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September 2006

COAST GUARD

Condition of Some Aids-to-Navigation and Domestic Icebreaking Vessels Has Declined; Effect on Mission Performance Appears Mixed

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Highlights

Highlights of GAO-06-979, a report to the Subcommittee on Fisheries and Coast Guard, Committee on Commerce, Science, and Transportation, U.S. Senate

Why GAO Did This Study

The marine transportation system is a critical part of the nation's infrastructure. To facilitate the safety and efficiency of this system, the Coast Guard maintains aids-to-navigation (ATON), such as buoys and beacons, and conducts domestic icebreaking in the Great Lakes, St. Lawrence Seaway, and northeast coast. To conduct these missions, the Coast Guard has a fleet of more than 200 vessels, ranging from 225-foot seagoing buoy tenders and 140-foot domestic icebreakers to 21-foot boats. After the terrorist attacks of September 11, 2001, many of these assets took on additional responsibilities for security patrols and other homeland security duties. Although some assets have been recently acquired, many others are reaching or have exceeded their design service lives, raising concerns about how well and for how much longer these older assets may be able to carry out their missions. In response, GAO examined (1) recent trends in the amount of time these assets have spent performing missions; (2) asset condition and its effect on mission performance; and (3) the actions taken by the Coast Guard to continue to achieve the missions of these assets.

To conduct this work, GAO reviewed Coast Guard documents, interviewed Coast Guard officials, and made site visits to various locations around the country.

In commenting on a draft of this report, the Coast Guard provided technical comments, which were incorporated as appropriate.

www.gao.gov/cgi-bin/getrpt?GAO-06-979.

To view the full product, including the scope and methodology, click on the link above. For more information, contact Stephen L. Caldwell at (202) 512-9610 or caldwells@gao.gov.

What GAO Found

Many ATON vessels and domestic icebreakers have operated more hours in recent years than in previous years, with the increase coming mainly in homeland security missions. Domestic icebreakers are now used more for homeland security than for icebreaking, reflecting their availability at times of the year when no icebreaking is needed. While not designed for homeland security, the assets can perform such duties acceptably, according to the Coast Guard. Most ATON vessels are used primarily for ATON activities. Newer ATON assets receive the greatest use on other missions, reflecting their greater multi-mission capabilities.

Trends are mixed with regard to asset condition and mission performance. Available evidence, such as the amount of maintenance conducted, suggests condition is declining for some assets, though not precipitously. Coast Guard officials said some assets, while being operated for more hours, are still largely being operated within planned limits. Against this backdrop, indicators for measuring performance show mixed results: some have declined, while others have not. The current measure for asset condition is not clearly linked to mission performance, but the Coast Guard is working on developing a measure that links the two.

Actions the Coast Guard has taken to continue to achieve the missions of these assets include revising maintenance approaches and developing a new analytical tool for deciding which projects provide the most capability for the dollars invested. The Coast Guard continues to acquire some new vessels to replace aging ones, but proposals to rehabilitate or replace other aging vessels have not been implemented, largely because of other funding priorities. The Coast Guard also studied the feasibility of contracting out some activities. While some possibilities for outsourcing were identified in the study, the Coast Guard has identified potential disadvantages to outsourcing these activities.

Coast Guard Buoy Tender (left) and Domestic Icebreaker (right)

Source: Coast Guard.

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Abbreviations

AOPS	Abstract of Operations
ATON	Aids-to-Navigation
CAMS	Capital Asset Management Strategy
DOD	Department of Defense
ELC	Engineering Logistic Center
OMB	Office of Management and Budget
POTF	Percent of Time Free of major casualties
PWCS	Ports, Waterways and Coastal Security
SSMEB	ship structure and machinery evaluation boards

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United States Government Accountability Office
Washington, DC 20548

September 22, 2006

The Honorable Olympia Snowe
Chair
The Honorable Maria Cantwell
Ranking Minority Member
Subcommittee on Fisheries and Coast Guard,
Committee on Commerce, Science and Transportation
United States Senate

The marine transportation system, which allows for the transportation of people and goods on the water, is a vast and critical part of the nation's infrastructure. The system includes coastal ports and shipping channels; 25,000 miles of navigable inland and coastal channels and waterways like the Mississippi, St. Lawrence, Columbia and Snake rivers; and shipping on the Great Lakes. Ninety-five percent of the United States' overseas trade tonnage moves by water, and the cargo moving through the U.S. marine transportation system contributes hundreds of billions of dollars to the U.S. gross domestic product. This system also enables the swift mobilization and supply of America's military as well as providing recreational value to millions of boaters, fishermen, and cruise passengers.

The Coast Guard is responsible for, among other things, providing a safe, efficient, and navigable waterway system, and it carries out this role through its aids-to-navigation (ATON) and domestic icebreaking missions. In its ATON mission, the Coast Guard establishes and maintains over 53,000 navigational aids, such as buoys and beacons, to assist mariners and prevent disasters, collisions, or wrecks. To carry out this mission, the Coast Guard uses a diverse fleet of more than 200 vessels ranging from 225-foot buoy tenders to 21-foot boats that can be transported on trailers by truck. In its domestic icebreaking mission, the Coast Guard breaks ice in the Great Lakes, the St. Lawrence Seaway, and the northeast U.S. coast.[1] This activity is intended to facilitate navigation for commerce, conduct search and rescue missions, and prevent flooding. To carry out this

[1] The Coast Guard is also responsible for operating and maintaining the nation's fleet of polar icebreakers. We did not examine those polar icebreaking assets as part of this review.

mission, the Coast Guard largely relies on 11 65-foot and 9 140-foot icebreaking cutters.[2]

While some of these vessels have come on line in the past few years, many are old and are reaching or have exceeded their designed service lives. Their age has raised concerns within the Coast Guard as to how well and for how much longer they will be able to carry out their missions. In addition, after the terrorist attacks of September 11, 2001, many ATON and icebreaking vessels took on additional responsibilities for security patrols and other homeland security activities. In this context, this report examines (1) the recent trends in the amount of time ATON and domestic icebreaking assets have spent performing various missions and the impact of these trends on their primary missions; (2) the condition of the ATON and domestic icebreaking assets and the impact of their condition on performing their primary missions; and (3) the actions the Coast Guard has taken to continue to achieve the missions of its ATON and domestic icebreaking assets.

To address the first two objectives, we analyzed a variety of Coast Guard data and records, focusing on fiscal years 2001 through 2005. We also made site visits to assets located on the West and East Coasts, Gulf Coast, Great Lakes, and inland rivers and met with the assets' crews to obtain their views on the condition of their assets. These assets were selected to provide diversity in terms of type, age of asset, and geographic location. To address the third objective, we met with Coast Guard officials at headquarters to discuss recent acquisitions and specific management actions they have taken or are in the process of taking. We also obtained and reviewed information and documents on the Coast Guard's plans to rehabilitate or replace the assets or study outsourcing to carry out missions. More details on our scope and methodology can be found in appendix I of this report. We conducted our work between July 2005 and August 2006 in accordance with generally accepted government auditing standards.

[2] The Coast Guard defines a cutter as any Coast Guard vessel 65 feet in length or greater, having adequate accommodations for crew to live on board. Boats are defined as those vessels under 65 feet in length that usually operate near shore and on inland waterways.

Results in Brief

Many of the Coast Guard's ATON vessels and domestic icebreakers saw a sharp increase in use for homeland security missions after the attacks of September 11, 2001, and while this trend has moderated somewhat, the use of some assets in these missions continues well above pre-September 11 levels. This increase was most prominent for domestic icebreakers, which continue to be used more for homeland security than for icebreaking. Rather than being diverted from icebreaking activities when needed for this mission, these icebreakers are basically being operated more extensively at other times of the year when no icebreaking needs to be done. In some cases, this more extensive use has caused some assets to be operated at levels exceeding the recommended levels. Coast Guard officials said that while these icebreakers are not specifically designed for security patrols and other homeland security activities, they can perform such duties acceptably, though at less than optimal levels. In contrast to the icebreakers, most ATON vessels continue to be used primarily for ATON activities, reflecting the greater year-round nature of ATON activity. ATON vessels have devoted additional hours to other missions and this reflects primarily an overall increase in the number of hours the ATON vessels are used, especially the larger assets. Newer ATON vessels, which generally have greater multiple-mission capabilities than older ATON vessels, tend to be the ATON assets used the most for other missions.

Available evidence shows mixed trends with regard to both the condition of these assets and the impact this condition has on the Coast Guard's ability to perform its ATON and domestic icebreaking missions. The Coast Guard's current measure of a vessel's condition—the percentage of time it is free of major casualties—is inadequate to link the assets' condition to any degradation in mission capabilities or performance and, therefore, may reflect a more positive condition. The Coast Guard is currently working on a new measure that should better link condition with mission degradation. Other evidence, such as the amount of maintenance conducted and anecdotal evidence we gathered, suggests that as these assets continue to age, their condition is declining, though not precipitously. For example, according to a program official who previously served as a commanding officer on an icebreaker, stated that the decline in condition of those assets has not been beyond what would be expected of assets 20 years or more of age. Our site visits showed that, on these older assets, crew members are spending increasing amounts of time and resources to troubleshoot and resolve maintenance issues. They indicated that because the systems and parts are outdated compared with the technology and equipment available today, it can be challenging and time consuming to diagnose a maintenance issue and find parts or determine what corrective action to take. For example, the propulsion control

system on the 140-foot icebreaking tugs uses circuit cards that are no longer manufactured and have been superseded by computer control systems. While some assets are being operated more extensively than in the past to meet additional responsibilities, particularly homeland security, Coast Guard officials said that overages can have an impact on some assets, especially those with more complex systems and subsystems. The officials said that exceeding planned usage limits may leave less time to maintain these systems. They said that the deterioration of an asset and its systems from usage consistently above the limits would be reflected in periodic engineering assessments of the assets. Against this backdrop, performance indicators for the two missions show mixed results. A milder winter in 2005 may have contributed to the Coast Guard's ability to meet its primary domestic icebreaking performance target, which aims for limiting the number of days critical waterways are closed due to ice to 2 days during average winters. For the ATON mission, the main performance measure (the number of collisions, allisions, and groundings) has been declining for the past 5 years, indicating continual improvement, while a secondary measure (the percentage of time an aid-to-navigation system is performing) has been declining over the same period—a negative trend.[3] In previous work, we found that many other factors, such as severity of weather, also affected outcome on performance measures.

To continue to achieve the missions of its ATON and domestic icebreaking assets, the Coast Guard has taken a number of actions to develop program management tools or acquire new assets, made proposals to address aging assets, and conducted a study of what makes the best business case for outsourcing:

- Actions taken or underway include developing a better measure for linking an asset's condition and its ability to carry out missions, a revised maintenance approach for newer assets, and a centralized system for tracking the condition and maintenance of smaller ATON boats. In addition, to better link asset conditions and funding decisions, the Coast Guard has developed a benefit-cost analysis tool to analyze the trade-offs involved in upgrading assets or continuing to maintain them, thereby helping the Coast Guard decide on the combinations of projects that will provide the most capability for the dollars invested. The Coast Guard has also acquired some newer assets: in 2004, it acquired the last of 30 new buoy tenders to replace older coastal and

[3] An allision is a collision between a vessel against a fixed or stationary object.

seagoing buoy tenders and in 2005, and it acquired a new icebreaker for the Great Lakes. These acquisitions have brought improved features to the fleet, such as computerized systems for positioning and propulsion control, enhanced multimission capabilities, and improved equipment for servicing navigation aids.

- Proposals made include steps to address the remaining aging assets, but these steps have not been implemented, largely because of other funding priorities. To determine whether to rehabilitate or replace assets, Coast Guard officials stated that they use a process that considers things such as the condition of the assets and trends in maintenance costs. In 2002, the Coast Guard proposed a project to systematically rehabilitate or replace its other aging ATON and domestic icebreaking assets. Requests for funding this project have been denied or deferred by the Department of Homeland Security or the Office of Management and Budget since fiscal year 2004, apparently due to competition for limited resources with other Coast Guard initiatives, such as the Deepwater project for replacing cutters and aircraft used far out at sea. As a result, parts of the project have been separated into smaller components with lower funding requirements. For example, in 2006, the Coast Guard began acquiring new trailerable ATON boats to replace 80 boats currently in use. Of these smaller components, only this new boat acquisition has received funding.

- The study conducted looked at what activities make the best business case for being outsourced to the private sector. While recognizing that, at the time of the study some ATON activities were being contracted to commercial sources on a limited basis, the study suggested that some asset classes related to the Coast Guard's ATON activities might be outsourced and merited further examination. However, according to the Coast Guard, potential disadvantages to outsourcing exist such as reduction of the Coast Guard's capacity to respond to hurricanes and other emergencies and disruption of the Coast Guard's personnel structure and ability to attract and retain personnel.

We provided a draft copy of this report to the Department of Homeland Security and the Coast Guard for review. The Coast Guard provided technical comments, which have been incorporated where appropriate.

Background

The US Coast Guard is a multimission, maritime military service within the Department of Homeland Security. The Coast Guard has responsibilities that fall under two broad missions—homeland security and non–homeland security.[4] (See table 1.)

