Navigation North of the Arctic Circle

by LCDR Michele Schallip

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In many parts of the world, sailors rely on information and support to navigate safely through inland and international waters. They use weather reports, shore-side data, and numerous floating and fixed aids to navigation, which mark recently sounded, well-charted traffic patterns and ports. Docks and boat harbors also line the coasts, providing fuel, food, rest stops, and emergency response.

However, these resources and modern conveniences are not available in the Arctic. Navigation north of the Arctic Circle presents challenges in that it is limited in many of the basic references sailors rely on in most other areas. Some chart information even pre-dates the U.S. purchase of Alaska in 1876 and is based on lead-line soundings from Russian and British exploration in the 1800s.

**Dated Data, Other Challenges**

Ice covers the Arctic for a majority of the year. Tidal and current reference points are wide-spaced and not always accurate. In addition, most of the water north of the Arctic Circle is charted in scales difficult for precise near-shore navigation.

For example, the scale for the most detailed National Oceanographic and Atmospheric Administration (NOAA) chart for Point Barrow is 1:47,983. This means

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**The Arctic: Did you know... Red Dog Mine**

The Red Dog Mine, named after a bush pilot’s dog, is the world’s largest producer of zinc concentrates and a major producer of lead and other key minerals. The mine, located north of the Arctic Circle and 55 miles from the Chukchi Sea, is an open-pit truck-and-loader operation, which uses conventional drill and blast mining methods.

The mine trucks partially processed ore to its port facility from July to mid-October. Massive ore carriers anchor off the mine’s port facility between Kotzebue and Kivilina, where barges carry the ore to the ships anchored in deeper water. These ships then transport the ore to smelting facilities in British Columbia, and to customers in Asia and Europe.
The History

The earliest Arctic navigators were the indigenous people, who used shallow-draft boats to hunt whale and walrus. They also used traditional knowledge passed down through many generations to navigate during the summer months.

In 1778, Captain James Cook searched for the ice-free Northwest Passage through the Arctic for the British government. He carried with him rough charts drawn from Vitus Bering’s early 1700s Arctic exploration, on behalf of the Russian Empire. These charts, while accurately charting the Russian ships’ route, failed to provide the navigational information Captain Cook had hoped they would.¹

Although solid ice prevented discovery of a northerly route during his trip, Captain Cook and his crew greatly improved Arctic bathymetry documentation.

In the mid-1800s, more non-native sailors navigated to the Arctic, transiting from the North American eastern seaboard to hunt whales. Through the years, the whaling industry waned and fewer ships transited the icy Arctic waters.

Endnote:

Every inch on the chart represents 47,893 inches or 0.7 nautical miles. In contrast, the largest scale chart available for Fort Lauderdale, Fla., is 1:10,000 or one inch equals 0.14 nautical miles. The narrowest point between the United States and Russia, the Bering Strait, has a scale of not less than 1:400,000 for an area 55 miles wide.

Few short-range aids to navigation mark Arctic waterways. Yearlong floating and coastal aids are no match for the long, harsh Arctic winters. While there are some government-maintained shore aids to navigation in Arctic communities, such as Point Hope and Kotzebue, most of these are seasonal. Floating aids to navigation north of the Bering Sea are also seasonal and maintained by private entities.

Additionally, the Arctic region has few weather stations and no weather buoys above the Arctic Circle. Two NOAA weather stations, one at Red Dog Mine and the other in Nome, provide the only immediate maritime weather information such as wind speed, direction, and barometric pressure. Therefore, real-time weather information remains an issue.

Efforts to Improve Navigation

The number of vessels sailing above the Arctic Circle is increasing. As a result, initiatives are underway to improve navigation in the Arctic and to overcome its lack of resources. For example, the National Oceanographic and Atmospheric Administration’s Office of Coast Survey has identified about 325,000 square miles of navigationally significant areas.² In early 2012, the agency completed a new chart of the Kotzebue Bay Sound, providing important detailed navigation information to those transporting goods to and from the Red Dog Mine. In February 2013, NOAA’s Office of Coast Survey, in conjunction with its Center for Operational Oceanographic Products and Services and the National Geodetic Survey, published the updated Arctic Nautical Charting Plan to lay out a strategy to improve Bering Sea and Arctic nautical charts.²

To increase real-time weather information, many mariners participate in the World Meteorological Organization voluntary observing ship scheme. Under this program, volunteers transmit real-time information to meteorologists by radio or satellite, which is then incorporated into weather reports and predictions.

Vessel Traffic

As transpolar and destination traffic continues to increase and evolve, all mariners must approach the navigational challenges with caution. If we are all prudent navigators, a wide spectrum of users, including
the indigenous people, can enjoy and benefit from a productive use of this fragile environment, and we can all avoid a life-threatening emergency or environmental tragedy.

About the author:
LCDR Michele Schallip is the commanding officer of USCGC Spar, homeported in Kodiak, Alaska. LCDR Schallip served aboard five cutters, and is on her third Alaskan assignment. She holds a master’s degree in public administration, and a 1600 gross-ton merchant mariner license.

Endnotes: