U.S. House of Representatives
Committee on Transportation and Infrastructure
Washington, DC 20515

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July 15, 2008

SUMMARY OF SUBJECT MATTER

TO: Members of the Subcommittee on Coast Guard and Maritime Transportation

FROM: Subcommittee on Coast Guard and Maritime Transportation Staff

SUBJECT: Hearing on Coast Guard Icebreaking

PURPOSE OF HEARING

The Subcommittee on Coast Guard and Maritime Transportation will meet on Thursday, July 16, 2008, at 2:00 p.m. in room 2167 Rayburn House Office Building to receive testimony on "Coast Guard Icebreaking".

BACKGROUND

Icebreaking as a federal responsibility

Icebreaking in the United States began in the 1830s with the advent of steam-powered vessels. At that time, side-wheeled steamers with reinforced bows were used in winter to open harbor channels along the East Coast as far south as the Chesapeake Bay. These icebreaking operations were conducted by private entities.

Federal interest in icebreaking began with acquisition of the Alaska purchase in 1867. For many years, the Revenue Cutter Service – a predecessor to the modern Coast Guard – provided the only Federal presence in the newly acquired territory. The Revenue Cutter Service's responsibilities included protecting sealers and whalers as well as protecting the seals themselves from over-hunting; general law enforcement; and emergency operations, including the more unusual task of transporting Siberian reindeer to the territory as a food staple for starving indigenous peoples.

The Revenue Cutter *Bear*, built in Scotland, along with the *Thetis*, were among several new cutters constructed for ice work in Alaska. These vessels were not true icebreakers as we understand

that term today – but they were vessels with reinforced hulls that could withstand the enormous pressures encountered while traveling though thick ice.

True icebreakers were developed during the period from the construction of the *Bear* in 1874 to her retirement in 1926, with most of the development occurring overseas. In 1899, the Russian government accepted the *Ermak,* a British vessel considered to be the first true icebreaker. Several cutters were built in the U.S. during this period for duty in Alaska and along the East Coast. One cutter – the *Androscoggin*, commissioned in 1908 – was built specifically "for the coast of Maine" to "break through the ice along the Maine coast for the relief of shipping."

In 1926, the Coast Guard purchased an ocean tug – the *Kickapoo* – and rebuilt her as icebreaker. *Kickapoo* replaced *Androscoggin* for operations along the Maine coast.

In 1927, the Coast Guard commissioned the *Northland* (WPG-49), a ship that was 216 feet long, just over 2,000 tons, with a welded steel hull and diesel electric engines that provided up to 1,000 horsepower of thrust. *Northland* was used to conduct Bering Sea patrols from San Francisco and Seattle.

Following the construction of *Northland* and beginning in 1932, six 165-foot cutters (known as the *Escanaba* class) were built, with the last vessel in the class – *Mohawk* – being commissioned in 1935. These vessels were intended for light icebreaking on the Great Lakes.

It was not until a year after the completion of the 165-footers that the Coast Guard received authority to conduct what today are referred to as domestic icebreaking operations when President Roosevelt issued Executive Order No. 7521 in December 1936. This Executive Order directed the Coast Guard "to assist in keeping open to navigation by means of icebreaking operations ... channels and harbors within the reasonable demands of commerce." The Coast Guard focused its icebreaking operations on clearing harbors and rivers to allow safe passage of oil supply barges to cities in New England.

Domestic Icebreaking

Following the President's 1936 Executive Order, the Coast Guard undertook an extensive study of icebreaker technology leading to the design and construction of the first true icebreakers (vessels that can push through the ice) in the service – the 110-foot *Raritan* class tugs. Four vessels in this class were commissioned in 1939; a total of 17 were eventually built.