Table 1: Homeland Security and Non-Homeland Security Programs by Mission Area

Mission and program	Activities and functions of each program
Homeland security missions	
Ports, waterways, and coastal security	Conducting harbor patrols, vulnerability assessments, intelligence gathering and analysis, and other activities to prevent terrorist attacks and minimize the damage form attacks that occur.
Undocumented migrant interdiction	Deploying cutters and aircraft to reduce the flow of undocumented migrants entering the United States by maritime routes.
Defense readiness	Participating with the Department of Defense (DOD) in global military operations, deploying cutters and other boats in and around harbors to protect DOD force mobilization operations.
Illegal drug interdiction	Deploying cutters and aircraft in high drug trafficking areas and gathering intelligence to reduce the flow of illegal drugs through maritime transit routes.
Other law enforcement (foreign fish enforcement)	Protecting US fishing grounds by ensuring that foreign fishermen do not illegally harvest US fish stocks.
Non-homeland security missions	
Search and rescue	Operating multi-mission stations, and a national distress and response communication system, conducting search and rescue operations for mariners in distress.
Living marine resources	Enforcing domestic fishing laws and regulations through inspections and fishery patrols.
Aids-to-navigation	Managing US waterways and providing a safe, efficient and navigable marine transportation system; maintaining the extensive system of navigation aids; monitoring marine traffic through vessel traffic service centers.
Ice operations	Conducting polar operations to facilitate the movement of critical goods and personnel in support of scientific and national security activity; conducting domestic icebreaking operations to facilitate year-round commerce; conducting international ice operations to track icebergs below the 48th north latitude.
Marine environmental protection	Preventing and responding to marine oil and chemical spills; preventing the illegal dumping of plastics and garbage in US waters; preventing biological invasions by aquatic nuisance species.
Marine safety	Setting standards and conducting vessel inspections to better ensure the safety of passengers and crew aboard commercial vessels; partnering with states and boating safety organizations to reduce recreational boating deaths.

Source: Coast Guard.

[4] The Coast Guard's homeland security and non–homeland security missions are delineated in section 888 of the Homeland Security Act of 2002 (P. L. 107-296, 116 Stat. 2135, 2249 (2002)). Starting with the fiscal year 2007 budget, however, OMB has designated the Coast Guard's drug interdiction and other law enforcement programs as non-homeland security missions for budgetary purposes.

One of the Coast Guard's strategic goals is maritime mobility, that is, to facilitate maritime commerce, eliminate interruptions and impediments to the movement of goods and people, and maximize access to and enjoyment of the water. The two non-homeland security missions through which the Coast Guard achieves this goal are aids–to-navigation (ATON) and domestic icebreaking, which is part of ice operations.

Aids-to-Navigation Mission

Through its ATON mission, the Coast Guard promotes safe waterways and an efficient Marine Transportation System. The Coast Guard has statutory responsibility to operate and maintain a system of maritime aids to facilitate navigation and to prevent disasters, collisions, and wrecks.[5] To fulfill this mission, the Coast Guard operates over 53,000 aids. These aids-to-navigation are like road signs of the waterways and are placed along coasts and navigable waters as guides to mark safe water and to assist mariners in determining their position in relation to land and hidden dangers. These aids consist of both floating aids, such as buoys, and fixed aids, such as lights or signs mounted on pilings. See figure 1 for an example of a buoy and fixed aid-to-navigation.

[5] The Coast Guard's statutory aids-to-navigation authorities include, for example, 14 U.S.C. § 2, and 14 U.S.C. § 81.

Figure 1: Examples of a Buoy and a Fixed Aid-to-Navigation

Source: Coast Guard.

The Coast Guard uses several types of vessels to place and service its aids-to-navigation such as buoy tenders, construction tenders, and boats that make up its ATON fleet. These vessels are used to perform both periodic routine maintenance of aids and discrepancy response, when, for example, a light is extinguished or a buoy is moved from its intended location. The assets are shown in table 2.

Table 2: Aids-to-Navigation Assets

Asset type	Number of assets	Asset description	Asset photograph
225-foot seagoing buoy tenders	16	The seagoing buoy tenders service and maintain coastal and offshore aids to navigation in exposed locations. They have a crew size of 40 to 48, a maximum speed of 15 knots and a range of 6,000 nautical miles. They have a lifting capacity of 20 tons and a cargo capacity of 75 tons. These tenders were commissioned between 1996 and 2004.	
175-foot coastal buoy tenders	14	The coastal buoy tenders service and maintain coastal and offshore aids to navigation. They have a planned crew size of 19 to 26 and a maximum speed of 13 knots. They have a lifting capacity of 10 tons and a cargo capacity of 40 tons. These tenders were commissioned between 1997 and 2000.	
160-foot/ 100-foot/ 75-foot inland construction tenders	13	The inland construction tenders construct, maintain, and remove aids to navigation along the Intra-coastal waterway system. They have a planned crew size of 13 to 14, a maximum speed of 9 to 11 knots, and a range of 1,300-5,350 nautical miles. The 100-foot and 75-foot tenders push construction barges. These tenders were commissioned between 1944 and 1976.	
75-foot/ 65-foot river buoy tenders	18	The river tenders push 90-foot to 130-foot barges and maintain short-range aids to navigation in the Mississippi River, its tributaries, and other rivers that flow into the Gulf of Mexico. They have a crew size of 12 to 13, a maximum speed of 9 to 11 knots, and an operating range of 3,000 to 3,500 nautical miles. These tenders were commissioned between 1960 and 1990.	
100-foot/ 65-foot inland buoy tenders	5	The inland buoy tenders service and maintain aids to navigation in remote waterways far from readily accessible logistics support. They have a planned crew size of 8 to 18, a maximum speed of 9 to 10 knots, and an operating range of 600-1,200 nautical miles. The 100-foot cutters have a lifting capacity of 5 tons and a cargo capacity of 56,000 lbs. The 65-foot cutter has a lifting capacity of 2 tons and a cargo capacity of 13,500 lbs. These tenders were commissioned between 1944 and 1963.	
72-foot cable laying boat	1	The cable boat maintains shore power to offshore aids to navigation that cannot be powered by solar means. It has a planned crew size of 4, a maximum speed of 11 knots, and an operating range of up to 225 nautical miles. It has a cargo capacity of 20,000 lbs. This boat was commissioned in 1953.	
64-foot aids-to-navigation boats	3	The 64-foot boats conduct aids to navigation work on the inland rivers. They have a planned crew size of four, a maximum speed of 9 knots, an operating range of 500 nautical miles, and a lifting capacity of 4,500lbs. The cargo capacity of these vessels is 30,000 lbs. These vessels were built in 1995.	
63-foot aids-to-navigation boats	1	The 63-foot boat is designed to work small floating aids to navigation. It has a planned crew size of six, a maximum speed of 15 knots, and an operating range of 300 nautical miles. It also has a lifting capacity of 14,000 lbs and a cargo capacity of 16,000 lbs. This asset was constructed in 1975.	

Asset type	Number of assets	Asset description	Asset photograph
55-foot aids-to-navigation boats	20	The 55-foot boats service small buoys and service fixed structures. They have a planned crew size of 4, a maximum speed of 21.5 knots, and an operating range of 175 nautical miles. They have a lifting capacity of 2,000/3,000 lbs and a cargo capacity of 8,000 lbs. These vessels were constructed from 1977 to 1988.	
49-foot buoy stern loading boats	26	The 49-foot boats service buoys on the intra-coastal waterway and in coastal areas. They have a planned crew size of four, a maximum speed of 10 knots, an operating range of 300 nautical miles, and a lifting capacity of 4,500 lbs. The last boat in this fleet completed construction in 2001.	
45-foot buoy boats	2	The 45-foot boats service buoys have a planned crew size of 4, maximum speed of 8.5 knots, and an operating range of 550 nautical miles. They have a lifting capacity of 4,000 lbs and a cargo capacity of 20,800lbs. These assets have been in service since the 1950s.	
21-foot trailerable aids-to-navigation boat	80	The 21-foot boats are used to provide discrepancy response in semi-exposed and protected waters and to service many of the aids located in shallow water. They have a planned crew size of 3 and a maximum speed of 20 knots. They have a lifting capacity of 250 lbs and a cargo capacity of 3,500 lbs. These boats were built from 1980 to 1992, have an average age of 10-22 years, and have exceeded their original estimated service life of 5 to 7 years.	

Source: Developed by GAO from Coast Guard data. Photographs of the 21-foot trailerable aids to navigation boat and inland construction tender are by GAO. All other photographs are courtesy of the Coast Guard.

Domestic Icebreaking Mission

Domestic icebreaking is a key component of the Coast Guard's ice operations mission, which facilitates the safe and efficient navigation on lakes, rivers, channels, and harbors during the winter season. The Coast Guard has statutory icebreaking responsibilities that are additionally addressed by an executive order that directs the Coast Guard to break ice in channels and harbors in order to keep them open to navigation.[6] Like plowing snow-covered roads, the Coast Guard keeps areas of water open as much as is reasonably possible for commercial traffic in winter. It also performs icebreaking for search and rescue and prevention of flooding by ice. To conduct this mission, the Coast Guard uses assets that are specially designed with strengthened hulls. The key icebreaker types the Coast Guard uses are shown in table 3.

[6] 14 U.S.C. § 2; Exec. Order No. 7521, 1 Fed. Reg. 2184 (1936).

Table 3: Domestic Icebreaking Assets

Asset type	Number of assets	Asset description	Asset photograph
140-foot icebreaking tugs	9	The icebreaking tugs are specially configured for breaking ice on the Great Lakes, rivers, and coastal waters, and support aids to navigation. They have a crew size of 17 to 27, a maximum speed of 14.7 knots and an operating range of 4,000 nautical miles. Two of these assets are augmented by a 120-foot ATON barge and perform mostly ATON mission activities. These vessels were commissioned between 1979 and 1988.	
65-foot small harbor tugs	11	The small harbor tugs perform shallow water icebreaking services and maintain short-range ATON in rivers and near-shore areas. They also perform port security and search and rescue missions. They have a planned crew size of 6, a maximum speed of 10 knots, and an operating range of 850 nautical miles. These vessels were built between 1962 and 1967.	

Source: Developed by GAO from Coast Guard data. Photographs are courtesy of the Coast Guard.

Note: In June 2006, the Coast Guard commissioned a new 240-foot Great Lakes icebreaker that has multi-mission capabilities and will perform both domestic icebreaking and aid-to-navigation as its primary mission activities. It replaces a 290-foot icebreaker that was commissioned in 1944. Because the new Great Lakes icebreaker has not yet completed ice trials, we did not include it in this table.

The Coast Guard classifies its vessel assets, such as those used in the ATON and domestic icebreaking missions, as cutters (assets 65 feet long or longer with adequate accommodations for crew to live on board) or boats (assets less than 65 feet in length that usually operate near shore and on inland waterways). For purposes of this report, the three main asset groups are ATON cutters, ATON boats, and domestic icebreakers.

Icebreaking and ATON Assets Show Significant Increases in Time Spent on Homeland Security Missions since 2001

Since 2001, the Coast Guard's domestic icebreakers and ATON cutters have experienced significant increases in the time spent conducting missions related to homeland security. Most of this increase has come in the Ports, Waterways and Coastal Security (PWCS) mission, which involves such activities as conducting security patrols and escorting vessels. The increase was greatest for domestic icebreakers, which continue to be used more for homeland security missions than for icebreaking because of their availability during months when no icebreaking is needed. By contrast, ATON cutters and boats still spend most of their time on ATON-related activities, reflecting the year-round nature of the ATON mission. Some newer ATON cutters with greater multi-mission capabilities, however, continue to have a more diverse workload. Coast Guard officials said icebreakers and ATON vessels, while less than ideal for carrying out security missions, can perform these missions adequately.

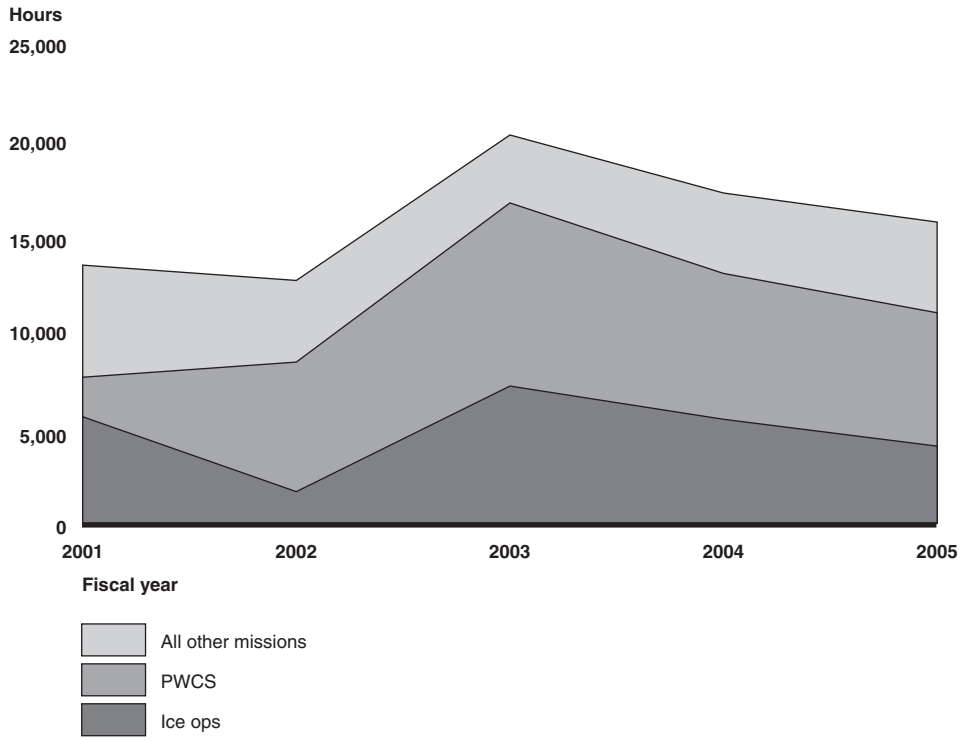
Domestic Icebreakers Show the Largest Increase in Time Spent on Homeland Security Missions

During fiscal years 2001 through 2005, the domestic icebreakers divided their time between several of the Coast Guard's 11 missions, but PWCS activities accounted for roughly half of all resource hours during fiscal years 2002 through 2005.[7] PWCS activities grew quickly from 15 percent of total resource hours in fiscal year 2001 to 53 percent in fiscal year 2002, and they have remained at 44 percent or more of total hours through fiscal year 2005. At the same time, icebreaking hours began at 41 percent in fiscal year 2001 and then dropped down to 13 percent in 2002, but ended at 26 percent in fiscal year 2005. The vast majority of this increase in PWCS has occurred in the New York City area with smaller increases in other East Coast ports.[8] As figure 2 shows, the increase came about largely by adding to the total number of hours these assets were operated. The total number of resource hours for these assets grew from about 12,000 hours in fiscal year 2002 to a high of about 20,000 the following year.

