what we will need to operate in the Arctic effectively for many decades into the future.

Similarly, the Coast Guard led the formation of the ACGF in October 2015 to help operationalize Arctic Council efforts to ensure safe, secure, environmentally responsible maritime activity in the Arctic. Agencies fulfilling the functions of coast guards from the eight Arctic countries—Canada, Denmark, Finland, Iceland, Norway, Sweden, the Russian Federation, and the United States—recently agreed to voluntary guidelines for combined operations. ACGF members tested these guidelines during a full-scale maritime SAR exercise off Iceland in September 2017. This international collaboration is critical to planning and building competency for Arctic SAR operations.

Arctic Aviation Requirements

Harsh conditions and frigid water temperatures require a rapid response to save lives. As a result, as conditions warrant on the basis of risk, the Coast Guard stages up to two MH-60 aircraft and crews at an FOL for approximately 4 months each year to establish an effective, seasonal, Arctic aviation SAR presence. Because of the extensive distance to the nearest Coast Guard Air Station in Kodiak (see Figure 2), the Coast Guard requires two airframes to allow for self-rescue capability plus redundancy to allow for maintenance of the assets.

Along with the MH-60s, the Coast Guard requires associated hangar space for the two helicopters, tools, and consumables; access to the Coast Guard data network; support and maintenance personnel; and adequate berthing and messing facilities to ensure that crew rest requirements can be met in accordance with the Coast Guard's Air Operations Manual COMDTINST M3710.1 (series). To meet all of those requirements, the Coast Guard entered into an agreement with the Alaska Air National Guard (ANG) to lease the Alaska ANG's hangar

in Kotzebue. The 1-year lease is renewable for additional years to support an Arctic presence in proximity to maritime activity. To support the FOL and personnel, the Coast Guard utilizes fixed-wing aircraft, currently the C-130H, for logistics and personnel movements between the FOL and Air Station Kodiak. The Coast Guard also has built a partnership with the Alaska ANG for aviation support during the mobilization and demobilization of the FOL.

To support the Arctic mission, the Coast Guard must deploy aviation assets, along with corresponding aircrews and support personnel, from across Coast Guard and from air stations throughout the Nation. As navigable water in the Arctic is forecasted to increase, seasonal deployment of aviation assets may be extended to address the risks associated with increased maritime activity in diminished and shifting sea ice conditions. Extended deployments may require additional aviation assets, including personnel and funding, to be resourced from other mission areas to support the FOL and deployed cutters.

Flight Deck Equipped Cutter Requirements

To support SAR, the Coast Guard historically has maintained continuous major cutter coverage in the Bering Sea. The major cutter deployed to the Bering Sea executes primary missions of SAR, maritime safety and security, marine environmental protection, and defense readiness. The exact operational area is determined on the basis of assessed SAR risk, location of the ice edge, and overall activity. Cutters are flightdeck-equipped and may operate north of the Bering Strait as ice conditions allow.

Currently, the northernmost deepwater port that can support and resupply major Coast Guard cutters is in Dutch Harbor, Alaska, in the Aleutian Islands. This port can be up to a 6-day round-trip transit to and from the Arctic operations area. This distance presents a significant logistical and operational challenge to Arctic deployments.

Recapitalization of the major cutter fleet will provide the Coast Guard with the ability to continue programming of continuous cutter coverage in the Bering Sea and will ensure presence in the Arctic. Changes to the timeline of ship deliveries or changes and reductions to the total fleet mix within recapitalization projects may jeopardize this ability and other commitments.

Arctic Communications Requirements

Currently, the only fixed communications available to Coast Guard assets operating in the Arctic are satellite communications. However, the limited satellite communications capability aboard cutters and aircraft is insufficient to support full-time response operations. Therefore, a Mobile Arctic Support System site is transported to Utqiagvik (Barrow), Alaska, from mid-June to late-October to supplement VHF and HF communications.

Both research and development (R&D) and programmatic efforts have been initiated to identify how best to extend Coast Guard tactical and public service voice and data networks in the region. Notably, the Coast Guard's R&D Center currently is working with DHS to launch a CubeSat, the Polar Scout, which will detect emergency position-indicating radio beacons and will be dedicated to the Polar Regions. This technology will facilitate Coast Guard SAR in a region

where vast distances and severe environmental conditions, including dense fog, high winds, complete darkness, shifting ice, and extreme sea conditions with receding ice are among the most challenging in the world.

Adaptability for the Near Future

The seasonal, mobile, and scalable approach that currently is employed by the Coast Guard allows the Coast Guard to deploy assets as risk warrants to effect SAR response in the Arctic. This approach is inherently flexible to meet the challenges posed by increased maritime traffic and anticipated growth in SAR cases.

Future Assets and Projects to Address Gaps

As previously discussed, the Coast Guard has ongoing R&D and acquisition projects to address some of the gaps associated with Arctic SAR operations, including recapitalizing assets and new communications systems.

Surface Assets

Polar icebreakers are critical for the Coast Guard to carry out its statutory missions in the Arctic and to support national priorities. Polar icebreakers are large seagoing vessels able to transit long distances and sustain operations for extended periods without replenishment. Icebreakers possess independent and redundant systems to operate successfully in harsh Arctic conditions with limited infrastructure. Icebreakers are able to maintain command and control of deployed assets and operate safely in sea ice and open water. Icebreakers provide security, support limited scientific research, safeguard the environment, project U.S. sovereign presence, facilitate commerce, and enhance national security and maritime safety.

The Coast Guard Cutter (CGC) POLAR STAR (built in 1976) is the Nation's only operational heavy icebreaker. The Coast Guard's immediate focus is on the construction of the first new heavy icebreaker since POLAR STAR entered service, followed by a second to re-establish self-rescue capability to enhance our assured access to the Arctic. The congressionally mandated 2011 High Latitude Study recommended three heavy icebreakers and three medium icebreakers to meet the Coast Guard's and the Nation's mission demands in the Polar Regions until September 30, 2050.

The Offshore Patrol Cutter (OPC) is critical to the future of the Coast Guard's offshore fleet and will replace the Coast Guard's aging fleet of medium endurance cutters, some of which are more than 50 years old. The OPCs also will support Arctic objectives by effectively regulating and protecting emerging commerce and conducting the full range of Coast Guard missions in the Arctic region during ice-free periods of the year.

Aviation Assets

The C-130J aircraft provides greater endurance, increased operating altitudes, and greater fuel efficiency than the C-130H aircraft, thereby improving SAR response, Arctic domain awareness, and logistical support of the FOL. The Coast Guard also is working to build capabilities and capacities with dedicated aircraft, and training and qualifications for personnel engaged in polar operations, including rotary wing aircraft.

Communications Assets

Members of the Coast Guard's R&D Center and local Air Station Kodiak technicians visited multiple locations in 2014. They determined that Eielson Air Force Base in Fairbanks, Alaska, offered the best long-term site placement for a future permanent Coast Guard HF radio communications site. This project is scheduled for completion in 2019.

The Mobile User Objective System (MUOS) is the next generation MILSAT communications package, expected in 2020, and should improve Arctic MILSAT communications coverage. The Coast Guard R&D Center conducted testing with the North American Aerospace Defense Command and United States Northern Command on CGC HEALY where MUOS services were exercised beyond the 89th parallel in 2014. MUOS holds promise for intraservice communications, and the Coast Guard is working with other agencies to determine when it might be installed on Coast Guard assets.

In addition to maintaining the current CONOPS and implementing future assets, the Coast Guard will continue to enhance SAR partnerships with the Department of Defense, the State of Alaska, and tribal and local entities through periodic exercises such as Arctic Chinook to ensure interoperability and to coordinate effective SAR responses in the Arctic.

Future and Residual Gaps

As Arctic activity grows, more resources, training, and experience will be required to provide appropriate risk mitigation in this harsh operating area. Without a matching increase in major ship and aircraft acquisition and resources to support those acquisitions, those resources must be sourced from within the Coast Guard at the expense of other mission areas. To offset this effect partially, the Coast Guard is seeking to broaden partnerships and work with international, federal, state, local, and tribal partners and stakeholders to grow response competencies and capabilities where appropriate.

Because of a lack of icebreaking assets, the Coast Guard is unable to maintain a persistent, year-round surface presence for SAR response in the Arctic. Once new icebreakers are available, limited numbers will require them to be diverted from other missions for emergency operations. The Coast Guard plans to close the icebreaker gap by 2026, with the delivery of a planned third heavy polar icebreaker. Until that time, the Coast Guard is mitigating risk through the mobile, scalable, and seasonal approach of *Arctic Shield*, and the forward deployment of air and surface assets during the times of peak maritime activity.