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Report to Congressional Requesters

July 2005

COAST GUARD

Progress Being Made on Addressing Deepwater Legacy Asset Condition Issues and Program Management, but Acquisition Challenges Remain

GAO-05-757

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GAO Accountability·Integrity·Reliability

Highlights

Highlights of GAO-05-757, a report to congressional requesters

Why GAO Did This Study

The Coast Guard has been asserting that its deepwater legacy assets are "failing at an unsustainable rate." After the events of September 11, 2001, the Coast Guard's deepwater missions expanded to include a greater emphasis on ports, waterways, and coastal security. These heightened responsibilities required changes to the Deepwater implementation plan to provide the assets with greater operational capabilities. To address these needs, in 2002, the Coast Guard began a multiyear acquisition program to replace or modernize its deepwater assets that is currently estimated to cost $19 to $24 billion. More recently, it began studying options for replacing or modernizing the assets more rapidly in an effort to avoid some of the costs that might be involved in keeping aging assets running for longer periods.

This report addresses three questions related to this effort: (1) How has the condition of the Coast Guard's deepwater legacy assets changed during fiscal years 2000 through 2004? (2) What actions has the Coast Guard taken to maintain, upgrade, and better manage its deepwater legacy assets? and (3) What are the management challenges the Coast Guard faces in acquiring new assets, especially if a more aggressive acquisition schedule is adopted?

www.gao.gov/cgi-bin/getrpt?GAO-05-757.

To view the full product, including the scope and methodology, click on the link above. For more information, contact Margaret Wrightson at (415) 904-2200 or wrightsonm@gao.gov.

What GAO Found

Available Coast Guard condition measures indicate that the condition of most Coast Guard legacy aircraft and cutters generally declined during fiscal years 2000-2004, but these measures are inadequate to capture the full extent of the decline in the condition with any precision. GAO's field visits and interviews with Coast Guard staff, as well as reviews of other evidence, showed significant problems in a variety of asset systems and equipment that are not currently captured in the Coast Guard's condition measures.

The Coast Guard has already taken actions to help keep its deepwater legacy assets operational. For example, to help meet mission requirements, Coast Guard staff are performing more extensive maintenance between deployments, but even so, aircraft and cutters continue to lose mission capabilities. Responding to these continued concerns, as well as to matters raised during this review and in prior GAO reports, the Coast Guard has begun to explore additional strategies and approaches to better determine and improve the mission capabilities of its legacy assets. These actions include (1) developing a more proactive approach for prioritizing maintenance and capability enhancement projects needed on its legacy assets; (2) developing measures that more clearly demonstrate the extent to which assets' conditions affect mission capabilities; and (3) for one command, proposing a new strategy to sustain one of its oldest classes of cutters. These ongoing efforts, while promising, are too new to allow GAO to assess whether they will allow the Coast Guard to better determine and improve the mission capabilities of its legacy assets.

If the Coast Guard adopts a more aggressive acquisition schedule, it will likely continue to face a number of challenges to effectively manage the Deepwater program. GAO has warned that the Coast Guard's acquisition strategy of relying on a prime contractor ("system integrator") to identify and deliver the assets needed carries substantial risks. GAO found that well into the contract's second year, key components for managing the program and overseeing the system integrator's performance had not been effectively implemented. While the Coast Guard has been addressing these problems—for example, putting more emphasis on competition as a means to control costs—many areas have not been fully addressed. A more aggressive acquisition schedule would only heighten the risks.

Two Coast Guard Deepwater Legacy Assets in Action

Pictured at left is a 270-foot medium-endurance cutter and an HH-65 helicopter.

Source: Photo courtesy of the U.S. Coast Guard.

Contents

Abbreviations

AC&I	acquisition, capital, and investment
CAMS	Capital Asset Management Strategy
DHS	Department of Homeland Security
FRAM	Fleet Rehabilitation and Modernization
HSP	Hull Sustainment Project
ICGS	Integrated Coast Guard Systems
IDS	Integrated Deepwater System
IPT	integrated product team
MCH	multimission cutter helicopter
MEP	Mission Effectiveness Project
POTF	percent of time free
SINTSS	Systems Integrated Near Term Support Strategy

GAO
Accountability * Integrity * Reliability

United States Government Accountability Office
Washington, DC 20548

July 22, 2005

The Honorable Don Young
Chairman, Committee on Transportation and Infrastructure
House of Representatives

The Honorable Frank A. LoBiondo
Chairman, Coast Guard and Maritime Transportation Subcommittee
House of Representatives

The Honorable Olympia J. Snowe
Chair
The Honorable Maria Cantwell
Ranking Minority Member
Subcommittee on Fisheries and the Coast Guard
United States Senate

The Coast Guard's Integrated Deepwater System (or Deepwater) acquisition program has experienced several changes since its inception in 2002. The Deepwater program is intended to be a long-term (20-year) replacement or modernization of certain legacy assets,[1] many of which are at or approaching the end of their estimated service lives. As originally conceived, Deepwater was designed around producing aircraft and cutters that would function in the Coast Guard's traditional at-sea roles, such as interdicting illicit drug shipments or rescuing mariners from difficulty at sea. The events of September 11, 2001, changed all of that. Suddenly, the missions for these assets expanded to include a greater emphasis on ports, waterways, and coastal security. These heightened responsibilities forced the Coast Guard to revise its Deepwater implementation plan to provide the replacement assets with greater operational capabilities. Further change has come more recently with the Coast Guard asserting that its deepwater legacy assets are "failing at an unsustainable rate" and examining options for accelerating their replacement, thereby avoiding

[1]For purposes of this report, we use the term "legacy assets" to refer to the existing fleet of deepwater aircraft and cutters. These legacy assets include the HC-130 (H models only), HU-25, HH-60, and HH-65 aircraft and the 378-foot high-endurance cutters, the 210-foot and 270-foot medium-endurance cutters, and the 110-foot and 123-foot patrol boats. We did not include the 213-foot *Acushnet*, the 230-foot *Storis*, or the 282-foot *Alex Haley* as part of our analyses of the deepwater legacy assets because they are one-of-a-kind cutters.

some of the costs that might be involved in upgrading these assets sufficiently to keep them running for longer periods.

These changes have created some uncertainty about how the Deepwater program is developing. In its fiscal year 2006 budget request, the Administration is requesting $966 million for the Deepwater program—$242 million more than Congress appropriated for the program for fiscal year 2005. Part of this request ($239.5 million) is for maintenance and upgrades to some deepwater legacy assets, a majority of which are scheduled to be part of the Deepwater solution. The fiscal year 2005 Department of Homeland Security (DHS) Appropriations Act[2] required the Secretary of Homeland Security to submit a revised Deepwater implementation plan in conjunction with its fiscal year 2006 budget request. However, with respect to pending fiscal year 2006 appropriations, the House Appropriations Committee considered the Coast Guard's implementation plan submission to be incomplete and recommended reducing the Coast Guard's fiscal year 2006 Deepwater budget request of $966 million by nearly 50 percent.[3] In late May 2005, the Coast Guard submitted further documentation to the committee in an effort to comply with the act's requirements. In June 2005, the Senate Appropriations Committee expressed concern about the lack of information concerning the Deepwater plan in the fiscal year 2006 budget request but recommended funding of $905.6 million for the program for fiscal year 2006.[4] As of early July 2005, the Coast Guard's fiscal year 2006 appropriation was still pending.

This report, which focuses on the condition of deepwater legacy assets and the Coast Guard's acquisition and management challenges, is aimed at providing information about some of these issues. We presented our preliminary observations on these matters in recent testimony.[5] This report adds further details on the condition of the assets, as well as updated information on Coast Guard initiatives to better sustain these

[2]Pub. L. No. 108-334, 118 Stat. 1298, 1306 (2004).

[3]H.R. Rep. No. 109-79, at 63 (2005).

[4]S. Rep. No. 109-83, at 60 (2005).