[7] The Coast Guard maintains information, on a program-by-program basis, about how resources (assets such as ships and boats) are used to conduct its program missions. Each hour that these resources are used is called a resource hour. Resource hours do not include things such as the time that the resource stands idle or the time that is spent in maintaining it. "Support" was also a mission identified by the Coast Guard; however, because this mission accounted for time spent on non-mission activities such as public affairs and training, we did not consider these hours recorded as "Support" to be "resource hours."

[8] In addition the Coast Guard also has several icebreakers stationed at locations along the East Coast. Of the locations these icebreakers are stationed, the demand for additional presence and patrols has been greatest in New York City. Sector New York has a requirement of 116 hours per day of PWCS patrols. Other sectors have little or no hours required.

Figure 2: Resource Hours for Domestic Icebreakers, Fiscal Years 2001 through 2005



Source: GAO analysis of Coast Guard data.

The increase in PWCS hours for domestic icebreakers mainly reflects their availability during those months when no icebreaking needs to be done. Icebreaking needs are typically greatest from December 15 to April 15. Coast Guard officials said that because icebreakers do not have a primary summertime mission, using them to conduct PWCS missions during slack periods has not limited the Coast Guard's ability to conduct routine icebreaking missions.[9] Icebreaking hours, however, did see some marked shifts during this period—most notably a decrease in fiscal year 2002 followed by a substantial increase in fiscal year 2003. The decrease in 2002

[9] According to a Coast Guard official, maintenance on the icebreakers is often done during the summer period and PWCS missions that occur during this time can result in planned maintenance being rescheduled. Although the assets have been ready to break ice when needed so far, the Coast Guard official stated that depending on how much the maintenance is delayed as well as whether there are any additional maintenance problems discovered, the potential exists for the assets not being ready if icebreaking is needed earlier than expected.

appears related to two main factors: a mild winter, during which the Great Lakes region was virtually free of ice throughout December and most of January, and a change in the way the Coast Guard accounted for its use of icebreakers. The Coast Guard does not record resource hours under two mission categories simultaneously, and prior to the attacks on September 11, 2001, resource hours used to break ice while escorting a vessel with hazardous cargo would only have been recorded as ice operations. After the attacks, these same hours could be logged either as PWCS or icebreaking at the discretion of the vessel's commanding officer. The increase in ice operations hours for fiscal year 2003 reflected an unusually severe winter in the Great Lakes.

Increased workloads have placed some icebreakers above the maximum number of recommended operating hours for the assets. The maximum recommended operating level, called an "underway hours limit," reflects maximum use established from planning documents, missions, and maintenance requirements, and historic use. In particular, the 65-foot small harbor tug fleet exceeded their underway hours limit from fiscal years 2001 to 2003 by increasingly more hours, starting with being 10 hours over the underway limit in 2001 and progressing to nearly 2,000 hours over the underway limit in 2003. In contrast, the 140-foot icebreaking tugs were operated within their underway hours limit from 2001 to 2005.

Coast Guard officials said domestic icebreakers, while not their vessel of choice for maritime security missions, can perform all PWCS missions adequately except for shore side patrols.[10] The Coast Guard's 87-foot coastal patrol boats are the preferred assets for PWCS missions. Commissioned since 1998, these boats can travel at up to 25 knots and have a system that allows the crew to launch and recover small boats.[11] Relative to these vessels, domestic icebreakers show both advantages and disadvantages (see table 4). Icebreakers are more capable of operating in cold weather, and their substantial size provides a significant presence on

[10] Shore-side patrols typically involve visiting a maritime facility and providing a law enforcement presence on land. The patrols are typically conducted by a Coast Guard shore unit.

[11] A knot is equivalent to 1 nautical mile per hour, approximately 1.85 kilometers or 1.15 miles-per-hour.

the waterways, but they are slower, less able to launch small boats, and pose increased training challenges for training crews in law enforcement.[12]

Table 4: Comparison of Features of the 87-foot Patrol Boats and Domestic Icebreakers

Feature	Patrol boats	Domestic icebreakers	
	87-foot coastal patrol boat	140-foot icebreaking tug	65-foot small harbor tug
Maximum speed	25 knots	14.7 knots	10 knots
Cold weather capability	Limited	Yes	Yes
Date commissioned	1998-2006	1979-1988	1962-1967
Requires additional training of crew for maritime security missions	No	Yes	Yes

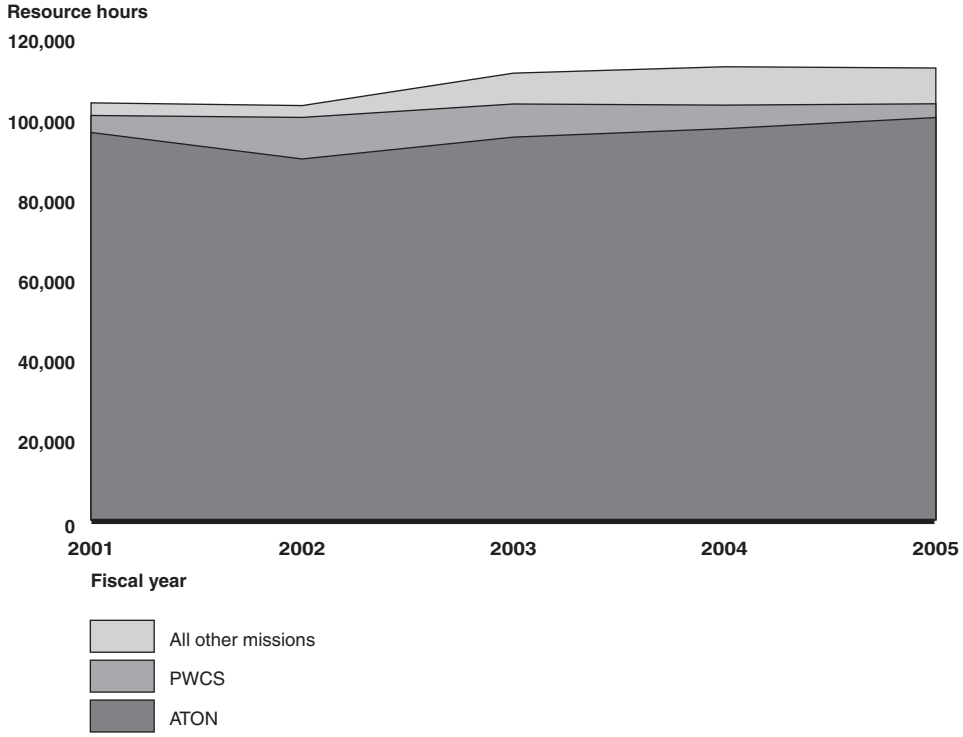
Source: Coast Guard.

Increase in Homeland Security Missions Is Less Extensive for ATON Assets

ATON assets also experienced an increase in use for homeland security missions after September 11, 2001, but to a much lesser degree than for domestic icebreakers. Overall, ATON assets were used for several of the Coast Guard's missions during fiscal years 2001 through 2005, but ATON remained the primary mission, accounting for more than 85 percent of the fleet's total resource hours for fiscal years 2001 to 2005. Time spent in PWCS activities increased from 4 percent of total resource hours in fiscal year 2001 to 10 percent in fiscal year 2002; since then, PWCS mission hours have steadily decreased (see fig. 3). Overall, PWCS activities accounted for 6 percent of resource hours during the period.

[12] To qualify for these crews, team members and officers must attend training in maritime law enforcement, where they are trained in the use of weapons including firearms.

Figure 3: Resource Hours for ATON Assets, Fiscal Years 2001 through 2005



Source: GAO analysis of Coast Guard data.

When resource hours are analyzed more closely by type of ATON asset, there are significant differences in the amount of hours used for the PWCS mission. The increase in PWCS resource hours came primarily from cutters (vessels ranging in length from 65 to 225 feet). Overall, ATON activities account for about 79 percent of total resource hours for the cutters, compared with about 90 percent for ATON boats (vessels less 65 feet in length). ATON boats were the only vessels that did not have as much of an increase in PWCS resource hours immediately after the attacks on September 11, 2001, though their use in PWCS activities did rise in fiscal year 2003. Among the ATON cutters, the newer cutters have greater multiple mission capabilities and consequently tend to be used more often in other missions. For example, ATON cutters acquired between 1944 and 1976 performed an average of 4 of the Coast Guard's 11 missions during fiscal years 2001 through 2005, while the 225-foot seagoing buoy tender, which the Coast Guard completed the acquisition of in 2004, was used in all 11 of the Coast Guard's missions in fiscal years 2004 through 2005.

Available Evidence Indicates Condition of Assets Varies Greatly and Mixed Impact on Mission Performance

The available evidence does not give a consistent picture of how usage trends may be affecting the condition of these assets and, ultimately, the Coast Guard's ability to meet performance goals for icebreaking and ATON missions. We analyzed three types of evidence related to condition—the Coast Guard's primary measure for reporting asset condition, overall trends in maintenance expenditures on each type of asset, and a body of anecdotal evidence gathered primarily through interviews with Coast Guard personnel and site visits to various installations. The Coast Guard's primary condition measure shows some assets meeting the operating standard and others falling below it. However, the current measure for asset condition is not clearly linked to mission performance, but the Coast Guard is working on developing a measure that links the two. Trends in maintenance costs and the anecdotal evidence we gathered tend to indicate that asset conditions are declining, though not substantially beyond what Coast Guard officials said they would expect for vessels of this age. Performance indicators for the icebreaking and ATON missions likewise show mixed results, with the Coast Guard meeting some performance goals and not meeting others. In part, these mixed results can be explained by the many other factors besides asset condition, such as the severity of weather in any given year.

Current Condition Measure Is Limited and Does Not Show a Clear Pattern in Asset Condition

For icebreaking and ATON cutter assets, the Coast Guard's key summary measure of condition shows mixed results. This measure—percent of time free (POTF)—of major casualties has been mixed.[13] The Coast Guard's standard is 72 percent or better. Measured against this standard for fiscal years 2000 through 2004, the various types of icebreakers and ATON cutters vary considerably.[14] As table 5 shows, some assets, such as the 65-foot small harbor icebreaking tugboat and the 65- and 75-foot river buoy tenders met the standard nearly every year, while others such as the 140-foot icebreaking tugboat and the 75-foot, 100-foot, and 160-foot inland construction tenders met it either not at all or only once during the 5-year period. Fiscal year 2004 was the worst of the 5 years, with only two of the eight types of cutters meeting the standard.

[13] A major casualty is a deficiency in mission-essential equipment that causes the major degradation of a primary mission or loss of at least one primary mission.

[14] The Coast Guard is in the process of developing a new condition metric and did not have fiscal year 2005 data available. Consequently, our analysis covers fiscal years 2000 through 2004.

Table 5: Condition of Domestic Icebreakers and ATON Cutters as Measured by Coast Guard's Standard of 72 Percent or More of Time Free of Major Casualties, Fiscal Years 2000 through 2004

Asset type	2000	2001	2002	2003	2004
Domestic icebreakers					
140-foot icebreaking tugs	○	○	○	○	○
65-foot small harbor tugs	●	○	●	●	●
ATON cutters					
75-foot river buoy tenders	●	●	●	●	○
65-foot river buoy tenders	●	○	●	●	●
65/100-foot inland buoy tenders	●	●	●	●	○
75/100/160-foot inland construction tenders	●	○	○	○	○
175-foot coastal buoy tenders	●	●	○	○	○
225-foot seagoing buoy tenders	●	○	○	●	○

Source: GAO analysis of Coast Guard data.

Legend ● = Met or exceeded 72-percent standard
○ = Did not meet 72-percent standard

The Coast Guard's condition measure for these assets, while instructive, needs to be viewed with some caution. As we have reported in our analysis of the condition of the Coast Guard's legacy deepwater assets, the measure captures only major equipment casualties, which degrade mission capabilities but does not capture minor equipment casualties that may also degrade mission capabilities.[15] As such, this measure may underestimate the decline in asset condition. The Coast Guard has acknowledged the limitations of this measure and is working on a replacement for it, which will better determine specific mission impacts.