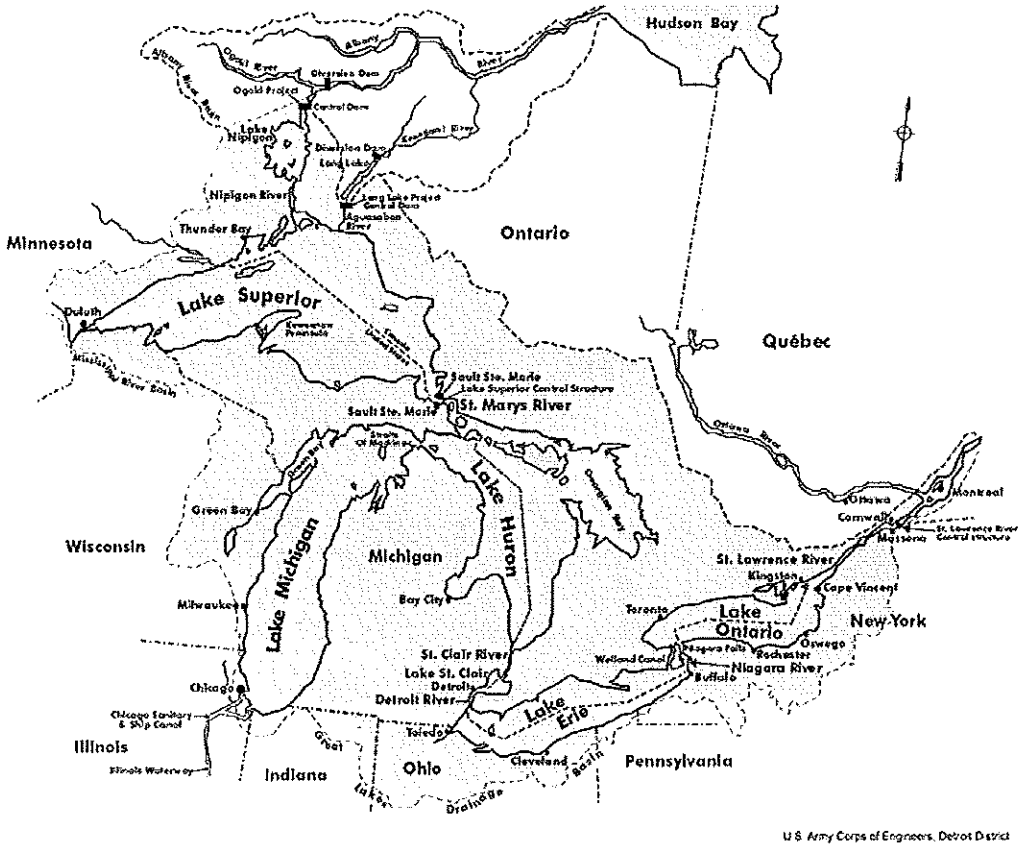
In 1939, the Lighthouse Service (a civilian uniformed service) was transferred from the Commerce Department to the Coast Guard. The Lighthouse Service had already developed the design for a 180-foot buoy tender (the *Cactus* class, later known as the *Balsam* class) that had icebreaking capability because of its hull design, including a cut-away forefoot and rounded, "slack" bilges. Buoy tenders are vessels designed to service aids to navigation. In addition to tending aids to navigation and conducting other duties, *Balsam* class cutters performed routine icebreaking chores along the East Coast for many years. Thirty-nine of these vessels were built in Duluth, Minnesota, between 1941 and 1944; the *Acacia* (WLB 406), served on the Great Lakes until it was decommissioned in 2006 after 62 years of service.

The *Storis* (WMEC-38), a 230-foot vessel originally built as a buoy tender, was commissioned in 1942. The *Storis* served in the Atlantic during World War II and was later relocated to Juneau, Alaska. In 1972, *Storis* underwent a major mid-life renovation that converted her from a tender to a medium endurance cutter with icebreaking capability. *Storis* served in Alaska – conducting Bering Sea patrols in addition to icebreaking and other responsibilities – until February 2007, when she was retired from service as the oldest vessel then in commission in the Coast Guard. Until they were all retired, the *Storis*, the 39 180-foot tenders, and the 17 110-foot tug boats gave the Coast Guard substantial domestic icebreaking capacity.

In the 1970s, the Coast Guard began replacing the aging 110-foot tugs with nine 140-foot tugs of the *Bay* class. These are modern vessels that can push through ice up to 20 inches thick and break ice that is up to three feet thick by ramming. Five of the *Bay* class tugs are homeported on the Great Lakes while four are homeported on the East Coast.

In addition to the 140-foot tugs, the Coast Guard now utilizes 14 175-foot (*Keeper* class) coastal buoy-tenders as well as 16 225-foot (*Juniper* class) seagoing buoy-tenders (which replaced the 180-foot *Balsam* class tenders) to conduct domestic icebreaking operations.

Great Lakes Icebreaking



Map of the Great Lakes

An important element of domestic icebreaking is the demanding requirements for ice operations in the Great Lakes. Compared to domestic icebreaking operations along the East Coast,

operations on the Great Lakes cover a large surface area. The coastline of Lake Michigan alone is 1,640 miles – equal to the distance from Portland, Maine, to Homestead, Florida. Despite the expanse of this waterway, which also includes the St. Lawrence Seaway, U.S. Coast Guard assets on the Lakes of all types are minimal and in recent years, icebreaking resources have been reduced even though approximately 115 million tons of cargo is transported on the Great Lakes annually. During "ice season" (December 15 – April 15) alone, 20 percent of the iron ore needed for the nation's manufacturing heartland are carried by Great Lakes vessels. Additionally, 10 percent of the Great Lakes coal load is carried during ice season. Hundreds of thousand of jobs depend on the materials and goods delivered across the Great Lakes.

The cutter *Mackinaw* (WAGB-83) was designed specifically for icebreaking on the Great Lakes. It is a longer, wider version of the *Wind* class cutter that draws less water than the other vessels in that class. *Mackinaw* was commissioned toward the end of World War II and served until 2006, when it was replaced by a new *Mackinaw* (WLLB-30). Assisting the original *Mackinaw* were a minimum of five of the 180-foot *Balsam*-class buoy tenders (*Sundew*, *Acacia*, *Woodrush*, *Bramble*, and *Mesquite*) – some of which had been especially strengthened for ice operations.

The keel for a new *Mackinaw* (WLBB-30), a 240-foot dual-purpose vessel was laid down in 2004; the vessel was commissioned in June 2006 and has carried out its buoy-tending and icebreaking responsibilities from its homeport in Cheboygan, Michigan ever since.

Supplementing the new *Mackinaw* are two 225-foot buoy tenders and five 140-foot *Bay* Class tugs. Since the decommissioning of the *Acacia,* Great Lakes interests have been petitioning the Coast Guard to station an additional *Bay* class tug in the Great Lakes. The Coast Guard continues to reassure Great Lakes interests "that we will continue to provide the same level of professional service that the citizens and mariners of the Great Lakes region have come to expect from the Coast Guard."[1]

Despite these reassurances, last winter, limited icebreaking capacity contributed to circumstances that resulted in damage to six Great Lakes vessels totaling $1.3 million in damages. Two vessels collided because of insufficient maneuvering room and suffered extensive damage, requiring approximately $650,000 in repairs, another two vessels suffered ice damage to their hulls, and two more had propeller damage. In addition, coal deliveries to Green Bay, Wisconsin, were significantly delayed.

It should be noted that in addition to the U.S. Coast Guard, the Canadian Coast Guard and commercial enterprises provide icebreaking capability on the Great Lakes. However, these services come at a price. U.S. shippers pay up to$24,800 per season for icebreaking services provided by Canada, and approximately $500 per hour for commercial icebreaking operations.

Polar Icebreaking Operations

The first truly polar-class icebreakers were built between 1942 and 1946 for the Coast Guard and the U.S. Navy; they were known as the *Wind* class cutters. The seven vessels in the *Wind* class were 269 feet in length with a 63.5-foot beam; they displaced 6,500 tons. Each vessel had three

[1] Letter dated Oct. 12, 2005 to Norman L. Carlson, Jr. Mayor, City of Charlevoix, Minn., from J. X. Monaghan, Chief of Boat Forces, U.S. Coast Guard.

propellers (two aft and one forward) and was driven by a diesel-electric plant utilizing six Fairbanks Morse engines developing a total of 12,000 horsepower. The hulls of the *Wind* class vessels were of exceptional strength due to their close frame spacing and the application of 1 5/8 inch all-welded hull plating.

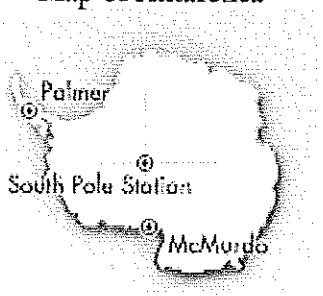
Some of the *Wind* class cutters were transferred by the Coast Guard to the Soviet Union during World War II and several were transferred to the U.S. Navy for the duration of the war. All *Wind* class cutters were returned to the Coast Guard by the mid-1960s. Interestingly, before being returned to the Coast Guard, the *Northwind* participated in Antarctic operations in support of Operation High Jump led by Admiral Byrd in 1946.

Coast Guard icebreakers supported the construction in the 1950s and subsequent resupply of the Distant Early Warning (DEW) line, which was comprised of a string of radar stations – some built above the Arctic Circle – designed to detect incoming Intercontinental Ballistic Missiles.

In 1955, the Coast Guard returned to the Antarctic in support of Operation Deep Freeze I, a collaborative effort among 40 nations to carry out earth science studies from the North Pole to the South Pole. *Wind*-class icebreakers supported these operations annually until the *Westwind* (WAGB-281) made her last Antarctic cruise in 1984.

The ongoing commitment to Deep Freeze operations precipitated a discussion in the late 1950s regarding whether a nuclear icebreaker should be built for the Coast Guard; however, this idea was rejected by the Eisenhower administration as too expensive. A joint Navy-Coast Guard study in the 1960s on icebreaker utilization concluded that all icebreaking operations should be combined in the Coast Guard. It was as a result of this finding that the five *Wind* class vessels transferred from the Coast Guard to the Navy during World War II were returned to the Coast Guard in 1965-66 – bringing the Coast Guard's complement of sea-going class icebreakers to eight. The *Eastwind* (WAGB-279) was decommissioned in 1968 but the other *Wind* class cutters remained in service for a number of years.

Map of Antarctica

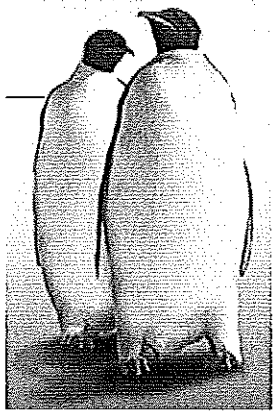


Oil exploration on the North Slope of Alaska in the 1970s brought new challenges to an aging fleet. As a result, two new icebreakers of the *Polar* class were authorized – which eventually gave the Coast Guard the first newly constructed icebreakers since the *Wind* class vessels were built in the 1940s. The *Polar Sea* (WAGB-11, 1976) and *Polar Star* (WAGB-10, 1978) were built by Lockheed Shipbuilding in Seattle at a cost of approximately $50 million each. Each vessel is 399 feet in length, with a beam of 83-feet; each vessel displaces more than 13,000 tons and is designed to break 6.5 feet of ice while traveling a steady three knots. The vessels can break up to 21 feet of ice

by ramming. Vessels in the *Polar* Class of icebreakers have two separate propulsion systems: 18,000 horsepower diesel-electric motors for "normal" icebreaking, and a 60,000 horsepower gas turbine that provides extra power to enable the vessels to break heavy ice. Currently, only the *Polar Sea* is being maintained in operational status. It is about to undergo major recurring maintenance which will include repairs to the vessel's main propulsion system, auxiliary systems, and other structural, mechanical, and electrical systems. The *Polar Sea* is used primarily for operations in the Antarctic, particularly in support of the U.S. base at McMurdo (see map of Antarctica above). The *Polar Star* is laid-up – unable to get underway – with a "caretaker" crew of 34 to maintain the vessel.

In the early 1990s, the Coast Guard commissioned the icebreaker/research vessel *Healy* (WAGB-20), a 420-foot vessel with more scientific support facilities than are contained on the *Polar* class vessels but with less icebreaking capability. The *Healy's* primary mission is to support scientific missions in the Arctic.

There is one other vessel in the U.S. polar icebreaking fleet at the moment. In 1992, the National Science Foundation (NSF) commissioned the construction of a smaller "purpose built" vessel capable of supporting scientific research in the Antarctic. The *Nathaniel B. Palmer* is owned by a private firm – Edison Chouset Offshore – and leased by another private firm – Raytheon Polar Services Company – to support NSF research operations and to resupply Palmer Station, a U.S. research station on the Antarctic Peninsula (see map of Antarctica above).



Studies on Polar Icebreaking

There have been two recent studies on U.S. polar icebreaking needs, capacity, and alternatives; additionally, a Coast Guard study on this issue is forthcoming. The National Research Council (NRC) conducted a study – requested in conference report language accompanying the Department of Homeland Security Appropriations Act for Fiscal Year 2005 (P.L. 108-334) – entitled: *Polar Icebreakers in a Changing World: An Assessment of U.S. Needs.*

The major issues addressed in the study are: current and future polar icebreaking capability and how to provide it, with particular emphasis on the U.S. presence in the Antarctic and our on-going need to access McMurdo and South Pole Stations. The Summary for Congress of the NRC study (September 2006) observes: "For the purposes of the single mission of resupplying McMurdo Station, the icebreakers do not necessarily need to be operated by the U.S. Coast Guard, but to best meet mission assurance requirements, they should be U.S. flagged, U.S. owned, and U.S. operated."

However, NRC concluded that there is a need to construct two new polar icebreakers to be operated by the U.S. Coast Guard. These conclusions are cited in the excerpt from the Summary for Congress below:

> The (study) committee finds that both operations and maintenance of the polar icebreaker fleet have been underfunded for many years, and the capabilities of the nation's icebreaking fleet have diminished substantially. Deferred long-term maintenance and failure to execute a plan for replacement or refurbishment of the nation's icebreaking ships have placed national interests in the polar regions at risk. The nation needs the capability to operate in both polar regions reliably and at will. Specifically, the committee recommends the following:
>
> - The United States should continue to project an active and influential presence in the Arctic to support its interests. This requires U.S. government polar icebreaking capability to ensure year-round access throughout the region.
>
> - The United States should continue to project an active and influential presence in the Antarctic to support its interests. The nation should reliably control sufficient icebreaking capability to break a channel into and ensure the maritime resupply of McMurdo Station.
>
> - The United States should maintain leadership in polar research. This requires icebreaking capability to provide access to the deep Arctic and the ice-covered waters of the Antarctic.
>
> - National interests in the polar regions require that the United States immediately program, budget, design, and construct two new polar icebreakers to be operated by the U.S. Coast Guard.
>
> - To provide continuity of U.S. icebreaking capabilities, the POLAR SEA should remain mission capable and the POLAR STAR should remain available for reactivation until the new polar icebreakers enter service.
>
> - The U.S. Coast Guard should be provided sufficient operations and maintenance budget to support an increased, regular, and influential presence in the Arctic. Other agencies should reimburse incremental costs associated with directed mission tasking.
>
> - Polar icebreakers are essential instruments of U.S. national policy in the changing polar regions. To ensure adequate national icebreaking capability into the future, a Presidential Decision Directive should be issued to clearly align agency responsibilities and budgetary authorities.[2]

In June 2008, the Congressional Research Service (CRS) released an updated report, *Coast Guard Polar Icebreaking Modernization: Background, Issues, and Options for Congress,* that examines the

[2] *Polar Icebreakers in a Changing World: An Assessment of U.S. Needs,* Committee on the Assessment of U.S. Coast Guard Polar Icebreaker Roles and Future Needs, National Research Council Of The National Academies (2007)

missions of U.S. polar icebreakers, current polar icebreaking resources, the 2007 National Research Council report, current Coast Guard icebreaking plans, cost estimates for modernization *Polar*-class cutters, and issues for Congress.[3] This report found that two of the Coast Guard's three polar icebreakers have exceeded their intended 30-year service lives. CRS found that:

> The *Polar Star* is [currently] not operational and has been in caretaker status since July 1, 2006. The Coast Guard has begun initial studies on replacements for *Polar Star* and *Polar Sea.* Under the Coast Guard's current schedule, the first replacement ship might enter service in 8 to 10 years. The Coast Guard estimates that new replacement ships might cost $800 million to $925 million each in 2008 dollars, and that the alternative of extending the service lives of *Polar Sea* and *Polar Star* for 25 years might cost about $400 million per ship.[4]

The CRS report also outlined potential options for Congress, including:

> "approve the Coast Guard's current plan to study requirements for future icebreakers and then derive an acquisition strategy based on the results of these studies – a plan that might result in an initial replacement icebreaker entering service 8 to 10 years from now; hold hearings to solicit additional information on the issue of polar icebreaker modernization; or direct the Coast Guard to provide such information; direct the Coast Guard to include the option of nuclear power in its studies of requirements and design options for future icebreakers; direct the Coast Guard to pursue a particular acquisition strategy for icebreaker modernization, such as new construction, 25-year service life extension, or some combination of these two approaches; accelerate the procurement of new icebreakers relative to the Coast Guard's current plan by shortening the study period, procuring multiple ships in a single fiscal year, or both; fund the procurement of new icebreakers in the SCN (Shipbuilding and Conversion, Navy) account or the NDSF (National Defense Sealift Fund) rather than in the Coast Guard's budget; and as a risk-mitigation measure, direct the Coast Guard to reactivate *Polar Star* and make it ready for either a single additional deployment or for another 7 to 10 years of operations."[5]

Icebreaking in the 21st Century

Today, the nation's requirements for icebreaking fall into two distinct categories: domestic and polar, with polar needs being further subdivided into Arctic and Antarctic needs. Domestic icebreaking is required on the Great Lakes to enable shipments of raw materials and finished goods to travel on the Lakes. Domestic icebreaking is also required along the East Coast from the Chesapeake north to Eastport, Maine, to ensure that Coast Guard rescue craft can transit the area safely; that cargo, particularly fuel oil, is delivered on time; and that commercial fishing vessels can gain access to the open sea.

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[3] CRS Report RL34391, Updated June 6, 2008
[4] Id, page 2.
[5] Id, pages 21-22.

Polar icebreaking primarily supports scientific research carried out by the NSF by providing research platforms in the Arctic and Southern Oceans and providing the supplies that support on-continent research in the Antarctic. The NSF is the primary customer of U.S. polar icebreaking and ice-strengthened vessel services for scientific research purposes.[6]

The Coast Guard supports NSF's Arctic research with the Coast Guard icebreaker/research vessel *Healy*. Currently, the NSF uses about 90 percent of the *Healy's* deployment days (185-200 days per year). The NSF is responsible for funding *Healy*'s operations and maintenance costs, while the Coast Guard is responsible for operating the vessel and carrying out its maintenance. It costs the NSF about $100,000 per day to keep the *Healy* at sea, resulting in an approximate annual expenditure of $20 million.

The NSF is planning to construct a new ice-strengthened vessel to support scientific studies in the Arctic. The NSF estimates that if and when the *Alaska Region Research Vessel* (ARRV) is completed, it could be operated for approximately $20,000 to $30,000 per day.

In the Antarctic, the NSF needs multi-purpose icebreakers that can act as research platforms in the Southern Ocean and that can resupply the coastal Palmer Station on the Antarctic Peninsula. The NSF also needs heavy icebreakers to open the resupply channel through "fast ice" to McMurdo Station, where supplies are transferred to the U.S. research station at the South Pole and remote field stations at other locations on the continent. Without heavy icebreaker support, an on-going U.S. presence cannot be assured in the Antarctic.

The Coast Guard has historically had the responsibility to support the opening of the channel to McMurdo Sound with the *Polar*-class icebreakers *Polar Sea* and *Polar Star*, but in recent years NSF has increasingly opted to use icebreaking funding to contract with foreign flag vessels instead of utilizing Coast Guard assets.[7] For Fiscal Year 2006, the Administration requested that Congress transfer funding ($47.4 million) for polar icebreaking from the Coast Guard budget to the budget of the National Science Foundation. NSF provided $52.74 million for the operation of Coast Guard polar-class icebreakers, and an additional $8 million for the charter of an additional Russian vessel in 2006. NSF has already contracted with the Swedish icebreaker *Oden*, owned and operated by the Swedish government to carry out servicing the Antarctic later this year.

Polar icebreaking funding transfer

FY	Funding Appropriated to NSF	Funding NSF Reimbursed CG for Polar Ops
2006	$47.4M	$55.8M*
2007	$57.0M	$53.8M
2008	$57.0M	$29.8M to date

* NSF reallocated funding internally to provide an additional $8.4M above the appropriated funds to support polar operations.

[6] Testimony of Dr. Arden L. Bement, Jr., Director, National Science Foundation before Subcommittee on Coast Guard and Maritime Transportation, September 26, 2006.

[7] *Polar Sea* and *Polar Star* have either been in repair status or laid-up on caretaker status.

Domestic Icebreaker fleet, including Great Lakes

Length (Class)	No. in Service	Crew Compliment
WLB 225' (*Juniper* Class)	16	50 (8 Officers, 42 Enlisted)
WLBB 240' (*Great Lakes* Class)	1	55 (9 Officers, 46 enlisted)
WLM 175' (*Keeper* Class)	14	24 (1 or 2 officers, 22 or 23 enlisted)
WTGB 140' (*Bay* Class)	9	17 (2 Officers, 15 enlisted)
WYTL 65' (Small Harbor Tug)	11	6 Enlisted

Domestic Icebreaking Program and Financing

Fiscal Year	2006 Actual	2007 Actual	2008 est	2009 est
Ice Operations	$132,000,000	$105,000,000	$116,000,000	$102,000,000

Recent events

The Coast Guard announced last month that it plans a series of exercises this summer season "to build a requirements list for what we might need in the future" according to Lieutenant Commander Michelle Webber, District 17.[8] Items that will be tested include communications capability and maritime security at Prudhoe Bay to see if current equipment is up to the challenges presented by an Arctic environment.

The National Snow and Ice Data Center in Boulder, Colorado, reports that the North Pole may be briefly ice-free by September. Last September, the Northwest Passage opened briefly for the first time in recorded history.[9]

The United States and Canada are collaborating – for the first time – on a United Nations scientific mapping project in the Arctic aimed at extending their sovereignty by proving that their respective continental shelves extend beyond the 200 nautical mile economic zones defined in the United Nations Convention on the Law of the Sea.[10]

On July 3, 2008, Coast Guard District 17 announced that the cutter *Mellon* (WHEC-717) "is presently deployed to the Alaskan Frontier conducting the full spectrum of Coast Guard missions." In addition to protection of living marine resources and fishing vessel safety the *Mellon* is also "developing Arctic Domain Awareness, protecting national sovereignty, and guarding U.S. resources deposits in the region."[11]

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[8] *Anchorage Daily News*, Monday, June 23, 2008, "US Coast Guard deploys to Arctic to find answers".
[9] *CBS News* , June 27, 2008
[10] Canadian Broadcasting Company, June 30, 2008
[11] U.S. Coast Guard Seventeenth District Press Release, July, 3, 2008

ISSUES FOR CONSIDERATION

There are several issues regarding icebreaking – domestic and polar – that the Subcommittee may want to consider including: defining domestic and polar icebreaking missions; determining what resources are needed to accomplish the identified missions; and determining how to best provide the resources to carry out the missions.

PREVIOUS COMMITTEE ACTION

The Subcommittee on Coast Guard and Maritime Transportation held a hearing on the National Research Council Report on icebreaking on September 26, 2006.

Section 422 of the House-passed Coast Guard Authorization Act of 2007 (H.R. 2830) requires an "assessment of needs for additional coast guard presence in high latitude regions." Section 917 of the Senate companion bill (S.1892) states the following: "The Secretary of the department in which the Coast Guard is operating shall acquire or construct 2 polar icebreakers for operation by the Coast Guard in addition to its existing fleet of polar icebreakers." H.R. 2830 passed the House 95-7 on April 24, 2008. S. 1892 is awaiting full Senate consideration.

WITNESSES

Member Panel

The Honorable Bart Stupak
Congressman
Michigan, District 1

PANEL I

Admiral Thad Allen, USCG
Commandant
United States Coast Guard

PANEL II

Dr. Arden L. Bement
Director
National Science Foundation

Mr. Mead Treadwell
Chairman
Arctic Research Commission

Mr. James H. I. Weakley
President
Lake Carriers' Association