ARCTIC MARITIME DOMAIN AWARENESS FABRIC OF MARITIME COMMUNITY

The U.S. Coast Guard Cutter *Willow* navigates past an iceberg, Aug. 23, 2011, during an Arctic patrol.

U.S. Coast Guard photo by Petty Officer 3rd Class Luke Clayton

MDA Means Knowing What's Going on at Sea

The Coast Guard needs more capability to monitor maritime activities in the Arctic region.

By Edward H. Lundquist

Maritime domain awareness (MDA) is to have knowledge about what's going on offshore – who is operating there, and why are they operating there, and what are the risks that the nation faces based on those operations. "Whether it's the East Coast, or the Straits of Florida, or the Gulf of Mexico, or any other region of the U.S. maritime interest, we need to have MDA for security and safety," said Rear Adm. Thomas Ostebo, commander of Coast Guard District 17, which includes Alaska and the maritime environment that encompasses the North Pacific Ocean and the Gulf of Alaska, all of the Bering Sea, and all of the Arctic Ocean.

"If you look at the top of the world and the amount of growth and activity up there, the Arctic is probably the fastest-growing maritime environment," Ostebo said.

The annual NOAA "Arctic Report Card" (www.arctic.noaa.gov/reportcard/) noted that Arctic-wide 2012 was an unremarkable year for surface air temperatures, a primary driver of melting. But, the report states, "... in spite of these moderate conditions, new records were set for sea ice extent, terrestrial snow extent, melting at the surface of the Greenland ice sheet, and permafrost temperature."

As the multiyear ice is diminished, there is more open water, especially in the summer months. That means more traffic on the water of all types.

"We've had a doubling of cargo tonnage just from last year to this year going through the Bering Strait across the Northern Sea Route. We had 20 or 30 research vessels operating in the Arctic this year. At one point this summer along the North Slope, we had almost a hundred vessels."

Ostebo said the maritime activity is growing at an unprecedented rate, and where there is an increase in maritime traffic, there is an increased risk for allisions (where one vessel runs into a stationary object or vessel), collisions, groundings, oil spills, sinkings, and any type of marine industry calamity.

"We're seeing more and larger cruise vessels for ecotourism go up in the Arctic. What if you have a cruise ship that's plying relatively uncharted waters, with relatively poor weather forecasting, and possible ice conditions, and they're up in the Arctic and they have a problem?" Ostebo said. "How do you rescue 300 people far off the coast of Wainwright? That would be extremely difficult."

The rest of the world has an interest in the Arctic, he said. "A good portion of the Arctic itself is international waters and it's available and open to the rest of the planet, hence you have countries as far away as China and India plying the waters of the Arctic to see what advantages they can find for their own nations up there," Ostebo said. "The Chinese have the largest conventional ice breaker in the world, the *Xuě Lóng*, which was operating extensively in the Arctic this year, to include cutting through our

Waves crash over the *Kulluk* oil rig, which grounded on Sitkalidak Island, Alaska, on Dec. 31, 2012. No oil spill or injuries were associated with the grounding, but increased oil exploration and drilling will increase the chances of such incidents occurring.

U.S. Coast Guard photo by PA3 Jon Klingenberg

EEZ [exclusive economic zone]. We ought to know what other people are doing there."

According to Ostebo, Unimak Pass – between the Bering Sea and the North Pacific Ocean, southwest of Unimak Island in the Aleutian Islands not far from Dutch Harbor – is one of the fastest-growing international straits on the planet, with east/west traffic in the North Pacific, from China, Korea, and Japan, going in and out of Canada and the Pacific Northwest following the great circle route through there because it's cheaper and faster for them to do that. "We probably see 2 [hundred] or 300 a month – thousands of ships a year of many different flags – going through this very, very narrow pass that has very little infrastructure at all around it and really very little response capability or understanding of it."