The POTF condition measure applies to cutters; the Coast Guard only recently started tracking POTF data for assessing condition trends on ATON small boats. During the fiscal year 2000 through 2004 period we reviewed, the Coast Guard did not have a centralized system for tracking the condition of these boats. Its internal assessment of the condition of the boats was based on two approaches, as follows:

[15] GAO, *Coast Guard: Progress Being Made on Addressing Deepwater Legacy Asset Condition Issues and Program Management, but Acquisition Challenges Remain*, GAO-05-757 (Washington, D.C.: July 22, 2005). The Deepwater fleet consists of 186 aircraft and 88 cutters of various sizes and capabilities, which play a critical role in all Coast Guard homeland and non-homeland security missions.

- For standard boats, which are purchased by Coast Guard headquarters and have similar capabilities and equipment for all boats of a particular type, the Coast Guard assessed condition by determining the boats' remaining service lives through a process referred to as ship structure and machinery evaluation boards (SSMEB). The SSMEB, which is conducted 10 years after a boat is commissioned and is repeated at 5-year intervals, applied to two of the six types of ATON boats we reviewed.

- For nonstandard boats, which are purchased by individual Coast Guard units for individual needs, the Coast Guard's assessment was based on anecdotal information from district boat managers, maintenance managers, annual boat inspection reports, and site visits. This approach was used on four of the six types of boats we reviewed.

Using these approaches, the Coast Guard characterized most of these asset types as in fair to poor condition. By contrast, however, when the Coast Guard assembled POTF data for a portion of these boats in fiscal year 2005, the data did not support this assessment. The boats analyzed had average scores above the Coast Guard's goal of 72 percent. (App. III provides further details on condition measures for each of the ATON and domestic icebreaking assets.)

Increasing Maintenance Costs Indicate Possible Condition Issues

For our second measure—trends in maintenance expenditures—the picture with regard to condition is more consistent than for our first measure: maintenance expenditures for domestic icebreaking and ATON cutters are increasing, even after taking inflation into account. We analyzed three types of maintenance costs[16]:

- Scheduled maintenance costs, which are planned for in advance and include such things as repainting the vessel;

- Unscheduled maintenance costs, which are for unforeseen emergencies; and

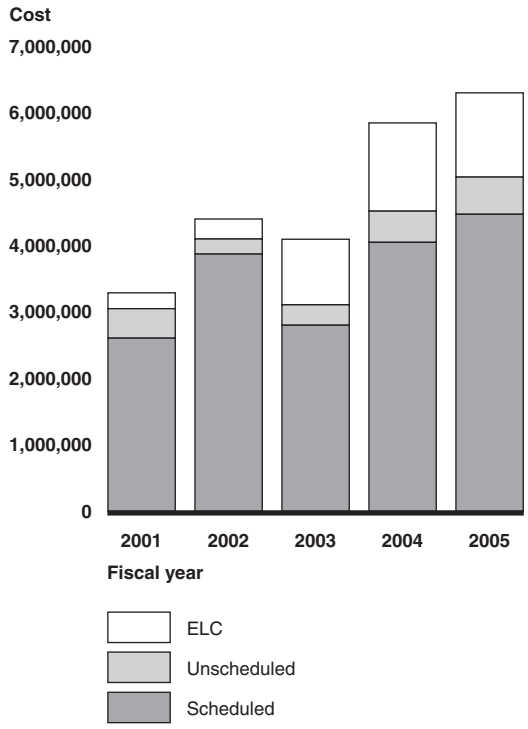
[16] We also examined a fourth category—deferred maintenance, which is the amount of scheduled maintenance that must be postponed in order to pay for unscheduled repairs. A previous GAO study found that a drop in this account is not necessarily an indicator that the condition of the assets are improving but rather a result of the Coast Guard having more money to address the maintenance needs. Due to this limitation we did not include our analysis of a sub-account within deferred maintenance which indicated a declining trend. Data to conduct an analysis on ATON small boats are not available.

- Engineering Logistic Center (ELC) costs, which include fleetwide projects that require engineering assistance (such as checking for watertight integrity) and therefore cannot be handled at the unit level. These projects, such as replacing a generator, help sustain capability but do not enhance it, according to Coast Guard officials.

While there are some asset-by-asset variations, total maintenance costs for domestic icebreakers and ATON cutters increased during the period we examined (fiscal years 2001 through 2005).[17] As figure 4 shows, total annual maintenance costs for domestic icebreakers nearly doubled, from slightly more than $3 million to slightly more than $6 million. The increase came primarily in two of the three categories in most years—scheduled maintenance costs and ELC costs. Although maintenance costs are also affected by the amount of funding available in any given year, according to Coast Guard officials, maintenance managers have discretion to move some funds to those assets most in need of maintenance money. Coast Guard officials have also said that these costs are indicative of condition issues. For example, an ELC official said that the increase in ELC costs was related to condition because the money was used for the overhaul of domestic icebreakers. In addition to the amount of funding available in any given year, these maintenance costs can also be impacted by a variety of other factors such as the pace of operations. For example, maintenance costs can be expected to increase as the pace of operations increases.

[17] Given the limitations of the Coast Guard data, we could not analyze maintenance costs for ATON small boats, and were unable to draw any conclusions about the condition of the ATON boats based on their maintenance costs. Starting in fiscal year 2003, the districts began shifting responsibility of boat maintenance from the district level to a centralized area level. Due to the segregated approach in which boat maintenance was carried out previously, maintenance data for the period we examined is inconsistent. Further complicating the analysis of this data is the fact that it is not broken out by scheduled and unscheduled costs, which would allow for identification of trends in unplanned maintenance and better reflect issues with condition. Finally, the maintenance cost figures reflect only half of the costs for standard boats, which is less than 40 percent of the total boat fleet.

Figure 4: Domestic Icebreaking Maintenance Cost Trends, Fiscal Years 2001 through 2005

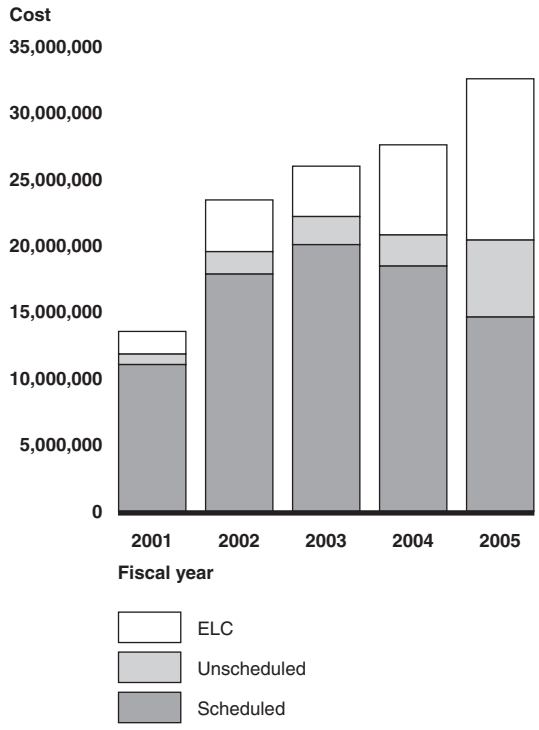


Source: GAO analysis of Coast Guard data.

Note: The figures presented above have been adjusted for inflation using 2005 dollars.

Total annual cost increases for ATON cutters showed a similar trend, more than doubling from over $13 million to over $32 million during the 5-year period (see fig. 5). For ATON cutters, cost increases were greatest in ELC maintenance and unscheduled maintenance. As with icebreakers, Coast Guard officials considered these expenditures to be related to asset condition.

Figure 5: ATON Cutter Maintenance Cost Trends, Fiscal Years 2001 through 2005



Source: GAO analysis of Coast Guard data.

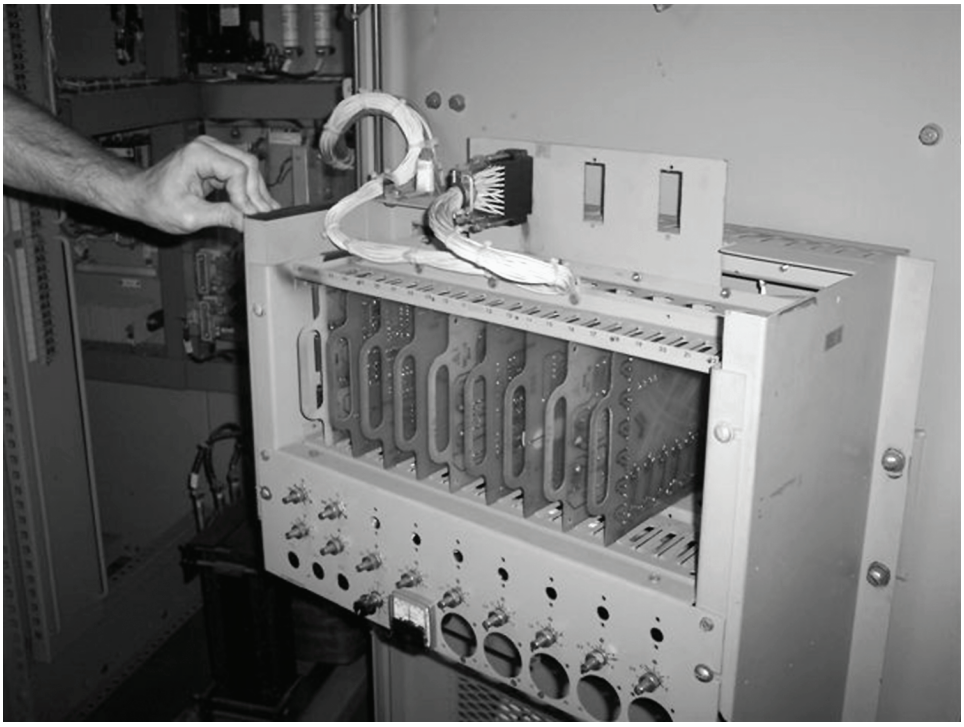
Note: The figures presented above have been adjusted for inflation using 2005 dollars.

Evidence Gathered from Interviews, Site Visits, and Other Records also Indicate Condition Issues

Evidence we gathered during our discussions with maintenance personnel, our visits to various Coast Guard installations, and our review of other Coast Guard records also pointed to declining condition of a number of these assets. However, according a program manager who previously served as a commanding officer on an icebreaker, for some of the older assets, the decline in condition of those assets has not been beyond what would be expected of assets 20 years or more in age. During our interviews and site visits, Coast Guard personnel reported to us that crew members have had to spend increasingly more time and resources to troubleshoot and resolve maintenance issues on older domestic icebreaking and ATON assets. They indicated that because the systems and parts are outdated compared with the technology and equipment available today, it can be challenging and time consuming to diagnose a maintenance issue and find parts or determine what corrective action to take. For example, the propulsion control system on the 140-foot icebreaking tugs uses circuit cards that were state-of-the-art when the tugs

were commissioned in the late 1970s to 1980s but are no longer manufactured today and have been superseded by computer control systems (see fig. 6). Coast Guard personnel said the lack of a readily available supply of these parts has forced maintenance personnel to order custom made parts or refurbish the faulty ones, increasing the time and money it takes to address maintenance problems. Finding knowledgeable individuals to identify problems with outdated equipment is difficult, they said, which further complicates maintenance. Crews of other assets we visited also confirmed the difficulty of diagnosing problems and obtaining replacement parts for other critical subsystems such as the main diesel engines.

Figure 6: Antiquated Circuit Card Rack, Which Serves as Part of the Main Propulsion Control System, on the 140-foot Icebreaking Tug



Source: GAO.

Since at least 2002, the Coast Guard has been on record as saying these assets are in decline. In a mission needs analysis issued that year, the Coast Guard concluded that its domestic icebreaking and ATON assets were affected in varying degrees with respect to safety, supportability, environmental compliance, and habitability, and that addressing these

issues would require replacing or rehabilitating the assets.[18] The analysis noted that the need to replace or rehabilitate inland buoy tenders and 45-foot buoy boats had been identified as early as 1993 but had not yet been addressed.[19] It also noted that the 21-foot trailerable aids-to-navigation boats and the 55-foot aids-to-navigation boats—most of which have yet to be replaced—had been extended beyond their projected service lives.

When we asked Coast Guard officials if current usage patterns were precipitating the decline of these assets, they said that overages can have an impact on some assets, especially those with more complex systems and subsystems. The officials said that exceeding planned usage limits may leave less time to maintain these systems. They said that the deterioration of an asset and its systems from usage consistently above the limits would be reflected in periodic engineering assessments, known as SSMEBs, of the assets. In our site visits, we did learn of one example in which increased use of assets for security-related purposes may be affecting condition. The example involves the 140-foot icebreakers, which currently are being used extensively for security-related activities when they are not engaged in icebreaking activity. According to Coast Guard personnel, these icebreakers were designed to operate at maximum power for icebreaking; however, maritime security missions typically require several hours of idling, which is detrimental to the engine. Extended periods of idling, they said, causes oil discharge and sludge build up in the engine and mufflers. Thus, running assets in ways for which they were not designed could result in faster degradation of their condition.