[5]GAO, *Coast Guard: Preliminary Observations on the Condition of Deepwater Legacy Assets and Acquisition Management Challenges*, GAO-05-307T (Washington, D.C.: April 20, 2005); and GAO, *Coast Guard: Preliminary Observations on the Condition of Deepwater Legacy Assets and Acquisition Management Challenges*, GAO-05-651T (Washington, D.C.: June 21, 2005).

assets until they are replaced or upgraded. Specifically, our report addresses three issues related to these considerations:

- How has the condition of the Coast Guard's deepwater legacy assets changed during fiscal years 2000 through 2004?
- What actions has the Coast Guard taken to maintain, upgrade, and better manage its deepwater legacy assets?
- What are the management challenges the Coast Guard faces in acquiring new assets, especially if a more aggressive acquisition schedule is adopted?

To address these objectives, we analyzed data and condition measures used by the Coast Guard for determining deepwater legacy assets' condition,[6] reviewed Coast Guard actions to maintain and upgrade legacy assets and their systems,[7] and met with operations and maintenance staff at U.S. Coast Guard headquarters and other Coast Guard facilities selected to provide coverage of each type of deepwater legacy aircraft and each class of deepwater legacy cutter. In addition, we met with Deepwater program staff, performance monitors, and contractor staff and reviewed documentation to verify the improvements the Coast Guard is making in its management of the Deepwater acquisition. We conducted our work between July 2004 and June 2005 in accordance with generally accepted governmental auditing standards. Appendix I describes our objectives, scope, and methodology in greater detail.

[6]In assessing the condition of deepwater aircraft and cutters for this report, we analyzed what Coast Guard officials told us were the best available condition measures. For deepwater aircraft, we reviewed the availability index (percentage of time aircraft were available to complete missions), cost per flight hour, labor hours per flight hour, programmed flight hours per year, scheduled versus unscheduled maintenance expenditures, and estimated deferred maintenance. For cutters, we reviewed the number of major casualties, the percent of time free of major casualties, scheduled versus unscheduled maintenance, and estimated deferred maintenance. To assess the reliability of the Coast Guard's data and condition measures, we questioned knowledgeable officials and reviewed existing documentation about the data and the systems that produced the data. We determined that the data were sufficiently reliable for the purposes of this report.

[7]For purposes of this report, we use the term "systems" to include all the electrical, mechanical, heating, ventilation, and air conditioning, and other systems on the deepwater assets.

Results in Brief

Coast Guard condition measures show that the condition of most deepwater legacy assets generally declined between fiscal years 2000 and 2004, but the Coast Guard's available condition measures are inadequate to capture the full extent of the decline in the condition of deepwater assets with any degree of precision. While there is no systematic, quantitative evidence sufficient to demonstrate that deepwater legacy assets are "failing at an unsustainable rate" as the Coast Guard has asserted, this does not mean that the assets are able to perform their missions safely, reliably, and at levels that meet or exceed Coast Guard standards. Evidence we gathered in ways other than reviewing condition measures, such as interviewing Coast Guard operations and maintenance staff, showed significant problems in a variety of the assets' systems and equipment that will need to be addressed if the assets are to continue performing their missions at or near current levels until replacement assets become operational. These problems are not necessarily reflected in the condition measures. For example, the Coast Guard's HH-65 helicopter consistently exceeded the Coast Guard's primary condition measure during fiscal years 2000 through 2004, yet its engines are being replaced because of safety and reliability concerns.

The Coast Guard has taken actions to keep its legacy assets operational. These include developing a compendium of information to identify the maintenance and upgrade projects needed to keep legacy assets operational and performing increasingly more maintenance on the legacy assets than it has in the past—for example, spending additional time on maintenance when cutters are in port between deployments. These additional maintenance efforts are likely helping to prevent a more rapid decline in the condition of these assets, but even with the additional maintenance, the legacy aircraft and cutters are still losing mission capabilities because of equipment and system failures. Responding to these continued concerns, as well as to matters raised during this review and in our prior reports, the Coast Guard has begun to explore additional strategies and approaches to better determine and improve the mission capabilities of its legacy assets. First, in an effort to implement our 2002 recommendation for developing a longer-term strategy for linking mission performance to measurable outputs and goals, the Coast Guard is developing a more proactive approach for prioritizing maintenance and capability enhancement projects needed on its legacy assets to increase mission capabilities. Second, after we informed the Coast Guard of our concern that existing measures of the condition of its assets were not adequate to demonstrate the extent of the assets' decline, the Coast Guard began to develop measures that more clearly demonstrate the extent to which assets' conditions impact mission capabilities. Finally, the Coast

Guard's Pacific Area Command, which is heavily dependent on the deteriorating 378-foot cutters for certain missions, is attempting to use new strategies to help sustain the operation of these cutters through 2016, when they are currently scheduled to be replaced with newer cutters. These ongoing efforts, while promising, are too new to allow us to assess whether they will allow the Coast Guard to better determine and improve the mission capabilities of its legacy assets.

The Coast Guard's fiscal year 2006 budget request of $966 million for the Deepwater program reflects significant revisions to the program's requirements, capabilities, and schedule in light of the homeland security mission. However, if a more aggressive acquisition schedule is adopted, the Coast Guard will likely continue to face a number of management challenges that have already affected its ability to effectively administer the Deepwater program. From the outset, we have expressed concern about the risks involved with the Coast Guard's acquisition strategy, which involves relying on a prime contractor (or "system integrator") to identify the assets needed, using tiers of subcontractors to design and build the actual assets. In 2004 we reported that well into the contract's second year, key components needed to manage the program and oversee the system integrator's performance had not been effectively implemented. We made 12 recommendations in the areas of program management, contractor accountability, and cost control through competition. While the Coast Guard agreed with nearly all of these recommendations and has initiated actions to address these problems, we remain concerned that the Deepwater program still carries major risks. While the Coast Guard has fully addressed 3 of the recommendations, the remaining recommendations have not been fully addressed. Recent information shows continued challenges in the areas of overall system integration, cost and schedule management, and integrated product teams, which consist of contractor and government personnel and are the Coast Guard's principal tool for managing the Deepwater program. The uncertainties associated with the proposed revisions to the Deepwater program only heighten these risks.

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

Background

As the lead federal agency for maritime homeland security within the Department of Homeland Security, the Coast Guard is responsible for

homeland and nonhomeland security missions, including ensuring security in ports and waterways and along coastlines, conducting search and rescue missions, interdicting drug shipments and illegal aliens, enforcing fisheries laws, and responding to reports of pollution. The deepwater fleet, which consists of 186 aircraft and 88 cutters of various sizes and capabilities, plays a critical role in all of these missions. As shown in table 1, the fleet includes fixed-wing aircraft, helicopters, and cutters of varying lengths.

Table 1: Deepwater Legacy Aircraft and Cutter Fleet, as of early June 2005

Deepwater asset	Number	Description	Photograph
Aircraft			
HC-130 (long-range surveillance airplane)	27	This is the largest aircraft in the Coast Guard's fleet. It has a planned crew size of 7, a maximum speed of 290 knots, and an operating range of 2,600 nautical miles. The original estimated service life of the HC-130 was 30 years or 40,000 flight hours.[a] The in-service fleet average age for the Coast Guard's HC-130H aircraft is 22.3 years.	
HU-25 (medium-range surveillance airplane)	23	This is the fastest aircraft in the Coast Guard's fleet. It has a planned crew size of 5, a maximum speed of 410 knots, and an operating range of 2,045 nautical miles. The original estimated service life of the HU-25 was 20 years or 20,000 flights or 30,000 flight hours.[a] The in-service fleet average age for the Coast Guard's HU-25 aircraft is 22.4 years.	
HH-60 (medium-range recovery helicopter)	41	This helicopter has a planned crew size of 4, a maximum speed of 160 knots, and a maximum range of 700 nautical miles. It is capable of flying 300 miles offshore, remaining on scene for 45 minutes, hoisting 6 people on board, and returning to its point of origin. The original estimated service life of the HH-60 was approximately 20 years or 10,000 flight hours.[a] The in-service fleet average age for the Coast Guard's HH-60 helicopters is 12.9 years.	
HH-65 (short-range recovery helicopter)	95	This helicopter has a planned crew size of 3, a maximum speed of 165 knots, a maximum range of 400 nautical miles, and a maximum endurance of 3.5 hours. It is capable of flying 150 miles offshore. The original estimated service life of the HH-65 was 20 years.[a] The in-service fleet average age for the Coast Guard's HH-65 helicopters is 18.0 years.	
Cutters			
378-foot high-endurance cutter	12	This is the largest cutter in the Coast Guard's deepwater fleet. It has a planned crew size of 167, a maximum speed of 29 knots, and a cruising range of 14,000 nautical miles. It can support helicopter operations. The estimated service life of the 378-foot cutter is about 40 years. The average age of the Coast Guard's 378-foot cutters is 36.3 years.	
270-foot medium-endurance cutter	13	This cutter has a planned crew size of 98, a maximum speed of 19.5 knots, and a cruising range of 10,250 nautical miles. It can support helicopter operations. The estimated service life of the 270-foot cutter is 30 years. The average age of the Coast Guard's 270-foot cutters is 18.0 years.	
210-foot medium-endurance cutter	14	This cutter has a planned crew size of 75, a maximum speed of 18 knots, and a cruising range of 6,100 nautical miles. It can support short-range recovery helicopter operations. The estimated service life of the 210-foot cutter is from 43 to 49 years. The average age of the Coast Guard's 210-foot cutters is 38.3 years.	
110-foot and 123-foot patrol boats	49	The patrol boats have a planned crew size of 16 and a maximum speed of 29.5 knots. The 110-foot patrol boat has a cruising range of between 3,300 and 3,500 nautical miles, and the 123-foot patrol boat has a cruising range of 3,180 nautical miles, depending on the class of the patrol boat. The estimated service life of the patrol boats is from 14 to 20 years. The average age of the Coast Guard's patrol boats is 16.4 years.	

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

[a] Because of scheduled depot-level maintenance and upgrades that the deepwater aircraft have received or will receive, the service lives can be extended beyond the original estimated service lives. For the HH-65 helicopter, a Coast Guard aviation official told us that the aircraft had no original estimated service life in terms of flight hours, but rather can continue to be operated as long as the structure of the aircraft is sound.

Some Coast Guard deepwater cutters were built in the 1960s. Notwithstanding extensive overhauls and other upgrades, a number of the cutters are nearing the end of their estimated service lives. Similarly, while a number of the deepwater legacy aircraft have received upgrades in

engines, operating systems, and sensor equipment since they were originally built, they too have limitations in their operating capabilities.

In 1996, the Coast Guard began developing what came to be known as the Integrated Deepwater System (IDS) acquisition program as its major effort to replace or modernize these aircraft and cutters. This Deepwater program is designed to replace some assets—such as deteriorating cutters—with new cutters and upgrade other assets—such as some types of helicopters—so they can meet new performance requirements.[8]

The Deepwater program represents a unique approach to a major acquisition in that the Coast Guard is relying on a prime contractor—the system integrator—to identify and deliver the assets needed to meet a set of mission requirements the Coast Guard has specified.[9] In 2002, the Coast Guard awarded a contract to Integrated Coast Guard Systems (ICGS) as the system integrator for the Deepwater program. ICGS has two main subcontractors—Lockheed Martin and Northrop Grumman—that in turn contract with other subcontractors. Rather than using the traditional approach of replacing classes of ships or aircraft through a series of individual acquisitions, the Coast Guard chose to employ a "system of systems" acquisition strategy that would replace its deteriorating deepwater assets with a single, integrated package of new or modernized assets. This system-of-systems approach is designed to provide an improved, integrated system of aircraft, cutters, and unmanned aerial vehicles to be linked effectively through systems that provide command, control, communications, computer, intelligence, surveillance, reconnaissance, and supporting logistics. The Deepwater program's three overarching goals are to maximize operational effectiveness, minimize total ownership cost,[10] and satisfy the customer—the operational

[8]Current plans call for the Coast Guard to replace all of its deepwater legacy cutters and patrol boats, beginning with the 378-foot cutters. The Coast Guard also plans to replace the HU-25 aircraft, but it will upgrade the existing HC-130 aircraft and HH-60 and HH-65 helicopters to extend their service lives.

[9]The mission requirements include such things as the ability to (1) respond to 90 percent of all distress incidents within 2 hours; (2) detect and track targets of any material such that the probability of detection is at least 90 percent for small targets, such as a person in the water or a single-engine civil aircraft; and (3) respond to National Emergency Response Operations within 48 hours.

[10]Total ownership cost is the sum of all costs associated with the research, development, procurement, personnel, training, operation, logistical support, and disposal of the entire Deepwater system.

commanders, aircraft pilots, cutter crews, maintenance personnel, and others who will use the assets.

The revised Deepwater schedule calls for acquisition of new assets under the Coast Guard's Deepwater program to occur over an approximately 20-year period at an estimated cost of $19 billion to $24 billion.[11] By 2007, for example, the Coast Guard is to receive the first 418-foot National Security Cutter, which will have the capability to conduct military missions related to homeland security. Current plans call for 6 to 8 of these cutters to replace the 12 existing 378-foot cutters. However, in order to carry out its mission effectively, the Coast Guard will also need to keep all of the legacy assets operational until they can be replaced or upgraded.

We have been reviewing the Deepwater program for several years, pointing out difficulties and expressing concern over a number of facets of the program. In our 2001 report, we identified several areas of risk for Deepwater.[12] First, the Coast Guard faced potential risk in the overall management and day-to-day administration of the contract. At the time, we reported on the major challenges such as developing and implementing plans for establishing effective human capital practices, having key management and oversight processes and procedures in place, and tracking data to measure system integrator performance. In addition, we expressed concerns about the potential lack of competition during the program's later years and the reliance on a single system integrator for procuring the Deepwater assets. We also reported there was little evidence that the Coast Guard had analyzed whether the approach carried any inherent risks for ensuring the best value to the government and, if so, what to do about them.

We reviewed the program again in 2004 and found many of the same concerns.[13] Specifically, we reported that key components needed to manage the program and oversee the system integrator's performance had

[11]The original Deepwater plan had an estimated cost of $17 billion.

[12]GAO, *Coast Guard: Progress Being Made on Deepwater Project, but Risks Remain*, GAO-01-564 (Washington, D.C.: May 2, 2001).

[13]GAO, *Coast Guard: Deepwater Program Acquisition Schedule Update Needed*, GAO-04-695 (Washington, D.C.: June 14, 2004); GAO, *Coast Guard: Key Management and Budget Challenges for Fiscal Year 2005 and Beyond*, GAO-04-636T (Washington, D.C.: April 7, 2004); and GAO, *Contract Management: Coast Guard's Deepwater Program Needs Increased Attention to Management and Contractor Oversight*, GAO-04-380 (Washington, D.C.: March 9, 2004).

not been effectively implemented. The Coast Guard's primary tool for overseeing the system integrator, the integrated product teams (IPTs) were struggling to effectively collaborate and accomplish their missions because of changing membership, understaffing, insufficient training, and inadequate communication among members. Also, the Coast Guard had not adequately addressed the frequent turnover of personnel in the program and the transition from existing assets to those assets that will be part of the Deepwater program moving forward. Further, the Coast Guard's assessment of the system integrator's performance in the first year of the contract lacked rigor, and the factors that formed the basis for the award fee determination were supported only by subjective performance monitor comments and not by quantifiable measures. This resulted in the system integrator receiving a high performance rating and an award fee of $4.0 million out of a maximum of $4.6 million despite documented problems in schedule, performance, cost controls, and contract administration.

At the time of our March 2004 report,[14] the Coast Guard had begun to develop models to measure the extent to which Deepwater was achieving operational effectiveness and reduced total ownership cost, but it had not made a decision as to which specific suite of models would be used. Further, Coast Guard officials were not able to project a time frame for when the Coast Guard would be able to hold the contractor accountable for progress toward the goals of maximizing operational effectiveness, minimizing total ownership cost, and customer satisfaction. Furthermore, the Coast Guard had not measured the extent of competition among suppliers of Deepwater assets or held the system integrator accountable for taking steps to achieve competition. The Coast Guard's lack of progress on these issues has contributed to our concerns about the Coast Guard's ability to rely on competition as a means to control future programmatic costs.

Finally, we found that the Coast Guard had not updated the Deepwater integrated acquisition schedule despite numerous changes, making it difficult to determine the degree to which the program was on track with its original plan. In response to these concerns, we made a number of recommendations to improve Deepwater management and oversight of the system integrator. The Coast Guard welcomed our observations and

[14] GAO-04-380.

concurred with our recommendations and has begun to take actions to address them.

Legacy Assets Show Declining Condition, but Measures Are Imprecise and Fail to Capture Impact on Mission Capabilities

Coast Guard condition measures show that the condition of most deepwater legacy assets generally declined between 2000 and 2004, but the Coast Guard's available measures are inadequate to capture the full extent of the decline in the condition of deepwater assets with any degree of precision and are insufficient for determining the impact on mission capabilities. Further, other evidence we gathered, such as information from discussions with maintenance and operations personnel, points to conditions that may be more severe than the available measures indicate. The Coast Guard acknowledges that it needs better condition measures, but it has not yet finalized or implemented such measures. The Coast Guard anticipates having the new measures finalized by the end of 2005.

Coast Guard's Condition Measures Show General Decline in Condition of Deepwater Assets, with Some Fluctuations

During fiscal years 2000 through 2004, the Coast Guard's various condition measures showed a general decline, although there were year-to-year fluctuations (see table 2). For deepwater legacy aircraft, a key summary measure of the condition—the availability index (the percentage of time aircraft are available to perform their missions)—showed that except for the HU-25 medium-range surveillance aircraft, the assets continued to perform close to or above fleet availability standards over the 5-year period. In contrast, other condition measures for aircraft, such as cost per flight hour and labor hours per flight hour, generally reflected some deterioration. For cutters, a key summary measure of condition—percent of time free of major casualties[15]—fluctuated but generally remained well below target levels. The number of major casualties generally rose from fiscal years 2000 through 2003 and then dropped slightly in fiscal year 2004.[16] (Appendix II provides further details on condition measures for each of the deepwater legacy aircraft and cutters.)

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

[16]However, major casualties for the 378-foot high-endurance cutters continued to increase in 2004.

Table 2: Synopsis of Deepwater Legacy Assets' Condition

Deepwater legacy asset	Synopsis of general asset condition
HC-130 aircraft	The percentage of time the HC-130 fleet was available to perform missions nearly met or exceeded the Coast Guard's target level during fiscal years 2000 through 2003, but dropped below the target level in fiscal year 2004.
HU-25 aircraft	The percentage of time the HU-25 fleet was available to perform missions varied from year to year but was consistently below the Coast Guard's target level during fiscal years 2000 through 2004.
HH-60 aircraft	The percentage of time the HH-60 fleet was available to perform missions met or was just below the Coast Guard's target level during fiscal years 2000 though 2004.
HH-65 aircraft	The percentage of time the HH-65 fleet was available to perform missions consistently exceeded the Coast Guard's target level during fiscal years 2000 through 2004.
378-foot high-endurance cutters	The percentage of time the 378-foot cutter fleet has operated free of deficiencies in mission-essential equipment remained substantially below the Coast Guard's target level during fiscal years 2000 through 2004.
270-foot and 210-foot medium-endurance cutters	The percentage of time the 210-foot and 270-foot cutter fleets have operated free of deficiencies in mission-essential equipment was well below the Coast Guard's target level during fiscal years 2000 through 2004, but it showed slight improvement in fiscal year 2004.
110-foot and 123-foot patrol boats[a]	The percentage of time the patrol boat fleet has operated free of deficiencies in mission-essential equipment was below but near the Coast Guard's target level during fiscal years 2000 and 2001, but it declined in more recent years.

Source: GAO analysis of data provided by the U.S. Coast Guard.

[a] Data on the 123-foot patrol boats were not compiled until fiscal year 2004. That year's data were added to the 110-foot patrol boat data to arrive at totals for the patrol boat fleet.

Another, albeit less direct, measure of an asset's condition is deferred maintenance—the amount of scheduled maintenance on an asset that must be postponed in order to pay for unscheduled repairs. Such deferrals can occur when the Coast Guard does not have enough money to absorb unexpected maintenance expenditures and still perform all of its scheduled maintenance, thus creating a backlog. For example, in spring 2004, while on a counterdrug mission, the 210-foot cutter *Active* experienced problems in the condition of its flight deck that were to be corrected during its scheduled depot-level maintenance. However, because of a shortage of maintenance funds, the maintenance was deferred and the flight deck was not repaired. As a result, the cutter lost all shipboard helicopter capability, significantly degrading mission readiness.

As table 3 shows, deferred maintenance does not show a clear pattern across all classes of deepwater legacy assets. For the deepwater legacy aircraft, the overall amount of estimated deferred maintenance increased each year during fiscal years 2002 through 2004, from $12.3 million to about $24.6 million. However, most of the increase came for one type of

asset, the HH-60 helicopter, and the increase came mainly from deferring maintenance past the 48-month interval requirement—thereby increasing the scheduled maintenance workload—and not from having to divert money to deal with unscheduled maintenance. For the deepwater cutters, the amount of estimated deferred maintenance increased from fiscal year 2002 to 2003, but then it dropped significantly in fiscal year 2004. The decrease in fiscal year 2004 came mainly because the Coast Guard received supplemental funding allowing it to address both scheduled and unscheduled maintenance. Thus, the drop in the estimate of deferred maintenance costs for fiscal year 2004 is not necessarily an indicator that the condition of the legacy assets was improving; it could be the result of the Coast Guard having more money to address the maintenance needs.

Table 3: Estimated Costs for Deferred Maintenance of Deepwater Aircraft and Cutters, Fiscal Years 2002-2004

Deepwater legacy asset	Fiscal year 2002	Fiscal year 2003	Fiscal year 2004
HC-130	$4,691,000	$7,016,000	$5,737,000
HU-25	0	$201,000	0
HH-60	$7,630,000	$9,436,000	$18,824,000
HH-65	0	0	0
Subtotal for aircraft	**$12,321,000**	**$16,653,000**	**$24,561,000**
378-foot cutters	$2,556,000	$8,135,000	$3,000,000
270-foot cutters	$2,070,000	$870,000	0
210-foot cutters	$786,000	$1,137,000	0
110-foot patrol boats	$1,618,000	$1,961,000	$500,000
Subtotal for cutters	**$7,030,000**	**$12,103,000**	**$3,500,000**
Total for all deepwater assets	**$19,351,000**	**$28,756,000**	**$28,061,000**

Source: U.S. Coast Guard.

Note: The Coast Guard estimates the cost for aircraft deferred maintenance by multiplying a percentage of average depot maintenance costs by the number of aircraft overdue for depot maintenance overhauls, plus the annual cost for extension inspections each year. The Coast Guard generally does not track deferred maintenance costs by cutter class but compiled these data at GAO's request for fiscal years 2002 through 2004. The Coast Guard estimated the costs of only the planned cutter maintenance that had to be deferred to the following year and not the amount of maintenance that should have been conducted and was not funded.

Current Condition Measures Not Sufficiently Robust to Link Condition with Impact on Mission Capabilities

At the time we began our work, the Coast Guard's measures generated some limited information on the condition of its legacy assets, but the measures were not sufficiently robust to link the assets' declining condition to degradation in mission capabilities or performance. As a result, the picture that emerges regarding the condition of the deepwater legacy assets based on current Coast Guard condition measures should be viewed with some caution. While there is no systematic, quantitative

evidence sufficient to demonstrate that deepwater legacy assets are "failing at an unsustainable rate," as the Coast Guard has asserted, this does not mean the assets are in good condition or have been performing their missions safely, reliably, and at levels that meet or exceed Coast Guard standards. We identified two factors that need to be considered to put these condition measures into proper context.

The first factor deals with limitations in the measures themselves. Simply put, the Coast Guard's measures of asset condition do not fully capture the extent of the problems. As such, they may understate the decline in the legacy assets' condition. More specifically, the Coast Guard measures we assessed focus on events, such as equipment casualties or flight mishaps, but do not measure the extent to which these and other incidents degrade mission capabilities. The following is an example in which Coast Guard measures we assessed are not sufficiently robust to systematically capture degradation in mission capabilities:

- The 378-foot cutter *Jarvis* recently experienced a failure in one of its two main gas turbines shortly after embarking on a living marine resources and search and rescue mission. While *Jarvis* was able to accomplish its given mission, albeit at reduced speed, this casualty rendered the cutter unable to respond to any emergency request it might have received—but did not in this case—to undertake a mission requiring higher speeds, such as drug interdiction. The Coast Guard condition measures are not robust enough to capture these distinctions in mission capability.

The second factor that needs to be kept in mind is the compelling nature of the other evidence we gathered outside of the Coast Guard's condition measures. This evidence, gleaned from information collected during our site visits and discussions with maintenance personnel, indicated deteriorating and obsolete systems and equipment as a major cause of the reduction in mission capabilities for a number of deepwater legacy aircraft and cutters. Such problems, however, are not captured by the Coast Guard's condition measures. One example of this involves the HH-65 short-range recovery helicopter. While this helicopter consistently exceeded availability standards established by the Coast Guard over the 5-year period we examined, it is currently operating with engines that have become increasingly subject to power failures, which may potentially render the fleet unable to meet mission requirements. As a result, Coast Guard pilots employ a number of work-arounds, such as dumping fuel or occasionally leaving the rescue swimmer on scene if the load becomes too heavy. Further, because of increasing safety and reliability problems, the

Coast Guard has also implemented a number of operational restrictions—such as not allowing the helicopter to land on helipads—to safeguard crew and passengers and prevent mishaps until all of the fleet's engines can be replaced.

Actions to Better Manage Legacy Assets Are Under Way, but Effects Will Not Be Known for Some Time

The Coast Guard has already undertaken two main types of actions to keep its legacy assets operational: developing a compendium of information for making decisions regarding maintenance and upgrades needed, and performing increasingly more maintenance on these assets between deployments. These efforts are likely helping to prevent a more rapid decline in the condition of the assets, but the condition of these assets has nonetheless generally continued to worsen. In response to both the continued decline in the condition of its legacy assets, as well as to various observations we have made to the Coast Guard about its need to develop more objective information on mission capability needs and more precise condition measures, the Coast Guard has begun to undertake additional efforts. These additional efforts include developing a knowledge-based model to provide more objective data on where to best spend budget dollars to achieve the greatest enhancements in mission capabilities, improving the condition measures it uses to more clearly quantify the impact declining conditions have on mission capabilities, and, at the Pacific Area Command, applying new business rules and strategies to better sustain the 378-foot high-endurance cutters through 2016. These ongoing efforts, while promising, are largely untested, and so it is too soon to tell whether they will allow the Coast Guard to better determine and improve the mission capabilities of its legacy assets.

Coast Guard Has Developed and Is Using a Compendium of Needs

Since 2002, the Coast Guard has annually issued a Systems Integrated Near Term Support Strategy compendium. Among other things, this compendium consolidates information needed to make planning and budgeting decisions regarding maintenance and upgrades to sustain legacy assets. Its purpose is to serve as a tool for senior Coast Guard management in setting priorities and planning budgets. From this strategic document, the Coast Guard has identified a number of upgrades to improve the capabilities of the deepwater legacy aircraft and cutters. The most recent compendium (for fiscal year 2006) lists more than $1 billion worth of upgrades to the deepwater legacy assets. The planned upgrades identified in the compendium that have been approved and received initial funding account for an estimated $856 million the Coast Guard anticipates it will need to complete those projects. The approved upgrades for deepwater legacy assets are shown in table 4.

Table 4: Approved Upgrades for Deepwater Legacy Aircraft and Cutters

Deepwater legacy asset	Synopsis of planned upgrades	Estimated costs and time frames of upgrades
HC-130 aircraft	The Coast Guard is beginning to replace aircraft's dated and difficult-to-support surface search radar system.	The radar system replacement is projected to cost $78 million and be completed in fiscal year 2008. A total of $9 million has been allocated through fiscal year 2005.
HH-60 aircraft	The Coast Guard has begun a service life extension plan and a replacement of the obsolete avionics suite.	The service life extension program is estimated to cost $16 million and be completed by fiscal year 2009. The avionics replacement program is projected to cost $121 million and be completed by fiscal year 2010. A total of $32.8 million has been allocated through fiscal year 2005 for these upgrades.
HH-65 aircraft	Serious safety and reliability problems with the engine led the Coast Guard to place operational restrictions on the HH-65 fleet in October 2003.	The Coast Guard plans to re-engine 84 HH-65 aircraft at a projected cost of $349 million, now estimated to be completed by February 2007. A total of $160.7 million has been allocated through fiscal year 2005.
270-foot and 210-foot medium-endurance cutters	During fiscal year 2005 these cutters are to enter a legacy asset sustainment project known as the Mission Effectiveness Project (MEP) aimed at increasing their service lives until their replacement by a new cutter. The MEP includes upgrading major engineering subsystems such as evaporators, sewage systems, and gyrocompasses.	The MEP is projected to cost a total of $292 million and be completed by fiscal year 2015. The medium-endurance cutters will ultimately be replaced by the Offshore Patrol Cutter. A total of $12.5 million has been allocated through fiscal year 2005.
Total		**A total of $856 million is needed to fund these projects, of which $215 million has been allocated through fiscal year 2005.**

Source: GAO analysis of data provided by the U.S. Coast Guard.

Note: While no funds have been allocated for upgrades to the HU-25 aircraft, the 378-foot cutters, or the 110-foot and 123-foot patrol boats, since all of these deepwater legacy assets are scheduled to be replaced, each of these assets has upgrades listed in the Systems Integrated Near Term Support Strategy compendium. The HU-25 aircraft has an engine replacement project estimated to cost $78.1 million; the 378-foot cutter has an MEP estimated to cost $137.8 million; and the patrol boats have three projects—replacement of the fin stabilizer system that is estimated to cost $10.4 million, an MEP that is estimated to cost $162 million, and replacement of the ship service generators that is estimated to cost $20.7 million. If the Coast Guard were to request funding for all of these sustainment projects, it would cost an additional $409 million.

Among the projects already begun is the re-engining of the HH-65 helicopters to address safety and reliability concerns. The Coast Guard is also upgrading several other aviation systems in an effort to improve aircraft capabilities. Enhancements are also planned for certain classes of deepwater cutters. For example, during fiscal year 2005, the Coast Guard is beginning a maintenance effectiveness project on the 210-foot and 270-foot cutters. This project includes replacing major engineering subsystems with the goal of extending the cutters' service lives until their

replacement by the Offshore Patrol Cutter. Of the $856 million total estimated costs needed for the planned upgrades to the deepwater legacy assets listed above, $215 million has been allocated through fiscal year 2005, and the Coast Guard has requested another $217.3 million in its fiscal year 2006 budget. The remaining estimated costs of $423.7 million would have to be funded beyond fiscal year 2006.

Increasing Amounts of Maintenance Are Being Performed, but Loss of Mission Capabilities Continues

Coast Guard personnel consistently reported to us that crew members have to spend increasingly more time between missions to prepare for the next deployment. For example, due to the aging main landing gear on the HH-65 helicopter, Coast Guard official stated that maintenance crews spend extensive time servicing, troubleshooting and fixing them in pre-deployment maintenance. Comparable accounts were given by personnel working on cutters. For example, officers of the 270-foot cutter *Northland* told us that because of dated equipment and the deteriorating condition of its piping and other subsystems, crew members have to spend increasingly more time and resources while in port to prepare for their next deployment. While we could not verify these increases in time and resources because the Coast Guard does not capture data on these additional maintenance efforts, the need for increasing amounts of maintenance was a message we consistently heard from the operations and maintenance personnel with whom we met.