There is a 50 percent increase in Arctic maritime activity (i.e., offshore exploratory oil drilling, international shipping transits, adventure tourism, etc.), which has effectively doubled District 17's area of responsibility, both in terms of geographic size and maritime customers.

According to Ostebo, the risk of vessel casualties that would require Coast Guard medical evacuation or search and rescue (SAR) support has been heightened by an overall increase in vessel traffic:

- total vessel traffic from 2008 to 2011 increased from 120-plus to 190;
- Bering Strait transits from 2008 to 2011 jumped from 220 to 410; and
- adventurer transits in the U.S. Arctic from 2011 to 2012 increased from approximately 13 to 22.

For perspective, in 2012, 1,559 vessels transited the Suez Canal, according to the Suez Canal Authority.

Creating Infrastructure

"You have all the challenges of obtaining situational awareness that you have off our lower 48 shoreline, and then you pile on top of that all the challenges of the Arctic," said Rich Hansen of the Coast Guard research and development center (RDC) in New London, Conn. "There are a few communities up there – they're few and far between – if you need something. You're going to have power challenges. And all of the locations present environmental challenges: extreme temperatures and extreme wind. Because of the extremely low temperatures, the air is much denser, so the wind loading is actually higher, per mile per hour, than you would have in Miami [Fla.], for example."

Installations might include radars in busier port locations, but mostly it's the Automatic Identification System (AIS), comprised of radio transponders on vessels continually transmitting their positions, and remote radio tower sites that receive and process the signals.

Left: Lt. Tom Pauser, with the 17th Coast Guard District's Prevention Division, demonstrates the proper use of a life jacket to a Hogarth Kingeekuk Sr. Memorial School student April 10, 2012. The school visit was designed to support the Kids Don't Float program, which stresses the wearing of life jackets. **Right:** Coast Guard divers familiarize themselves with the hull of the Polar-class CGC *Polar Star* as part of the training for the annual Cold Water Diving Course in Seattle, Wash., Feb. 9, 2011. The *Polar Star* was reactivated in December 2012 after refurbishing and modernization and is expected to re-enter service in midsummer for ice breaking and scientific work in the Arctic region.

U.S. Coast Guard photo by Petty Officer 3rd Class Grant DeVuyst

U.S. Coast Guard photo by Petty Officer Nathan W. Bradshaw

U.S. Coast Guard photo by Petty Officer 1st Class Sara Francis

"We're trying to expand the VHF and UHF radio footprint throughout Alaska," said Capt. Alan Arsenault, commanding officer of RDC. "We're pretty well covered in the southeast section with VHF and UHF radio coverage, but up on the North Slope, we virtually have nothing shoreside as far as communicating with our afloat assets using that frequency range. We're slowly working that process to expand the footprint up there, starting with the shoreside command and control nodes where the communications will be centralized, and a response can be organized in the event of a distress call. But we need the ability to hear a distress call from a vessel on the North Slope. That doesn't exist today. If somebody hit the distress button on their digital selective calling-enabled VHF radio, that wouldn't work at all. Up on the North Slope, we don't have any shoreside capability to respond to anything, but in addition to that, we don't have any shoreside capability to 'hear' any communications traffic."

In southeast Alaska, the radio towers are remote sites at very high altitudes, because that's a mountainous region of Alaska. The radio units are battery powered with a charge cycle system. When the battery power gets low, generators kick in to recharge the batteries. The generators are powered by propane, and they rely on solar panels and even wind turbines so they don't go through as much propane – propane-refilling evolutions on the top of the mountains are very interesting. Service personnel have to refill by helicopter with many trips to actually get those tanks filled. On the relatively flat North Slope, the remote shelters with the radio gear have to be built above the permafrost, and the towers would have to be much taller and able to withstand icing and high winds.