[18] Absent from the analysis were the newer 49-foot stern loading buoy boats, and the 175-foot and 225-foot seagoing buoy cutters.

[19] This need was to be met by acquiring a new 49-foot buoy stern loading boat, but the existing 45-foot buoy boat assets were continued in service when the Coast Guard determined that the 49-foot boats could not support the needs for all locations across the country.

Performance Indicators for Icebreaking and ATON Missions Show Mixed Results

Against this backdrop of condition indicators, the Coast Guard's measures of performance for domestic icebreaking and ATON missions show mixed results, with several indicators showing that mission performance has been improving or largely unchanging, while at least one other indicator indicates a decline.

- For domestic icebreaking, the Coast Guard's performance indicator is the number of days that ice leads to closures of waterways in the Great Lakes region—the region in which most domestic icebreaking activity occurs.[20] The Coast Guard's performance goal is to have 2 or fewer closure days during average winters.[21] During fiscal years 2001 through 2005 the Coast Guard met this goal every year but 1. The exception was fiscal year 2004, when waterways were closed for 4 days. According to Coast Guard officials, however, vessel condition was not a factor in waterway closures; instead, they were related to an icebreaker's being diverted to free a stuck vessel and to a response to a commercial aircraft crash.

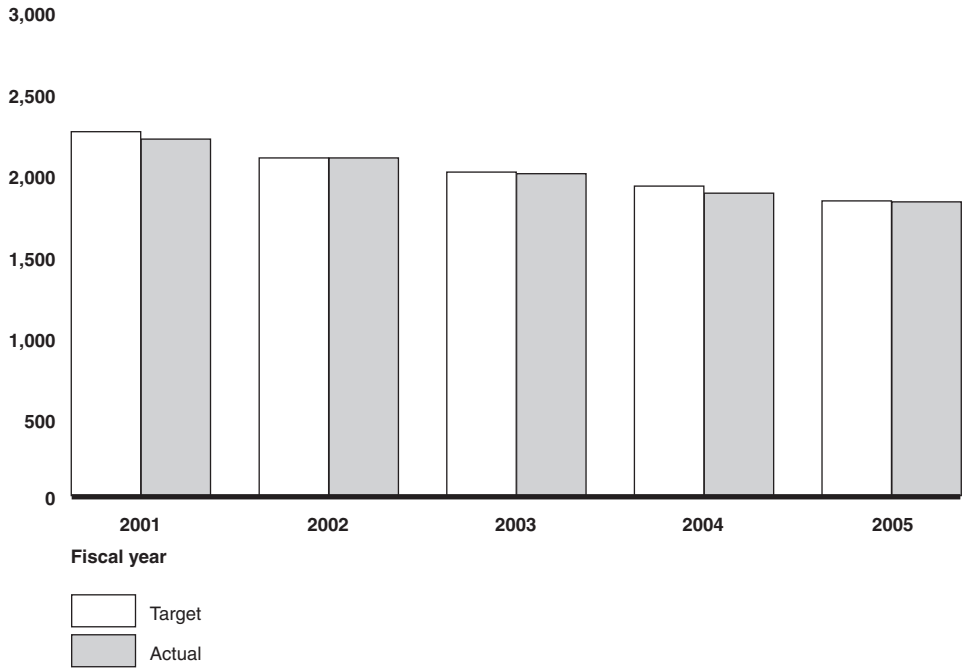
- For ATON, the Coast Guard's primary performance indicator is the number of collisions, allisions, and groundings.[22] Since these events can cause deaths and injuries, environmental and property damage, and lead to waterway closures that limit commercial and recreational activity, a decline in this measure is an improvement. During fiscal years 2001 through 2005, this measure declined—a positive development (see fig. 7).

[20] In our recent review of the performance measures for non-homeland security missions, we found that although the Coast Guard breaks ice in many East Coast ports and waterways, according to Coast Guard officials, the measure focuses on the Great Lakes region because it is a large commerce hub where the icebreaking season tends to be longer and where ice has a greater impact on maritime transportation. Coast Guard program officials at agency headquarters said that they are in the early stages of developing a new primary performance measure that will incorporate domestic icebreaking activities in areas beyond the Great Lakes. For more information, see GAO, *Coast Guard: Non-Homeland Security Performance Measures Are Generally Sound, but Opportunities for Improvement Exist*, GAO-06-816 (Washington, D.C.: Aug. 16, 2006).

[21] The Coast Guard has a goal of 8 or fewer days during severe winters.

[22] The Coast Guard defines an "allision" as a vessel collision with a fixed object.

Figure 7: Average Number of Collisions, Allisions, and Groundings, Fiscal Years 2001 through 2005



Source: GAO analysis of Coast Guard data.

- While the Coast Guard's primary ATON performance indicator was showing improvement, however, an important secondary measure was showing an adverse effect. This indicator, which measures the probability that an aid to navigation or a system of aids-to-navigation is performing its specified function at any randomly chosen time and is expressed as a percentage of total time, is the leading performance measure used in managing the ATON program, according to Coast Guard officials.[23] This measure has steadily declined since fiscal year 2002 (see table 6), and since a smaller percentage means fewer aids are available, a decline in this measure is an adverse development. Coast Guard officials said some of this decline was attributable to the condition of ATON cutters and boats for servicing the navigational

[23] The Coast Guard's primary indicator—collisions, allisions, and groundings—is the measure included in external performance reports, but it reflects many factors outside the aids to navigation mission, such as weather, dredging, and vessel equipment standards.

aids, but they were not able to estimate how much of the decline could be attributed to this cause.[24]

Table 6: Availability of Navigational Aids, Fiscal Years 2001 through 2005

Fiscal year	Percent of aids available
2001	98.3
2002	98.4
2003	98.2
2004	97.6
2005	97.3

Source: Coast Guard.

Note: Coast Guard's goal is 99.7 percent of all aids to navigation available.

In other work, we have noted that the Coast Guard's performance indicators can be affected by multiple factors and that there are challenges to using such measures in linking resources to results.[25] The ability to meet icebreaking goals, for example, can be affected by the severity of the winter. In fact, when the Coast Guard met its goal for waterway closures in fiscal year 2005, Coast Guard officials attributed the result in part to less severe average ice conditions than in previous years. Similarly, the ability to keep navigational aids in working order can be adversely affected by such uncontrollable factors as the severity of a hurricane or winter storm season.

The Coast Guard has launched a number of initiatives designed to address challenges in linking resources to results of these missions.[26] These initiatives followed program assessments conducted by the Office of Management and Budget, which completed an assessment of the ATON

[24] Coast Guard officials also said that, in some cases, the lack of availability was related not to vessel's condition but to its use in other missions. For example, seagoing and coastal buoy tenders may be called upon to respond to unexpected events like hurricanes, precluding their use in fixing navigational aids.

[25] See, for example, GAO, *Coast Guard: Relationship between Resources Used and Results Achieved Needs to Be Clearer*, GAO-04-432 (Washington, D.C.: Mar. 22, 2004).

[26] For more information on these initiatives, see GAO, *Coast Guard: Non-Homeland Security Performance Measures Are Generally Sound, but Opportunities for Improvement Exist*, GAO-06-816 (Washington, D.C.: Aug. 16, 2006).

program in 2002 and the domestic icebreaking program in 2004.[27] For the ATON program, the assessment determined that the program did not demonstrate results and recommended that the program have specific long-term performance goals that focus on outcomes. The assessment of the domestic icebreaking program determined that the program was effective, but that more ambitious performance targets needed to be set. In response to these findings, the Coast Guard has worked to set long-term performance targets and develop new measurement frameworks to align with OMB's recommendations.

To Continue to Achieve the Missions of Its ATON and Domestic Icebreaking Assets, the Coast Guard Has Taken Actions, Made Proposals, and Studied Outsourcing Possibilities

The Coast Guard has considered or proposed a wide variety of actions to continue to achieve the missions that its domestic icebreaking and ATON assets perform and is moving ahead with several of them. Actions under way include developing new ways to measure asset condition, manage boat and cutter maintenance, and make choices about which maintenance projects to conduct. The Coast Guard has also acquired some new buoy tenders and a new icebreaker, though the bulk of its icebreaking and ATON fleet remains at or beyond projected service lives. Coast Guard officials stated that to determine whether and when to replace or rehabilitate aging assets, factors such as the assets' condition and trends in maintenance costs, among other things, are taken into account. Proposals to systematically rehabilitate or replace these assets have been denied or deferred by DHS or the Office of Management and Budget (OMB), apparently due to competition from initiatives such as the $24-billion Deepwater project for replacing or renovating other Coast Guard vessels and aircraft. In response, the Coast Guard has separated the proposals into smaller parts and is trying to fund some projects from within the Coast Guard's budget. Finally, the Coast Guard studied what mission activities make the best business case for outsourcing of functions to the private sector, but states that potential disadvantages to outsourcing exist such as loss of capabilities and inability to retain personnel.

[27] These assessments were done using OMB's Program Assessment Rating Tool (PART), which is a diagnostic rating tool meant to provide a consistent approach to evaluating federal programs as part of the executive budget formulation process. It applies 25 questions to "programs" under four broad topics: (1) program purpose and design; (2) strategic planning; (3) program management; and (4) program results (i.e., whether a program is meeting its long-term and annual goals) as well as additional questions that are specific to one of seven mechanisms or approaches used to deliver the program.

Actions Have Been Taken to Manage Assets and Acquire Some New Ones

Three main steps to manage assets are under way, and several acquisitions have been completed in both the icebreaking and ATON fleets.

Coast Guard Is Developing a More Robust Condition Measure

The Coast Guard is working on the development of a new measure to track an asset's condition. As mentioned above, the Coast Guard's previous measure, percent of time free of major casualties, did not capture the extent to which equipment casualties degraded mission capabilities. Called "percent of time fully mission capable," this new measure is intended to more directly link a cutter's condition to its mission capability. Developed after our examination of the condition of deepwater assets, this measure will be used for ATON and domestic icebreaking assets as well.[28] For the new measure, the Coast Guard is developing codes that rank the degree of importance of each piece of a cutter's equipment to each mission that the cutter could perform. The Coast Guard plans to use these codes in casualty reports, providing engineers and operators with information about the impact of equipment casualties on each possible mission. This information will then be used in calculating the condition measure for each cutter class and mission. This information would allow Coast Guard officials to determine, for example, the degree of icebreaking capability of its domestic icebreaking fleet at any given time. Coast Guard officials said they expect final approval of this measure this year.

Coast Guard Is Implementing New Approaches to Manage ATON Boat and Cutter Maintenance

The Coast Guard is implementing a centralized boat maintenance initiative to improve the management of its boat fleet, which includes many ATON boats. In contrast to the previous approach in which local boat operators managed boat maintenance and oversaw the spending of maintenance funds, the new initiative places management of boat maintenance and expenditures with naval engineers. According to the Coast Guard, the key advantages of this initiative include standardized maintenance practices for the boats, better oversight of maintenance funding, and enhanced tracking and analysis of casualties. In addition, it should improve the tracking of the condition of the Coast Guard's small boat fleet, which has lacked a centralized tracking system. Known as Centralized Boat Maintenance Management, this initiative is expected to be rolled out Coast Guard-wide by fiscal year 2008 if adequate resources and personnel are available.

[28] GAO-05-757.

Since 2002, the Coast Guard has also been gradually implementing a maintenance approach called "condition based maintenance" for select subsystems and parts of its newer coastal and seagoing buoy tending cutters.[29] Under this approach, the condition of a part or subsystem, such as the main diesel engine, is evaluated or assessed at regular intervals to determine whether it needs to be replaced or have maintenance performed. Parts or systems would be replaced or receive maintenance only if their condition showed excessive wear or did not perform at an acceptable level. Under the previous approach, maintenance occurred at time-based intervals even if the part showed no excessive wear or performed acceptably. The key advantage of the change, according to Coast Guard officials, is reduced costs. For example, the Coast Guard estimated that it reduced drydock costs related to maintaining newer coastal and seagoing buoy tenders $2 million in fiscal year 2005. The Coast Guard is considering expanding the use of this maintenance approach to other subsystems of the newer buoy tending assets and the new Great Lakes icebreaker commissioned in 2006.

Coast Guard Is Developing a Tool to Better Prioritize Upgrades and Maximize Asset Capabilities

In 2002, we recommended that the Coast Guard develop a long-term strategy to set and assess levels of mission performance.[30] We found this was an important step to take because it links investments to asset capabilities and mission priorities so that the Coast Guard can better decide how limited budget dollars should be spent. The Coast Guard has been working to apply the principles behind such a strategy to (1) better prioritize the projects needed to upgrade assets such as aging ATON and domestic icebreakers and (2) obtain the greatest overall mix of capabilities for its assets within its budget in order to maximize mission performance. The tool it is developing is called the Capital Asset Management Strategy (CAMS).

[29] A form of this approach was first adopted by the Navy in the late 1970s and most Coast Guard "condition based maintenance" capability is derived from proven Navy programs. According to Coast Guard officials, the Coast Guard is in the process of evaluating what other assets and systems for which such a maintenance approach may be effective. They stated that this approach is not a replacement for preventative maintenance work but is intended to complement it.

[30] GAO, *Coast Guard*: *Comprehensive Blueprint Needed to Balance and Monitor Resource Use and Measure Performance for All Missions*, GAO-03-544T (Washington, D.C.: Mar. 12, 2003); and GAO, *Coast Guard: Strategy Needed for Setting and Monitoring Levels of Effort for All Missions*, GAO-03-155 (Washington, D.C.: Nov. 12, 2002).