Such efforts are likely helping to prevent a more rapid decline in the condition of these deepwater legacy assets, but it is important to note that even with the increasing amounts of maintenance, these assets are still losing mission capabilities because of deteriorating equipment and system failures. For example, in fiscal year 2004, the 378-foot cutter *Chase* lost 98 counterdrug mission days because of a number of patrol-ending casualties—including the loss of ability to raise and lower boats and run major electrical equipment—requiring $1.2 million in emergency maintenance. In addition, the 378-foot cutter *Hamilton* lost 27 counterdrug mission days in the fall of 2004 when it required emergency dry dock maintenance because of hydraulic oil leaking into the reduction gear.

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

In the past, we have recommended that the Coast Guard develop a long-term strategy to set and assess levels of mission performance.[17] We found this was an important step for the Coast Guard to take because it links legacy asset investments to asset capabilities, mission priorities, and goals so that the Coast Guard can better decide how limited budget dollars should be spent. The Coast Guard has recently begun to apply the principles behind such a strategy to (1) better prioritize the projects needed to upgrade legacy assets that will be part of the Deepwater program 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).

CAMS, once fully implemented, is expected to help the Coast Guard to better manage its assets by linking funding decisions to asset condition. Unlike the Coast Guard's current compendium, CAMS is designed to provide analyses on the capability trade-offs for upgrades and maintenance projects across asset classes, thereby allowing the Coast Guard to determine which combination of projects will provide the most capability for the dollars invested. For example, when Coast Guard officials are trying to decide among potential project upgrades such as an HC-130 weather radar replacement, an HH-65 sliding cabin door replacement, or a 110-foot patrol boat fin stabilizer replacement, CAMS, once fully implemented, could provide the officials with a recommended mix of project upgrades that would achieve the greatest capability enhancements based on the available budget.

CAMS analyses are to be based on legacy asset condition and readiness data, asset retirement and replacement timelines, asset degradation estimates, project production rates, cost data, and mission utility rankings. Mission utility rankings will grade an asset's importance to specific missions, such as search and rescue or counterdrug operations. Rankings may also be assigned to an asset's critical subsystems or may be altered based on an asset's geographic location. For example, a 378-foot cutter may be critical to the success of fisheries patrols in the Pacific but may not be as important for alien/migrant interdiction operations in the Caribbean. However, according to Coast Guard headquarters officials, the Coast

[17]GAO, *Coast Guard: Comprehensive Blueprint Needed to Balance and Monitor Resource Use and Measure Performance for All Missions*, GAO-03-544T (Washington, D.C.: March 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).

Guard remains cautious about employing such a strategy because an investment strategy of this nature could lead to cutters that are no longer multmission capable and are unable to respond to an emergency due to reduced capabilities. In addition, the Coast Guard plans to rank its missions within CAMS based on their relative importance.[18] Each of these elements is to form the basis for recommendations regarding which combination of upgrade and maintenance projects will provide the greatest enhancements to fleet capabilities.

According to Coast Guard staff, CAMS recommendations are not a replacement for the existing budget development process, but rather are to augment and make more consistent the information currently provided to decision makers. Because the recommendations are to be based, in part, on user assumptions, CAMS recommendations are to be reviewed by several internal Coast Guard officials before any final funding requests are made. Further, in order to prevent user "gaming"—making assumptions in such a way as to ensure a positive recommendation or outcome for a particular project—the Coast Guard is developing a series of job aids, manuals, and training courses to ensure data integrity and consistency.

Coast Guard officials expect to have CAMS fully implemented by September 2005 and intend to use it while developing the Coast Guard's fiscal year 2008 budget submission. Although it is too soon to assess the effectiveness of CAMS, we view this approach as a good faith effort toward knowledge-based budgeting for legacy asset sustainment.

Coast Guard is Developing More Robust Condition Measures

At the time we began our work, in August 2004, the majority of the Coast Guard's condition measures were not sufficiently robust to link an asset's condition with its impact on mission capabilities. As we discussed with Coast Guard officials, without such condition measures, the extent and severity of the decline in the existing deepwater legacy assets and their true condition cannot be fully determined. On the basis of our inquiries and a series of discussions we held with cognizant Coast Guard officials, the Coast Guard has begun developing improved measures to more accurately capture data on the extent to which its deepwater legacy assets

[18]A mission's relative importance will be determined by Coast Guard operational decision makers. These determinations will not be static, but rather will be reviewed and revised to reflect changing priorities.

are degraded in their mission capabilities. However, because these measures have not been finalized or fully implemented, we were unable to assess their effectiveness. The Coast Guard anticipates having the new measures finalized by the end of 2005.

Coast Guard naval engineers told us that they had begun developing a "percent of time fully mission capable" measure to reflect the degree of mission capability, as well as measures to track cutter readiness. As part of this measure, the Coast Guard is developing mission criticality codes, which would rank the degree of importance of each piece of a cutter's equipment to each possible mission that the cutter could perform. These codes would then be linked to electronic casualty reports for each cutter, which would provide the cutter engineers and operators with information on the impact that the equipment casualties would have on each possible mission. This casualty report/mission criticality linkage will then be factored into the calculation of the percent of time fully mission capable measure for each cutter class and mission type. Coast Guard officials could then review this measure to determine, for example, the degree of capability that its 270-foot medium endurance cutter fleet has to conduct search and rescue missions at any given time. We agree that measures like this are needed—and as soon as possible.

According to Coast Guard officials, while the availability index will remain the Coast Guard's primary measure for aircraft condition and operational readiness, the Coast Guard is working to improve its dispatch reliability index measure, which provides causal information on delayed, aborted, or canceled missions.[19] The Coast Guard can use the dispatch reliability index—in conjunction with data captured by unit-level and depot-level maintenance staff and entered into the Coast Guard's Electronic Aircraft Logbook and Aviation Logistics Management Information System, respectively—to determine which components and systems are failing most frequently and thus causing degradation in aircraft availability and mission performance. According to Coast Guard officials, data provided from these systems rival the information that will be produced by the cutter community's proposed percent of time fully mission capable measure. Because the dispatch reliability index measure and the electronic aircraft logbook are relatively new and have only recently been

[19]Because this measure was not in use during the full period covered by our review (fiscal years 2000 through 2004), we did not include it as one of the measures we used for assessing the condition of deepwater legacy aircraft; see appendix II.

fully implemented Coast Guard-wide, we have not assessed their effectiveness. However, we view these tools as a positive step toward providing Coast Guard decision makers with more detailed information on the primary factors leading to mission degradation.

New Initiative for Maintaining 378-Foot Cutters Is Under Way

One effort is under way at the Coast Guard's Pacific Area Command to improve maintenance practices for its 378-foot cutters, which are among the oldest cutters in its fleet.[20] Pacific Area officials have recognized that a different approach to maintaining and sustaining legacy cutters may be needed since they are dependent on 378-foot cutters for meeting missions, such as defense operations and fisheries patrols. As a first step, Pacific Area officials have undertaken an initiative applying what they refer to as "new business rules and strategies" to better maintain the 378-foot high-endurance cutters through 2016, when they are scheduled to be fully replaced by National Security Cutters. Under the original Deepwater proposal, the final 378-foot cutter was to be decommissioned in 2013, but by 2005, that date had slipped to 2016. To help keep these cutters running through this date, Pacific Area officials are applying such rules and strategies as (1) ensuring that operations and maintenance staffs work closely together to determine priorities, (2) recognizing that maintaining or enhancing cutter capabilities will involve trade-off determinations, and (3) accepting the proposition that with limited funding not all cutters will be fully capable to perform all types of missions as they near the end of their useful lives. Pacific Area officials believe that in combination, these rules and strategies will result in more cost-effective maintenance and resource allocation decisions—recognizing that difficult decisions will still have to be made to balance maintenance and operations. However, according to Coast Guard headquarters officials, if such strategies are employed, careful planning must occur to avoid placing a cutter in an operational emergency where it is incapable of adequately responding.