"We are currently working with the Center for Islands, Maritime, and Extreme Environments Security [CIMES, a Department of Homeland Security Center of Excellence], a partnership [with the] University of Hawaii, University of Alaska Fairbanks, University of Puerto Rico at Mayagüez, and a private industry partner, Intelesense Technologies, to develop technology demonstrations that integrate HF radar information, unmanned aerial vehicle sensors, and satellites to achieve some degree of Arctic MDA. We also plan to work with CIMES to understand how radar waves interact with the dielectric properties of ice, so we can get the optimal surface search radars on arctic assets, many of which are not ice-strengthened and need good ice navigation capability," said Bert Macesker, executive director of RDC.

"From a science and technology perspective, we need a space-based maritime domain awareness system that provides everything from ice coverage and weather information, to vessel traffic information in the Arctic, with environmental information – as we saw in the Gulf of Mexico – to give us the extent of oil spills, Ostebo said. "If we had that, then we would know what's going on offshore, and not just flying patrols or steaming around in ships to see what's going on at sea with the eyeball. I clearly think the Arctic lends itself to a space-based or a technology solution for most of the information we need, so we can target the really high-dollar assets and limited infrastructure to address a problem that's developing instead of gaining awareness or patrolling."

Macesker said more information is better, but it can make things harder. "We're doing a good job bringing in data and displaying

A.J. Edwards, the national distress system team leader from electronic systems support unit Juneau, Alaska, clears ice and snow from solar panels that power a microwave link site for VFH-FM communications in western Alaska atop Sharatin Mountain on Kodiak Island April 3, 2012. The microwave site is one of several in the area and one of two dishes in need of maintenance.

data, but we don't want to make things classified because the Coast Guard needs to be able to share this information with our industry and port partners."

Building the Network

The Marine Exchange of Alaska (MXAK) is a nonprofit organization that collects and shares maritime information with member organizations, the state of Alaska, and the Coast Guard. Its vessel-tracking network is a major component of the Coast Guard's MDA capability.

Real-time information about where a ship is and when it will dock is essential for shipping companies, agents, cargo brokers, pilots, and tug operators assisting vessels into port, as well as the dock crews, port captains, and harbor masters who handle the cargo after a vessel is moored. This information is also valuable to Alaska state agencies, NOAA, and the Coast Guard. It takes a robust vessel-tracking system to collect and move this information over a network that hardly exists in Alaska.

"Regulations and voluntary risk reduction measures are in place to minimize marine casualties and prevent environmental harm," said MXAK Executive Director Capt. Ed Page. "But just as there are speed limits on highways, you need to have the ability to monitor and compel compliance with regulations. You can't do that if you can't see the vessels."

The Coast Guard can also be much more effective in saving lives and responding to marine casualties if they have information on the location of mariners in distress as well as vessels in the area that may help avert a casualty. The MXAK's AIS network, comprised of more than 95 receiving stations, provides a maritime safety net.

MXAK is continuing to build more nodes for the expansive AIS network. A typical installation has a radio antenna to receive AIS data and radio signals, and a satellite dish to provide Internet connectivity that sends the data back to its 24/7 operations center in Juneau. Solar panels, wind generators, and fuel cells

A Coast Guard Station Juneau crewmember greets Consul General Denis Stevens, Consulate General of Canada, to Seattle, Wash., shortly after he boarded one of the station's 45-foot response boats-medium Feb. 1, 2012. Stevens visited the station with Rear Adm. Thomas Ostebo, District 17 commander, to become more familiar with Coast Guard missions in Alaska.

help power remote units. During the long winter up north, the solar panels are useless, but that corresponds to a period where shipping stops for the season. Not all locations are "off the grid," Page said. But they all have to be able to withstand the elements. "We have gnarly weather."

MXAK has an operations center manned 24 hours a day. "We can set up alarms if a vessel departs from the transit lanes, is going too fast or too slow, enters restricted waters, or is doing something out of the ordinary," Page said. "It's a series of electronic fences we refer to as watchdogs."

"The maritime industry, state of Alaska, and Coast Guard all have a shared commitment," said Page. "We are all working together on providing tools and capabilities that help ensure safe, secure, efficient, and environmentally responsible maritime operations here in Alaska and the Arctic."