CAMS is designed to analyze the capability trade-offs for upgrades and maintenance projects across asset classes, allowing the Coast Guard to determine which combination of projects will provide the most capability for the dollars invested. These analyses take into account such factors as asset condition, the asset's importance to specific missions, and the relative importance of missions. The Coast Guard continues to refine CAMS and expects to have it in full use beginning with the budget for fiscal year 2009. The recommendations stemming from CAMS are intended to augment the information currently provided to decision makers in the budget development process.

Coast Guard Acquired Some New Assets

Since the 1990s, the Coast Guard has been able to replace buoy tenders with new assets that represent about 15 percent of its current ATON fleet. From 1996 to 2004, the Coast Guard commissioned 14 new 175-foot coastal buoy tenders and 16 new 225-foot seagoing buoy tenders to replace an aging fleet of 11 coastal and 27 seagoing buoy tenders that were built between 1942 and 1971. The new buoy tenders have improved capabilities such as the following:

- A computerized positioning system that automates the task of holding the vessel in place while working on a navigational aid. Previously, this task had to be done manually, requiring the crew to constantly monitor and maintain the vessel's position, sometimes for up to 10 hours at a time. The system relieves the crew of this task and reduces safety concerns associated with crew fatigue.

- Bow and stern thrusters to enhance the vessels' maneuverability and improve the crew's ability to maintain position.

- Hydraulic chain stoppers and winches to reduce the number of crew members required to do the work and enhance safety (see fig. 8).

- Accommodations that allow for dual gender crews, increasing the Coast Guard's ability to allow women to serve on the vessels.

Figure 8: Chain-in Haul Winch

Source: GAO.

These and other features also allow the newer buoy tenders to carry out other missions, according to a Coast Guard official involved in their design and acquisition. Their size, stability, and maneuverability are useful for such missions as search and rescue, homeland security, and law enforcement, and they have specific capabilities for dealing with other duties as skimming oil or mounting machine guns for security patrols.

With their sizeable fuel tanks and storage capacity, they can also serve as logistics support platforms to restock vessels involved in drug interdiction and other activities. For 7 weeks in 2005, for example, one tender served as a supply platform for a Coast Guard vessel conducting drug interdiction patrols. According to Coast Guard officials, this enabled the patrol vessel to remain on patrol in the area for a longer period of time than it would have otherwise with its limited fuel and storage capacities.

Besides the buoy tenders, the Coast Guard commissioned a new 240-foot multimission icebreaker in 2006 to replace a 62-year-old icebreaker and an aging buoy tender on the Great Lakes. The new icebreaker has enhanced icebreaking capabilities and the same ATON capabilities as the newer seagoing buoy tenders, enabling it to work on navigational aids in ice conditions as well as during other times of the year when no icebreaking is needed.

Additional Proposals to Rehabilitate or Replace Aging Assets Remain Largely Unfunded

Despite the new acquisitions, more than half of the assets in the domestic icebreaking and ATON fleet have reached or are nearing the end of their service lives. Coast Guard officials stated that they use a process that considers information such as how close the assets are to the end of their design life, the condition of the assets as determined by periodic assessments, and trends in maintenance costs, among other things to determine whether to rehabilitate or replace these aging assets. This information is used to identify the asset types that are most in need of replacement or major maintenance, and therefore should be given greater consideration in maintenance planning and budgeting.

In 2002, the Coast Guard proposed options for systematically rehabilitating or replacing 164 cutters and boats in these fleets.[31] According to Coast Guard officials, these options were proposed after determining that the age, condition, and cost of operating these assets would diminish the capability of the Coast Guard to carry out ATON and domestic icebreaking missions over time without rehabilitation or replacement of some or all of the assets. In 2004, it completed a preliminary analysis of four approaches,

[31] The scope of this proposal considered rehabilitating or replacing the following asset types: 21-foot trailerable aids-to-navigation boats; 45-foot buoy boats; 55-foot aids-to-navigation boats; 63-foot aids-to-navigation boat; 72-foot cable laying boat; 65-foot and 75-foot river buoy tenders; 65-foot small harbor tugs; the 65-foot and 100-foot inland tenders; the construction tenders (75-foot, 100-foot, and 160-foot); and the 140-foot icebreaking tugs.

including the status quo—that is, maintaining the existing fleet. This analysis provided an estimate of the total life-cycle costs for each approach over a 33-year period from fiscal year 2005 to fiscal year 2037.[32] (See table 7 for a description of each approach.) Estimated costs ranged as high as $8.5 billion; however, Coast Guard officials emphasized that these estimates were preliminary and are not reliable. As a result, we are not reporting these numbers in detail.

Table 7: Approaches to Replace or Rehabilitate ATON and Domestic Icebreaking Assets under the Integrated ATON Platform Modernization Project

Status quo: The existing fleet of ATON and domestic icebreaking assets would receive maintenance as needed to maintain current operations.
Rehabilitation: Nearly all existing assets[a] would undergo major rehabilitation projects whose effect is expected to last 15 years for most vessels after which another major rehabilitation would be required.
Replace: All existing assets would be replaced with a system of new standardized assets.
Rehabilitate/replace: Depending on the condition of certain asset types, the assets would be either replaced with new assets or rehabilitated.

Source: GAO analysis of Coast Guard data.

[a]Under this alternative, trailerable aids-to-navigation boats and the 45-foot buoy boats would be replaced.

No funds have been allocated to pursue this project further, apparently due to competing funding requests for replacing or rehabilitating other Coast Guard assets. According to a Coast Guard program official, although resource proposals to carry out this project were made during the budget planning processes for fiscal years 2004 through 2007, the requests were either deferred or denied by DHS or the Office of Management and Budget. Coast Guard officials involved in the program said they were not aware of the exact reasons why the requests were terminated or deferred. The officials said that the funding demands from other major Coast Guard programs already underway (such as the Deepwater program for replacing or rehabilitating aircraft and cutters with greater at-sea capability) that likely had higher priority in the competition for limited resources combined with the large scope and size of the proposed project, may have prevented the project from being funded.

[32] These life-cycle costs include costs associated with planning and design, procurement, management and use, and disposal of the assets at the end of their service lives. We did not assess the reasonableness of the estimates provided in this analysis.

Without specific funding to move the project forward, the Coast Guard has attempted to break the project into smaller components and pursue potential funding from within the Coast Guard's budget, focusing on the assets most in need of maintenance or replacement. In February 2006, the Coast Guard began a project to replace its fleet of 80 trailerable aids-to-navigation boats with new boats that have enhanced capabilities to do ATON work as well as other missions.[33] The enhanced capabilities include equipment to lift navigational aids out of the water for service, more deck space for working on these aids, an elevated work platform for working on aids that are high in the water, and faster speeds to reduce transit times. The Coast Guard intends for the new boats to be more multimission capable. For example, their added speed and deck space will help with search and rescue missions, and they will have gun mounts for use in law enforcement or maritime security missions.

According to a Coast Guard official, this acquisition would cost approximately $14.4 million if all 80 boats are purchased and would bring on new boats over a 5-year period as funds allow.[34] The Coast Guard official responsible for the project said the Coast Guard intends to make the purchases using a funding stream appropriated for the maintenance of nonstandard boats that can be allocated to the boats with the most pressing maintenance or recapitalization needs. Availability of these funds, however, depends on the condition and maintenance needs of other nonstandard boats; if this funding has to be applied to meet other needs, such as unanticipated problems, it may not be available for purchasing these boats.

Separate from this effort to acquire new trailerable boats, the Coast Guard has made a request as part of the budget process to begin rehabilitating aging river buoy and construction tenders. This project, which will focus on rehabilitating the systems within the engine rooms of the assets, is

[33] These boats can be placed on trailers and transported on land by truck.

[34] According to a Coast Guard official, the Coast Guard is purchasing these boats under a 5-year "indefinite delivery, indefinite quantity" contract that allows the Coast Guard to order as many boats from the vendor at any given time at a cost of $180,000 per boat. The official stated that this price includes delivery, spare parts, trailers, and crew training and that the Coast Guard's obligation under the contract was to purchase at least one boat, which it has already met. Currently, the Coast Guard has 24 more boats on order and expects to order a total of 80 over the course of the contract to replace its existing fleet. According to a Coast Guard official, the Coast Guard hopes to have all new boats in place by 2011. This official also stated that under this contract, other DHS agencies also have the option of purchasing up to 20 boats of similar design.

estimated to cost approximately $75 million. The Coast Guard plans to include this project in future budget requests. Coast Guard officials indicated that they were submitting this request because these assets were determined to be in the worst condition.

Study Identified Outsourcing Possibilities but May Face Disadvantages to Implement

In 2004, the Coast Guard examined possibilities for outsourcing missions in response to an OMB assessment of the ATON program.[35] As a result of that assessment, Coast Guard and OMB officials agreed to study which ATON activities make the best business case for being performed by contractors outside of the Coast Guard with minimal impact on the Coast Guard's ability to carry out its other missions.[36] The subsequent study, completed in April 2004, found that inland construction tenders spent most of their resource hours on the ATON mission with minimal impact or use in other missions and provided one of the best opportunities for further study of outsourcing.[37] However, the study did not quantify the potential benefits that could be derived from outsourcing these activities.

In August 2006 the Coast Guard completed an analysis as to whether ATON functions could feasibly be outsourced, and which parts, if any, were inherently governmental in nature.[38] The objective of this analysis was to compare the Coast Guard's inland construction and river buoy tender operating costs with representative private sector marine industry costs and make recommendations regarding the feasibility to commercially support and operate the inspection, servicing, and contingency response capability of the ATON mission and assets.

[35] This assessment was done using OMB's Program Assessment Rating Tool (PART), which is a diagnostic rating tool meant to provide a consistent approach to evaluating federal programs as part of the executive budget formulation process. The assessment of the ATON program was completed in 2002.

[36] According to Coast Guard officials, a limited amount of ATON work is currently contracted out in cases where the capabilities are needed only occasionally or the work cannot be done by the Coast Guard's assets. For example, in the aftermath of Hurricane Katrina, some ATON work was contracted to commercial providers that fixed navigational aids in waters too shallow for the Coast Guard's construction tenders to reach.

[37] BearingPoint, *United States Coast Guard Aids to Navigation Business Case Analysis*, April 2004.

[38] This study was commissioned by OMB in July 2006 and directed the Coast Guard to provide a conceptual analysis regarding ATON assets operating in the Western Rivers Waterways System. To accomplish this directive, the Coast Guard conducted an economic analysis of the Coast Guard's inland construction tender and river buoy tender assets.

According to Coast Guard officials, the results will be incorporated into future acquisition plans for replacing the current capabilities represented by inland construction tenders and river buoy tenders. This Coast Guard analysis was finalized after we had completed our audit work. Therefore, we were unable to obtain and review the study in time for the final preparation of this report.

Although possibilities for outsourcing were identified, outsourcing also carries potential disadvantages, according to Coast Guard program officials. Potential disadvantages they mentioned include the following:

- Outsourcing could lead loss of "surge" capability—that is, the capacity to respond to emergencies or unusual situations. In part, this capability may be needed within the ATON or icebreaking mission itself, such as when a hurricane or ice destroys or damages a large number of navigation aids. In the case of Hurricane Katrina, Coast Guard officials stated that because the Coast Guard had ATON assets such as construction tenders, crews were able to begin working immediately to repair damaged aids and get the waterways open to maritime traffic again. This "surge" capability may also be needed for other missions, such as occurs when ATON assets can be used to support search and rescue efforts. In the aftermath of Hurricane Katrina, for example, some ATON assets provided logistical support for first responders or transported stranded individuals.

- Outsourcing may disrupt the Coast Guard's personnel structure and weaken the agency's ability to attract and retain personnel. Specifically, they are concerned that outsourcing would likely reduce opportunities that provide important experience for personnel to advance in their careers and eliminate positions that typically have more predictable work schedules than positions in some of the other Coast Guard's missions.

Concluding Observations

The Coast Guard has been using its domestic icebreaking vessels and its ATON assets to a lesser extent, to accommodate the need for additional homeland security activities in the post-September 11 environment, and it is doing so thus far largely without curtailing ATON or domestic icebreaking activities or unduly straining these assets past their designed workloads. The available evidence also indicates that despite some decline in the condition of some asset types, the Coast Guard's ability to meet its aids-to-navigation and domestic icebreaking missions, as indicated by mixed outcomes of its key mission performance measures, has not shown

clear trends of decline. Efforts by Coast Guard personnel to troubleshoot operational problems and to take other steps to keep assets operating appear to be one reason mission performance has not been further affected, and many other factors, such as the harshness of a winter or the severity of storm damage on navigation buoys and beacons, can also affect performance results. For the present, however, the impact of these additional mission responsibilities does not appear to be a cause for alarm.