One example of the bridging strategies Pacific Area officials are exploring is the development of what Pacific Area officials refer to as a "class within a class" approach. Under this strategy, the individual cutters within the 378-foot high-endurance cutter fleet would be designated to perform specific mission types based on an assessment of their condition and

[20]The Pacific Area Command is responsible for operations covering 74 million square miles, ranging from South America to the Arctic Circle and west to the Far East.

mission capabilities.[21] Cutters possessing full mission capabilities could be assigned to the more demanding defensive operations, while cutters in poorer condition and less than fully capable would be assigned to less demanding missions, such as fisheries enforcement. According to Pacific Area officials, this strategy is designed to more effectively spend the maintenance funds available for the 378-foot cutters, since current funding levels for the 378-foot cutters make it very difficult for Pacific Area to maintain all 10 of its 378-foot cutters as fully mission capable.

Pacific Area Command's new initiative has the potential for assisting the Coast Guard in making more informed choices regarding the best use of their resources, but according to Pacific Area officials, the approach will likely require that the Coast Guard allocate additional maintenance funds. Further, because the approach has not been fully implemented, it is too soon to tell whether the approach will provide the results intended. Coast Guard headquarters officials stated that before such a strategy can be implemented further analysis is required, to include: (1) determining the estimated savings associated with creating multiple 378-foot cutter classes; (2) analyzing other cost saving concepts, such as decommissioning cutters or rotating crews; (3) obtaining further information on the effect on Coast Guard mission readiness; and (4) assessing the operational risk associated with operating cutters that are no longer multimission capable. Officials from Coast Guard headquarters officials further stated that they are exploring the possibility of increasing the funds available for operating expenses for the 378-foot high-endurance cutters in fiscal year 2007.

Management Challenges Faced in Acquiring New Assets Remain Significant

In its fiscal year 2006 budget request, the Administration requested $966 million for the Deepwater program—-$242 million more than Congress appropriated for the program in fiscal year 2005. This request reflects significant revisions to the Deepwater program's requirements, capabilities, and schedule necessitated by the Coast Guard's new homeland security mission. Recently, the House Appropriations Committee recommended $500 million for the Deepwater program, $466 million less than the Administration requested.[22] The committee

[21]Pacific Area officials have developed a "report card" to assist in assigning cutters to specific missions by collecting a variety of data and condition assessments from its cutter crews from which it prepares a color-coded assessment of (1) the condition of each cutter's critical systems (e.g., propulsion, electrical) to meet its current mission, and (2) the ability of each cutter to meet each possible future mission.

[22]H.R. Rep. No. 109-79, at 63 (2005).

expressed concern about the path the program has taken and the lack of information provided to Congress as the primary reasons for this recommendation. Specifically, the committee did not believe that the Coast Guard's revised implementation plan provided enough programmatic information such as asset delivery timelines and funding projections for each year through the program's completion.

In late May 2005, the Coast Guard submitted documentation to the committee in response to the committee's request. In June 2005, the Senate Appropriations Committee expressed concern about the lack of information concerning the Deepwater plan in the fiscal year 2006 budget request but recommended funding of $905.6 million for the program for fiscal year 2006.[23] As of early July 2005, the fiscal year 2006 appropriation for the Deepwater program was still pending, and so the funding level is still not known. Since the inception of the Deepwater program, we have expressed concerns about the degree of risk in the acquisition approach and the Coast Guard's ability to manage and oversee the program. In 2004 we reported that, well into the contract's second year, key components needed to manage the program and oversee the system integrator's performance had not been effectively implemented.[24] We also reported that the degree to which the program was on track could not be determined because the Coast Guard was not updating its schedule.[25] We detailed improvements needed in a number of areas, shown in table 5. These concerns have a direct bearing on any consideration to increase the program's pace. Because the Coast Guard was having difficulty managing the Deepwater program at the pace it had anticipated, increasing the pace by expediting the acquisitions would only complicate the problem.

[23]S. Rep. No. 109-83, at 60 (2005).

[24]GAO-04-380.

[25]GAO-04-695.

Table 5: Summary of Deepwater Areas Needing Management Attention as Reported by GAO

Area of concern	Recommendations to the U.S. Coast Guard
Key components of management and oversight are not effectively implemented	Improve integrated product teams responsible for managing the program by providing better training, approving charters, and improving systems for sharing information between teams
	Ensure adequate staffing of the Deepwater program
	Provide field personnel with guidance and training on transitioning to new Deepwater assets
	Update the original acquisition schedule to support future budget requests, starting with the fiscal year 2006 request
Procedures for ensuring contractor accountability are inadequate	Develop measurable award fee criteria consistent with guidance from the Office of Federal Procurement Policy
	Provide for better input from U.S. Coast Guard technical representatives
	Hold system integrator accountable for improving effectiveness of integrated product teams
	Establish a time frame for putting steps in place to measure contractor's progress toward improving operational effectiveness
	Establish a baseline for determining whether the acquisition approach is costing the government more than a traditional asset replacement approach
	Establish criteria to determine when to adjust the project baseline and document the reasons for change
Control of future costs through competition remains at risk because of weak oversight	Develop a comprehensive plan for holding the system integrator accountable for ensuring adequate competition among suppliers
	For subcontracts over $5 million awarded by the system integrator to the two major subcontractors, require notification to the Coast Guard about decisions to perform the work in-house rather than contracting it out

Source: GAO.

The Coast Guard agreed with nearly all of our recommendations and has made progress in implementing them. Specifically, the Coast Guard has fully addressed three of the recommendations and has actions under way on others. However, in light of continuing management challenges, it will likely take some time for the Coast Guard to fully address the remaining recommendations. While actions are under way, management challenges remain that are likely to take some time for the Coast Guard to fully address.

Improvement of Program Management and Contractor Oversight Is Mixed

We have seen mixed success in the Coast Guard's efforts to improve management of the program and contractor oversight. Three of the four areas of concern—improving integrated project teams (IPT), ensuring adequate staff for the program, and planning for human capital

requirements for field units receiving new assets—have yet to be fully addressed.

Strengthening Integrated Product Teams

Although the Deepwater program has made some efforts to improve the effectiveness of IPTs, we continue to see evidence that more improvements are needed—such as greater coordination—for the teams to effectively do their jobs. These teams, the Coast Guard's primary tool for managing the program and overseeing the contractor, are generally chaired by a subcontractor representative and consist of members from subcontractors and the Coast Guard. The teams are responsible for overall program planning and management, asset integration, and overseeing delivery of specific Deepwater assets. Since our March 2004 report, the teams have been restructured, and 20 teams have charters setting forth their purpose, authority, and performance goals. And new, entry-level training is being provided to team members.

Despite this progress, however, the needed changes are not yet sufficiently in place. A recent assessment by the Coast Guard of the system integrator's performance found that roles and responsibilities in some teams continue to be unclear. Decision making is to a large extent stovepiped, and some teams still lack adequate authority to make decisions within their realm of responsibility. One source of difficulty for some team members has been the fact that each of the two major subcontractors has used its own databases and processes to manage different segments of the program. Decisions on air assets are made by Lockheed Martin, while decisions regarding surface assets are made by Northrop Grumman. This approach can lessen the likelihood that a system-of-systems outcome will be achieved if decisions affecting the entire program are made without the full consultation of all parties involved. Deepwater program officials told us that more attention is being paid to taking a system-wide approach and that the Coast Guard has emphasized the need to ensure that the two major subcontractors integrate their management systems. We will continue to monitor the Coast Guard's progress in implementing this recommendation during our pending review of the revised Deepwater plan.

Ensuring Adequate Staffing for the Deepwater Program

The Coast Guard has taken steps to more fully staff the Deepwater program, with mixed effects. In February 2005, the Deepwater program executive officer approved a revised human capital plan. The plan emphasizes workforce planning, including determining needed knowledge, skills, and abilities and developing ways to leverage institutional knowledge as staff rotate out of the program. This analysis is intended to help determine what gaps exist between needed skills and existing skills

and to develop a plan to bridge these gaps. The Coast Guard has also taken some short-term steps to improve Deepwater program staffing, hiring contractors to assist with program support functions, shifting some positions from military to civilian to mitigate turnover risk, and identifying hard-to-fill positions and developing recruitment plans specifically for them. Finally, the Deepwater program and the Coast Guard's acquisition branch have begun using an automated system for forecasting military rotation cycles, a step Deepwater officials believe will help with long-range strategic workforce planning and analysis.