Responding to Crisis

The Arctic has extremely limited infrastructure, and logistics are challenging. There is no location north of Nome where a large cutter can refuel or make dockside repairs. Nome can support a medium-sized cutter or a buoy tender for refueling and limited repairs. There are no Coast Guard hangars to house a C-130 Hercules or helicopter in the Arctic. "We were able to rent a substandard hangar for Arctic Shield 2012 to house two H-60 Jayhawk helicopters, but at significant cost," said Lt. Veronica Colbath, external affairs officer for District 17. "There are limited berthing facilities in the Arctic in case we need to surge people to respond to a crisis."

Coast Guard assets from Kodiak can respond to situations in the Arctic, but it takes a considerably longer time to respond, said Colbath. "The immediate response is to send a C-130 from Kodiak or use an H-60 from Forward Operating Location Barrow if they are forward located during a crisis. 2012 was the first time Coast Guard helicopters were stationed in Barrow for the open-ocean period."

"We're quickly going to run out of communications capability and bandwidth in the event of a major mishap along the North Slope," Ostebo added. "Barrow and the other remote communities are not connected by fiber optic and if you look at the demand for information and the demand for command and control-type information we've seen from [Hurricane] Katrina, *Deepwater Horizon*, and [Hurricane] Sandy, for example, we would overwhelm the communications capability up there."

Ostebo said the Coast Guard has engaged every partner available – the Department of Defense (DoD) through U.S. Northern Command, and Joint Task Force-Alaska and Alaskan Command; the state of Alaska; the Alaska National Guard; local communities; tribal communities and native partners; and industry – to decide how to solve this problem in the short run. "One of the big goals with the Arctic Shield exercise we held this past summer was for all of us to come together and walk through what we would do if we had to conduct a mass rescue. We examined what would be the community centers of excellence that could help us out. Nome, Barrow, and Dutch Harbor are the three places that have been alerted to this growth in operations and have stepped up as local community partners to help us do that."

Another one of those capabilities is floating assets, Ostebo said. "The national security cutter *Bertholf* was operating up there

U.S. Coast Guard photo by Petty Officer 3rd Class Grant DeVuyst

this summer. It's not an icebreaker, but it is a highly capable ship and it did a phenomenal job in the capabilities that it brought offshore."

Ostebo said the Coast Guard and the nation need more ice breaking capability. "We will be bringing one of our icebreakers back to active-duty service. *Polar Star* will be coming out next summer, which will essentially double our icebreaker capabilities for the nation, and we'll have more capability to use in the Arctic, not only for scientific work, but also to complete all the missions of the United States Coast Guard in the Arctic, particularly during times of ice-covered waters."

The entire Aleutian Islands – a chain of 14 large islands and 55 smaller ones that extends for 1,200 miles – is a national environmental sanctuary. The surrounding waters are incredibly dangerous. "On a routine basis, we'll have hurricane-force winds. There are also homeland defense and security risks, from stowaways to illicit cargoes, coming through there," Ostebo said.

Much of that great circle traffic also passes through Dixon Entrance, the pass just south of Ketchikan leading to Prince Rupert, British Columbia. Prince Rupert is a new port, with a new railhead and highway connection. "It's a growing port," said Ostebo. "In fact, it's already bigger than the port of Oakland [Calif.]. There's thousands of vessels that go through Dixon Entrance east and west, and cruise vessel traffic – a million passengers a year – and Alaskan freight going north and south."

Tribal Partners

"We value our relationship with our federal, state, local, and tribal partners," said Sudie Hargis, tribal liaison for District 17. "We have many challenges to overcome in the Arctic, and we need the knowledge and experience of our partners to help us achieve our goals."

Hargis said the service is committed to working with its Alaska Native partners who reside in the Arctic. To prepare for last summer's Operation Arctic Shield 2012, advance teams – including the 17th District commander and other senior staff members, actively engaged tribal leaders during the planning phase and throughout the 2012 season to minimize adverse impacts from Coast Guard operations on tribal rights, interests, and subsistence activities.