That said, the future of these assets bears close watching. The fact that many of the assets have or will be approaching the end of their design service lives could mean the need for rehabilitated or new assets may become more pressing in the future. Another issue is whether current operations, both in level and types of usage, are adding to these costs and incidents beyond what the Coast Guard would normally expect. For example, operating domestic icebreakers beyond their underway hours limit—could potentially accelerate the level of decline. If this is the case, using these assets to meet security missions could be meeting the Coast Guard's immediate needs but accelerating the need for replacement or rehabilitation. According to Coast Guard officials, the Coast Guard's attempt to systematically rehabilitate or replace its ATON and domestic icebreaking fleet was proposed at a time when competing demands likely caused postponements of requests for the needed funds. These competing demands, reflected largely in the Coast Guard's expensive and lengthy Deepwater asset replacement program, will continue for some time, as will other pressures on the federal budget. The Coast Guard is moving to improve the process it uses to set budget priorities through actions such as its new tool to link asset condition and funding decisions to better identify the projects that will provide the most capability with the limited funds that are available. Given that many of these actions are recent and need a chance to work, it is too early to evaluate their effectiveness. However, even as the Coast Guard takes steps to determine how best to replace or rehabilitate its assets, limited budgetary resources combined with other competing asset replacement programs already in process will likely continue to challenge the Coast Guard to find sufficient resources to carry out the options identified.

Agency Comments

We requested comments on a draft of this report from the Department of Homeland Security and the Coast Guard. The Coast Guard provided technical comments, which we have incorporated into the report as appropriate.

As agreed with your office, unless you publicly announce the contents of this report earlier, we plan no further distribution of it until 30 days from the date of this letter. We will then send copies of this report to the appropriate congressional committees; the Secretary of Homeland Security; the Commandant of the Coast Guard; and other interested parties. In addition, this report will be available at no charge on the GAO Web site at http://www.gao.gov.

If you or your staff have any questions about this report, please contact me at (202) 512-9610 or CaldwellS@gao.gov. Contact points for our Offices of Congressional Relations and Public Affairs may be found on the last page of this report. GAO staff who made major contributions to this report are listed in appendix V.

Stephen L. Caldwell
Acting Director, Homeland Security and Justice Issues

Appendix I: Objectives, Scope, and Methodology

This report examines the time spent by the U.S. Coast Guard's domestic icebreaking and ATON assets on various missions, the condition of these assets, and the actions the Coast Guard has taken to continue to achieve the missions of these assets. Our work focused on three key questions: (1) What are the recent trends in the amount of time these assets have performed various missions? (2) What is the condition of the Coast Guard's ATON and domestic icebreaking assets and how has their condition impacted the performance of their primary missions? (3) What actions has the Coast Guard taken to continue to achieve the missions of its ATON and domestic icebreaking assets?

In identifying trends in the amount of time spent on missions and the impact of these trends, we analyzed data from the Coast Guard's Abstract of Operations (AOPS) database, which tracks resource hours for each asset. For each asset type within our scope, we examined trends in the number of resource hours spent between fiscal years 2001 and 2005 conducting each of the Coast Guard's missions.[1] To determine the reliability of this data, we (1) reviewed the results of previous reliability assessments we have conducted of this data for other work and (2) confirmed with the AOPS program manager that the data and the manner in which it is managed has not changed since the previous assessment that would affect its reliability. We determined that the data was sufficiently reliable for the purposes of this report. We supplemented our analysis of these resource hours with documentation from interviews with asset program managers and crews of ATON and domestic icebreaking assets.

In assessing the condition of the assets during fiscal years 2001 to 2005, we analyzed what Coast Guard officials identified as the best available condition measures. We obtained concurrence from the Office of Naval Engineering and the Office of Cutter Forces that the appropriate measures to use for the condition of assets were percent of time free of major casualties, scheduled/unscheduled/Engineering Logistics Center maintenance costs, and estimated deferred maintenance costs. To determine the reliability of this data, we (1) reviewed the results of previous reliability assessments we have conducted of this data for other work and (2) examined responses the Coast Guard provided to a questionnaire we sent requesting updated information on the administration and oversight of the databases. We determined that the

[1] Due to a lack of data, we did not perform this analysis for the 72-foot cable laying boat.

data was sufficiently reliable for the purposes of this report. We supplemented our analysis of these measures with documentation from internal Coast Guard reports, as well as from interviews of asset program managers at Coast Guard headquarters and crewmembers of the assets located in the field. In addition to talking with crewmembers, we directly observed the condition of various assets during our site visits to Alameda, Calif; Bayonne, N.J.; Buchanan, Tenn; Baltimore, Md; Mobile, Ala; Seattle, Wash; Sault St. Marie, Mich; and Atlantic Beach, N.C. These assets were selected to provide diversity in terms of type and age of asset and geographic location. In addition, we interviewed Coast Guard officials with the Area Commands in Alameda, Calif., and Portsmouth, Va., as well as in Districts 5 and 13.

To determine the actions that the Coast Guard has undertaken to continue to achieve the missions of its ATON and domestic icebreaking assets, we interviewed officials with the Coast Guard's Engineering and Logistics Center, Engineering and Logistics Directorate, Office of Naval Engineering, Office of Boat Forces, and Office of Cutter Forces. To obtain information on newer assets the Coast Guard has acquired, we also made site visits to interview personnel and observe the assets in San Francisco, Calif.; Atlantic Beach, N.C.; Baltimore, Md.; Cheboygan, Mich.; and Mobile, Ala. To determine what proposals the Coast Guard has made to rehabilitate or replace its ATON and domestic icebreaking assets, we reviewed Coast Guard project documents and interviewed officials at Coast Guard headquarters. We did not, however, verify the accuracy of the cost estimates provided for those proposals. Finally, to determine the work the Coast Guard has done to study the outsourcing of ATON and domestic icebreaking mission activities and the potential impact of outsourcing those activities, we interviewed Coast Guard officials at headquarters as well as officials and crew members in the field. We also reviewed the completed business case analysis of outsourcing opportunities for ATON mission activities.

We performed our review from July 2005 to August 2006 in accordance with generally accepted government auditing standards.

Appendix II: Mission Resource Hours of ATON and Domestic Icebreaking Assets, Fiscal Years 2001 to 2005

Appendix II provides information on the number of resource hours Coast Guard ATON and domestic icebreaking assets have spent on various Coast Guard missions during fiscal years 2001 through 2005. The Coast Guard maintains information, on a program-by-program basis, about how resources, such as vessels, boats, and aircraft, are used. Each hour that these resources are used is called a resource hour. Resource hours are accumulated and reported by quarter and represent the time spent by the Coast Guard's major assets to conduct its programs. The table 8 shows by asset type, the hours ATON and domestic icebreaking assets have spent on each of Coast Guard's missions for each fiscal year, from 2001 through 2005. The percentage of each asset types' total fiscal year resource hours that these hours represent is shown in parenthesis.

Table 8: Resource Hour Usage and Percent, by Asset Type and Mission Program, Fiscal Years 2001 through 2005

Fiscal year	Non-homeland security						Homeland security				
225-foot seagoing buoy tenders											
	SAR	MS	ATON	Ice ops	MEP	LMR	Drug	Other LE	Migrant	PWCS	Defense
2001	80 (1%)	0 (0%)	4,366 (61%)	0 (0%)	447 (6%)	918 (13%)	0 (0%)	171 (2%)	58 (1%)	948 (13%)	216 (3%)
2002	407 (4%)	0 (0%)	5,139 (48%)	0 (0%)	0 (0%)	1,066 (10%)	0 (0%)	254 (2%)	0 (0%)	3,547 (33%)	200 (2%)
2003	75 (0%)	48 (0%)	9,189 (55%)	65 (0%)	24 (0%)	1,774 (11%)	0 (0%)	33 (0%)	181 (1%)	2,113 (13%)	3,170 (19%)
2004	435 (2%)	13 (0%)	13,039 (59%)	746 (3%)	78 (0%)	2,852 (13%)	40 (0%)	293 (1%)	1,617 (7%)	1,363 (6%)	1,763 (8%)
2005	631 (3%)	195 (1%)	13,118 (62%)	622 (3%)	1,171 (6%)	1,606 (8%)	234 (1%)	765 (4%)	175 (1%)	618 (3%)	1,962 (9%)
175-foot coastal buoy tenders											
	SAR	MS	ATON	Ice ops	MEP	LMR	Drug	Other LE	Migrant	PWCS	Defense
2001	129 (1%)	0 (0%)	12,158 (87%)	82 (1%)	35 (0%)	339 (2%)	0 (0%)	56 (0%)	3 (0%)	1,202 (9%)	7 (0%)
2002	36 (0%)	0 (0%)	10,735 (74%)	0 (0%)	32 (0%)	0 (0%)	0 (0%)	216 (1%)	10 (0%)	3,389 (23%)	21 (0%)
2003	122 (1%)	28 (0%)	12,422 (78%)	478 (3%)	17 (0%)	0 (0%)	0 (0%)	1 (0%)	298 (2%)	2,345 (15%)	265 (2%)
2004	4 (0%)	0 (0%)	13,402 (85%)	446 (3%)	16 (0%)	0 (0%)	0 (0%)	159 (1%)	358 (2%)	1,341 (9%)	25 (0%)
2005	136 (1%)	0 (0%)	14,375 (90%)	120 (1%)	30 (0%)	0 (0%)	0 (0%)	34 (0%)	585 (4%)	749 (5%)	18 (0%)

Fiscal year	Non-homeland security						Homeland security				
160-foot/100-foot/75-foot inland construction tenders											
	SAR	MS	ATON	Ice ops	MEP	LMR	Drug	Other LE	Migrant	PWCS	Defense
2001	19 (0%)	1 (0%)	12,929 (99%)	0 (0%)	3 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	165 (1%)	5 (0%)
2002	4 (0%)	0 (0%)	13,430 (90%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	9 (0%)	1,403 (9%)	73 (0%)
2003	2 (0%)	119 (1%)	13,896 (92%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	97 (1%)	1,034 (7%)	8 (0%)
2004	5 (0%)	41 (0%)	13,510 (90%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	1,368 (9%)	11 (0%)
2005	1 (0%)	0 (0%)	17,272 (93%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	1,296 (7%)	12 (0%)
140-foot icebreaking tugs											
	SAR	MS	ATON	Ice ops	MEP	LMR	Drug	Other LE	Migrant	PWCS	Defense
2001	52 (1%)	57 (1%)	2,031 (28%)	4,064 (55%)	0 (0%)	316 (4%)	13 (0%)	47 (1%)	0 (0%)	681 (9%)	121 (2%)
2002	93 (2%)	166 (3%)	1,071 (19%)	1,174 (21%)	0 (0%)	33 (1%)	0 (0%)	158 (3%)	12 (0%)	2,849 (50%)	89 (2%)
2003	273 (2%)	158 (1%)	952 (9%)	4,770 (43%)	0 (0%)	19 (0%)	0 (0%)	120 (1%)	0 (0%)	4,695 (42%)	72 (1%)
2004	84 (1%)	264 (2%)	1,081 (10%)	3,749 (35%)	0 (0%)	343 (3%)	84 (1%)	283 (3%)	0 (0%)	4,655 (44%)	93 (1%)
2005	159 (2%)	116 (1%)	732 (8%)	2,866 (30%)	0 (0%)	602 (6%)	133 (1%)	27 (0%)	7 (0%)	4,795 (51%)	22 (0%)
100-foot/65-foot inland buoy tenders											
	SAR	MS	ATON	Ice ops	MEP	LMR	Drug	Other LE	Migrant	PWCS	Defense
2001	22 (0%)	0 (0%)	4,735 (99%)	13 0%	3 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	1 (0%)
2002	5 (0%)	43 (1%)	3,234 (89%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	363 (10%)	7 (0%)
2003	57 (2%)	6 (0%)	3,336 (95%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	24 (1%)	0 (0%)	84 (2%)	0 (0%)
2004	4 (0%)	38 (2%)	2,250 (98%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
2005	7 (0%)	42 (2%)	2,364 (98%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)

Fiscal year	Non-homeland security						Homeland security				
75-foot river buoy tenders											
	SAR	MS	ATON	Ice ops	MEP	LMR	Drug	Other LE	Migrant	PWCS	Defense
2001	9 (0%)	0 (0%)	13,325 (99%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	78 (1%)
2002	31 (0%)	0 (0%)	14,406 (100%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	14 (0%)
2003	10 (0%)	1 (0%)	15,022 (99%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	70 (0%)	17 (0%)
2004	1 (0%)	0 (0%)	12,109 (100%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	17 (0%)
2005	4 (0%)	0 (0%)	12,448 (100%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	17 (0%)
65-foot river buoy tenders											
	SAR	MS	ATON	Ice ops	MEP	LMR	Drug	Other LE	Migrant	PWCS	Defense
2001	6 (0%)	0 (0%)	6,389 (99%)	2 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	27 (0%)	0 (0%)
2002	8 (0%)	0 (0%)	6,087 (100%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	6 (0%)	4 (0%)
2003	5 (0%)	0 (0%)	6,385 (99%)	9 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	10 (0%)	27 (0%)
2004	1 (0%)	14 (0%)	6,771 (100%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	8 (0%)	3 (0%)
2005	2 (0%)	0 (0%)	6,671 (100%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	4 (0%)
65-foot small harbor tugs											
	SAR	MS	ATON	Ice ops	MEP	LMR	Drug	Other LE	Migrant	PWCS	Defense
2001	95 (2%)	365 (6%)	1,372 (23%)	1,401 (24%)	188 (3%)	94 (2%)	2 (0%)	627 (11%)	0 (0%)	1,345 (23%)	369 (6%)
2002	77 (1%)	114 (2%)	1,558 (23%)	449 (7%)	2 (0%)	10 (0%)	0 (0%)	721 (11%)	0 (0%)	3,795 (56%)	83 (1%)
2003	80 (1%)	17 (0%)	962 (11%)	2,269 (26%)	1 (0%)	0 (0%)	0 (0%)	800 (9%)	0 (0%)	4,695 (53%)	28 (0%)
2004	62 (1%)	64 (1%)	755 (12%)	1,586 (25%)	0 (0%)	13 (0%)	0 (0%)	978 (16%)	0 (0%)	2,823 (45%)	22 (0%)
2005	26 (0%)	598 (10%)	1,254 (21%)	1,092 (18%)	376 (6%)	260 (4%)	179 (3%)	0 (0%)	0 (0%)	2,043 (34%)	162 (3%)

Fiscal year	Non-homeland security						Homeland security				
64-foot aids-to-navigation boats											
	SAR	MS	ATON	Ice ops	MEP	LMR	Drug	Other LE	Migrant	PWCS	Defense
2001	0 (0%)	0 (0%)	1,216 (100%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
2002	0 (0%)	0 (0%)	635 (100%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
2003	0 (0%)	0 (0%)	747 (100%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
2004	0 (0%)	0 (0%)	580 (100%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
2005	0 (0%)	0 (0%)	1,109 (100%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
63-foot aids-to-navigation boat											
	SAR	MS	ATON	Ice ops	MEP	LMR	Drug	Other LE	Migrant	PWCS	Defense
2001	0 (0%)	0 (0%)	199 (100%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
2002	7 (6%)	4 (4%)	98 (90%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
2003	0 (0%)	0 (0%)	179 (100%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
2004	0 (0%)	0 (0%)	195 (100%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
2005	0 (0%)	0 (0%)	197 (100%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
55-foot aids-to-navigation boats											
	SAR	MS	ATON	Ice ops	MEP	LMR	Drug	Other LE	Migrant	PWCS	Defense
2001	100 (2%)	17 (0%)	4,182 (94%)	0 (0%)	12 (0%)	53 (1%)	12 (0%)	19 (0%)	0 (0%)	75 (2%)	2 (0%)
2002	155 (3%)	80 (2%)	3,985 (87%)	0 (0%)	0 (0%)	35 (1%)	0 (0%)	24 (1%)	0 (0%)	301 (7%)	0 (0%)
2003	45 (1%)	0 (0%)	3,820 (74%)	0 (0%)	9 (0%)	20 (0%)	0 (0%)	320 (6%)	0 (0%)	970 (19%)	13 (0%)
2004	45 (1%)	5 (0%)	3,643 (91%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	211 (5%)	0 (0%)	89 (2%)	3 (0%)
2005	196 (4%)	0 (0%)	4,338 (92%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	80 (2%)	86 (2%)	0 (0%)

Fiscal year	Non-homeland security						Homeland security				
49-foot stern loading buoy boats											
	SAR	MS	ATON	Ice ops	MEP	LMR	Drug	Other LE	Migrant	PWCS	Defense
2001	23 (0%)	0 (0%)	9,477 (87%)	8 (0%)	0 (0%)	0 (0%)	4 (0%)	17 (0%)	0 (0%)	1,373 (13%)	0 (0%)
2002	18 (0%)	14 (0%)	6,863 (91%)	3 (0%)	0 (0%)	0 (0%)	0 (0%)	30 (0%)	0 (0%)	638 (8%)	0 (0%)
2003	5 (0%)	8 (0%)	8,079 (89%)	11 (0%)	0 (0%)	0 (0%)	0 (0%)	14 (0%)	0 (0%)	852 (9%)	94 (1%)
2004	7 (0%)	0 (0%)	7,883 (96%)	26 (0%)	0 (0%)	0 (0%)	0 (0%)	18 (0%)	0 (0%)	283 (3%)	31 (0%)
2005	18 (0%)	0 (0%)	6,588 (96%)	19 (0%)	9 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	233 (3%)	0 (0%)
45-foot buoy boats											
	SAR	MS	ATON	Ice ops	MEP	LMR	Drug	Other LE	Migrant	PWCS	Defense
2001	0 (0%)	0 (0%)	1,024 (100%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
2002	0 (0%)	0 (0%)	494 (100%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
2003	0 (0%)	0 (0%)	248 (100%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
2004	0 (0%)	0 (0%)	373 (100%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
2005	0 (0%)	0 (0%)	526 (100%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
21-foot trailerable aids-to-navigation boats											
	SAR	MS	ATON	Ice ops	MEP	LMR	Drug	Other LE	Migrant	PWCS	Defense
2001	48 (0%)	9 (0%)	25,429 (98%)	0 (0%)	12 (0%)	1 (0%)	1 (0%)	64 (0%)	0 (0%)	401 (2%)	2 (0%)
2002	23 (0%)	2 (0%)	23,798 (97%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	79 (0%)	7 (0%)	590 (2%)	0 (0%)
2003	55 (0%)	4 (0%)	20,961 (96%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	29 (0%)	4 (0%)	687 (3%)	7 (0%)
2004	52 (0%)	12 (0%)	22,616 (94%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	62 (0%)	0 (0%)	1347 (6%)	7 (0%)
2005	89 (0%)	0 (0%)	20,105 (97%)	0 (0%)	5 (0%)	0 (0%)	26 (0%)	0 (0%)	0 (0%)	407 (2%)	0 (0%)

Source: GAO analysis of Coast Guard data.

Notes: Due to rounding, percentages may not add to 100 percent for each fiscal year.

The Coast Guard's mission categories are as follows:
SAR: Search and Rescue
MS: Marine Safety
ATON: Aids-to-Navigation
Ice ops: Ice operations such as domestic icebreaking
MEP: Marine Environmental Protection
LMR: Living Marine Resources
Drug: Illegal Drug Interdiction
Migrant: Migrant Interdiction
Other LE: Foreign Fisheries Enforcement
PWCS: Ports, Waterways, and Coastal Security
Defense: Defense Readiness

Appendix III: Condition Measure of ATON and Domestic Icebreaking Assets, Fiscal Years 2000 to 2005

Condition Measure for ATON and Domestic Icebreaking Cutters

Appendix III provides information on the condition of the Coast Guard's ATON and domestic icebreaking assets. The Coast Guard's key summary measure of condition—percent of time free (POTF)—of major casualties shows a mixed picture of condition for ATON and domestic icebreaking cutters. However, the measure captures only major equipment casualties, which degrade mission capabilities but does not capture minor equipment casualties that may also degrade mission capabilities. As such, this measure may underestimate the decline in asset condition. The Coast Guard has acknowledged the limitations of this measure and is working on a replacement for it. Because the Coast Guard is in the process of developing a new condition metric and did not have fiscal year 2005 data available, our analysis covers fiscal years 2000 through 2004. See table 9 for individual POTF figures for the ATON and domestic icebreaking cutter assets for fiscal years 2000 through 2004.

Table 9: Percent of Time Free of Major Casualties for ATON and Domestic Icebreaking Cutters, Fiscal Years 2000 through 2004

Fiscal year	POTF
225-foot seagoing buoy tenders	
2000	100
2001	16
2002	49
2003	80
2004	55
175-foot coastal buoy tenders	
2000	86
2001	78
2002	64
2003	66
2004	65
160-foot/100-foot/75-foot inland construction tenders	
2000	86
2001	53
2002	67
2003	52
2004	59

Fiscal year	POTF
140-foot icebreaking tugs	
2000	69
2001	50
2002	67
2003	45
2004	47
100-foot/65-foot inland buoy tenders	
2000	97
2001	97
2002	91
2003	87
2004	69
75-foot river buoy tenders	
2000	92
2001	86
2002	77
2003	83
2004	71
65-foot river buoy tenders	
2000	100
2001	71
2002	75
2003	90
2004	89
65-foot small harbor tugs	
2000	89
2001	70
2002	83
2003	76
2004	82

Source: U.S. Coast Guard.

Condition Measure for ATON Boats

The Coast Guard has less data for ATON boats, with POTF figures available for only fiscal year 2005. Based on these figures most boats appear to be in fair to poor condition. In addition to these figures, the Coast Guard has performed an internal assessment of condition using two approaches, one for standard and another for nonstandard boats. For standard boats the Coast Guard assessed condition through a process referred to as ship structure and machinery evaluation boards (SSMEB). While, for nonstandard boats the Coast Guard assessed condition by obtaining anecdotal evidence from district managers, maintenance managers, annual boat inspection reports, and site visits. This internal assessment, however, seems to further support our original finding that the Coast Guard's POTF figure may be underestimating condition. As you will see in table 10 below, while the 45-foot buoy boat and 21-foot trailerable aids-to-navigation boat had POTF percentages above 90 percent, their internal assessment of condition was rated at poor.

Table 10: Condition of ATON Boats as Evidenced by POTF and Internal Coast Guard Assessment

Asset	POTF for FY 2005	Coast Guard assessment of condition
Standard boats		
55-foot aids-to-navigation boat	90.1%	Fair
49-foot buoy stern loading boat	88.1%	Good
Nonstandard boats		
64-foot aids-to-navigation boat	88.6%	Good
63-foot aids-to-navigation boat	79.5%	Fair
45-foot buoy boat	97.1%	Poor
21-foot trailerable aids-to-navigation boat	90.7%	Poor

Source: U.S. Coast Guard.

Appendix IV: Maintenance Trends of ATON Cutter and Domestic Icebreaking Assets, Fiscal Years 2001 to 2005

Maintenance Trends

Appendix IV provides information on the maintenance costs spent on the Coast Guard's ATON cutter and domestic icebreaking assets during fiscal years 2001 to 2005. Maintenance cost data for domestic icebreakers and ATON cutters shows a consistent increasing trend. The cost figures are broken out by scheduled (planned maintenance), unscheduled (unforeseen maintenance), and Engineering Logistic Center (ELC) (fleetwide projects that require engineering assistance) amounts, which allow for a more specific analysis as to the type of increase being incurred. Table 11 shows the individual maintenance cost data, adjusted for inflation using 2005 dollars, for ATON cutters and domestic icebreakers for fiscal years 2001 through 2005.

Table 11: Maintenance Costs for ATON Cutters and Domestic Icebreakers, Fiscal Years 2001 through 2005

Cutter Type	Fiscal year	Unscheduled cost	Scheduled cost	ELC cost	Total (scheduled, unscheduled, ELC) cost
225-foot seagoing buoy tenders	2001	$197,500	$2,300,492	$1,057,645	$3,555,637
	2002	605,637	3,372,110	2,868,107	6,845,853
	2003	798,994	5,167,818	1,625,370	7,592,182
	2004	914,750	5,703,552	2,946,798	9,565,099
	2005	4,313,387	6,715,405	2,631,631	13,660,422
175-foot coastal buoy tenders	2001	246,665	3,288,053	294,868	3,829,585
	2002	316,694	7,054,995	821,725	8,193,414
	2003	806,494	7,490,459	674,800	8,971,752
	2004	591,828	5,141,464	495,708	6,229,000
	2005	555,245	2,672,709	1,014,257	4,242,210
160-foot/100-foot/75-foot inland construction tenders	2001	124,735	1,943,315	343,346	2,411,396
	2002	366,968	2,889,575	192,786	3,449,329
	2003	251,036	3,781,760	1,366,811	5,399,607
	2004	356,726	3,966,089	3,318,928	7,641,742
	2005	437,112	2,605,441	8,316,939	11,359,492
100-foot/65-foot inland buoy tenders	2001	39,425	554,900	9,970	604,295
	2002	14,219	595,933	6,391	616,543
	2003	35,661	813,977	94,620	944,258
	2004	94,856	1,168,921	17,748	1,281,525
	2005	81,453	177,082	63,294	321,828

Cutter Type	Fiscal year	Unscheduled cost	Scheduled cost	ELC cost	Total (scheduled, unscheduled, ELC) cost
140-foot icebreaking tugs	2001	343,902	1,885,671	192,131	2,421,703
	2002	190,010	2,789,443	206,031	3,185,483
	2003	225,959	1,748,739	850,783	2,825,481
	2004	344,080	2,954,156	1,245,042	4,543,277
	2005	449,911	3,339,509	1,258,332	5,047,752
75-foot river buoy tenders	2001	102,701	2,587,246	0	2,689,947
	2002	308,977	1,808,732	0	2,117,709
	2003	141,748	1,309,262	0	1,451,010
	2004	259,143	1,591,882	6,870	1,857,895
	2005	355,520	2,122,927	50,251	2,528,697
65-foot river buoy tenders	2001	77,169	387,648	0	464,816
	2002	81,662	2,140,323	3,031	2,225,017
	2003	80,862	1,449,003	30,480	1,560,344
	2004	127,692	904,538	0	1,032,230
	2005	55,117	343,930	69,701	468,748
65-foot small harbor tugs	2001	100,009	724,359	46,244	870,612
	2002	36,852	1,086,856	95,173	1,218,882
	2003	81,196	1,056,155	136,783	1,274,133
	2004	125,441	1,098,967	83,688	1,308,096
	2005	110,001	1,136,472	9,919	1,256,392

Source: GAO analysis of Coast Guard data.

Note: The numbers presented in this table have been adjusted for inflation using 2005 dollars.

Appendix V: GAO Contact and Staff Acknowledgments

GAO Contact

Stephen L. Caldwell, Acting Director, Homeland Security and Justice Issues, (202) 512-9610, or CaldwellS@gao.gov.

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