In addition to engaging with Alaska Native tribal governments, the Coast Guard engaged extensively with local, state, and other federal agencies to maximize operations. "Working with tribes and local governments really helped us learn how to operate safely and respectfully in an area where subsistence activities are critical to survival of the residents in the region. We are building relationships that will be vital to our long-term success in the region," Hargis said.

The Coast Guard also conducted outreach to 27 different Arctic communities to conduct water safety training at schools and with residents; worked with local SAR personnel in Nome and Barrow to carry out ice rescue safety cross-training; and provided medical, dental, and veterinary outreach in many of those communities.

"We try to be as far forward-leaning as we can to look after and protect our national environmental, security, and defense interests. And we're doing that with all the partners that we can. But I temper that with the fact that there are some places, like in the Bering Strait, there is very little we can do in the control of those spaces," Ostebo said.

"We're the smallest Coast Guard district in terms of personnel, but the largest in terms of area. We have more shoreline here than the rest of the U.S. combined. We have very few coasties up here, and they all do a great job. Just turn on your TV and watch *Coast Guard Alaska* and you'll be impressed with the men and women up here – not only how brave they are, but how adaptable they are to the operating environment up here. It's amazing. I couldn't be more proud to be their district commander."

OPENING OF ARCTIC OFFERS OPPORTUNITY, RISK

The Arctic ice shelf shrank to its smallest size in recorded history on Sept. 19, 2012. According to Canadian Air Force Brig. Gen. A.D. "Al" Meinzinger, deputy director of strategy at North American Aerospace Defense (NORAD) and U.S. Northern Command's (USNORTHCOM) Policy and Plans Directorate, increased melting of the Arctic ice cap means both opportunity and risk.

"We recognize some fundamental changes occurring," Meinzinger said. "And from a security perspective, we recognize that with that change coming, human activity in the Arctic will be increasing."

There will be more fishing, transiting ships, tourism, and mineral and oil exploitation, but there are also safety and security challenges.

Army Gen. Charles H. Jacoby Jr., who commands USNORTHCOM and NORAD, noted in congressional testimony in early 2012 that USNORTHCOM could be called on to support civil authorities in an environmental disaster response in the Arctic or to support search and rescue operations there.

DoD's unified defense plan identified USNORTHCOM as the department's advocate for Arctic capabilities in April 2011, reflecting the command's dual roles in defending the homeland and providing military support to civilian first responders, when requested. In USNORTHCOM's Arctic role, it is responsible for working with stakeholders across the U.S. military, the interagency, and the international community to promote safety and security in the region.

Jacoby and Coast Guard Commandant Adm. Bob Papp Jr. signed a report in March that identifies gaps in communication, domain awareness, infrastructure, and presence. This analysis will help guide investments to prepare for the eventual opening of the Arctic, including infrastructure that Meinzinger said often takes four times longer and costs four times as much as similar projects in less isolated and demanding environments.

USNORTHCOM also is collaborating with the Navy, other DoD entities, the Department of Homeland Security and the Canadian government to enhance collective capabilities in the Arctic.

Jacoby has joined Canadian Army Lt. Gen. Stuart Beare, commander of Canadian Joint Operations Command, to sign the Tri-Command Framework for Arctic Cooperation that promotes enhanced military cooperation to support safety, security and defense operations in the region.

"We have an opportunity, while we watch the Arctic begin to open up, to get ahead of potential security requirements," Jacoby told the Senate Armed Services Committee.

"We have common interests," Meinzinger said. "The eight [Arctic] nations understand that this is a fragile environment, and we have a mutual interest in ensuring the Arctic opens in a peaceful manner and that conflict is not on anybody's priority list."

"We need to anticipate the Arctic operations today so we are prepared for the Arctic operations of tomorrow," he said.

Adapted from a USNORTHCOM press release