Despite these actions, however, vacancies remain in the program, and some measures that may have highlighted the need for more stability in the program's staff have been removed from the new human capital plan. As of January 2005, 244 positions were assigned to the program, with 206 of these filled, resulting in a 16 percent vacancy rate. A year ago, 209 staff were assigned to the program. Further, the new human capital plan removes a performance goal that measured the percentage of billets filled at any given time. Coast Guard officials stated that the prior plan's goal of a 95 percent or higher fill rate was unduly optimistic and was a poor measure of the Coast Guard's ability to meet its hiring goals. For example, billets for military personnel who plan to rotate into the program in the summer are created at the beginning of the budget year, leading the measure to count those positions as vacant from the beginning of the budget year until summer. Other performance measures that were included in the prior plan to measure progress in human capital issues have also been removed. For example, to help ensure that incoming personnel received acquisition training and on-the-job training, a billet was included in the prior plan to serve as a floating training position that replacement personnel could use for a year before the departure of military incumbents. The Coast Guard did not fund this position, and the new plan removes the billet. According to the Coast Guard, these measures were removed because the revised Deepwater plan focuses on the long-range strategic human capital issues associated with the execution of the acquisition over the entire period, whereas the prior plan had a short-term operational focus. We will continue to monitor the Coast Guard's progress in implementing this recommendation during our pending review of the revised Deepwater plan.

Improving Communication with Personnel Who Will Use the New Assets

The Coast Guard recognizes the critical need to inform the operators who are to use the Deepwater assets of progress in the program, and officials stated that on the basis of our recommendations, they have made a number of improvements in this area. A November 2004 analysis of the Deepwater program's communication process, conducted in coordination

with the National Graduate School, found that the communication and feedback processes were inadequate. Emphasis has now been placed on outreach to field personnel, with a multipronged approach involving customer surveys, face-to-face meetings, and presentations. We have not yet evaluated the effectiveness of the new approach.

Human capital requirements for the Deepwater program—such as crew numbers and schedules, training, and support personnel—will have an increasing impact on the program's ability to meet its goals as the pace at which assets are delivered to field units picks up. Recent assessments by Coast Guard performance monitors show this to be an area of concern.[26] Coast Guard officials have expressed concern about whether the system integrator is appropriately considering human capital in systems engineering decisions. The system integrator is required to develop a workforce management plan for Deepwater, as well as "human factors engineering" plans for each Deepwater asset and for the overall system of systems. The Coast Guard rejected the contractor's workforce management plan and several of the proposed human factors engineering plans as being inadequate. The rejections were due, in part, to the lack of an established and integrated system-level engineering approach that shows how issues relating to human capabilities and limitations of actually performing with the system will be approached. One performance monitor noted that as of late 2004, requirements for staffing and training of maintenance facilities and organizations had yet to be determined. According to the Coast Guard, emphasis on a system integrator for addressing human capital considerations is necessary to ensure that Deepwater goals are met, especially as they pertain to operational effectiveness and total ownership cost. We will continue to monitor the Coast Guard's progress in implementing this recommendation during our pending review of the revised Deepwater plan.

Updating the Acquisition Schedule

The Coast Guard has recently undertaken efforts to update the original 2002 Deepwater acquisition schedule—an action that we suggested in our June 2004 report.[27] The original schedule had milestone dates showing when work on an asset would begin and when delivery would be expected, as well as the integrated schedules of critical linkages between assets, but we found that the Coast Guard was not maintaining an updated and

[26]Performance monitors are contracting officers' technical representatives, who represent the contracting officer in monitoring the contractor's performance.

[27]GAO-04-695.

integrated version of the schedule.[28] As a result, the Coast Guard could not demonstrate whether individual components and assets were being integrated and delivered on schedule and in critical sequence. As recently as October 2004, Deepwater performance monitors likewise expressed concern that the Coast Guard lacked adequate visibility into the program's status and that lack of visibility into the schedules for component-level items prevented reliable forecasting and risk analysis. The Coast Guard has since taken steps to update the outdated schedule and has indicated that it plans to continue to update the schedule each month for internal management purposes, and semiannually to support its budget planning efforts. We think this is an important step toward improving the Coast Guard's management of the program because it provides a more tangible picture of progress, as well as a baseline for holding contractors accountable. We will continue our oversight of the Coast Guard to ensure progress is made and to monitor how risks are mitigated.

Procedures for Ensuring System Integrator Accountability Are More Rigorous, but Concerns Remain

We have seen progress in terms of the rigor with which the Coast Guard is periodically assessing the system integrator's performance, but concerns remain about the broader issues of accountability for achieving the overarching goals of minimizing total ownership cost and maximizing operational effectiveness.

Improving Criteria for Assessing Performance

Improvements continue to be made to the criteria for assessing the system integrator's performance. In March 2004, we reported that the process for assessing performance against specific contract tasks lacked rigor. The criteria for doing so have since been revised to more clearly reflect those that are objective, (that is, measured through automated tools against established measures) and those that are subjective, meaning the narrative comments by Coast Guard performance monitors. Weights have been assigned to each set of evaluation factors, and the Coast Guard continues to refine the distribution of the weights to reach an appropriate balance between automated results and the eyewitness observations of the performance monitors. Coast Guard officials told us that they have also provided additional guidance and training to performance monitors. We found that efforts have been made to improve the consistency of the

[28]Not maintaining a current and integrated schedule lessens the Coast Guard's ability to monitor the system integrator's performance and take early action to resolve risks that could become problems later. Maintaining such a schedule is an industry best practice; the Department of Defense is required to do so in order to be able to report any breaches in cost, schedule, or performance targets.

format used for their input in assessments of the system integrator's performance. Coast Guard officials said that they are continuing to make improvements to ensure that performance monitors' relevant observations are appropriately considered in making award fee determinations.

It is important to note that although performance monitor comments are considered subjective, they are valuable inputs to assessing the system integrator's performance, particularly when they are tied to measurable outcomes. According to Coast Guard officials, the Coast Guard will continue to refine the award fee factors as the program progresses. In some cases, we noted that the performance monitors' assessments differed vastly from the results of automated, data-driven assessments. For example, while schedule management is discussed in the Coast Guard's midterm assessment of the system integrator's performance as a major area of challenge and risk, the objective measure showed 100 percent compliance in this area. Another measure assesses the extent to which integrated product teams consider the impact of their decisions on the overall cost and effectiveness of the Deepwater program. Performance monitors reported that because system-level guidance had not been provided to the teams responsible for specific assets, they had a limited ability to see the whole picture and understand the impact of decisions on total ownership cost and operational effectiveness. However, the automated measure was again 100 percent compliance. Coast Guard officials said that, in some cases, the data-driven measures do not accurately reflect the contractor's performance. We will continue to monitor changes to the Coast Guard's measures for assessing the system integrator's performance.

Holding the System Integrator Accountable for Effectiveness of Product Teams

Changes have been made to the award fee measures that place additional emphasis on the system integrator's responsibility for making integrated product teams effective. Award fee criteria now incorporate specific aspects of how the integrator is managing the program, including administration, management commitment, collaboration, training, and empowerment of these teams. However, as discussed above, concerns remain about whether the teams are effectively accomplishing their goals.

Evaluation of Operational Effectiveness and Total Ownership Cost

While the Coast Guard has developed models to measure the system integrator's performance in operational effectiveness and total ownership cost, concrete results have not yet emerged. Minimizing total ownership cost and maximizing operational effectiveness are two of the overarching goals of the Deepwater program. The system integrator's performance in these two areas will be a critical piece of information when the Coast Guard makes a decision about whether to award the contractor the first

contract option period of 5 years. Initial decision making is to start in June 2006.

With regard to the operational effectiveness of the program, measuring the system integrator's impact has yielded limited results to date because few of the new assets are operational. The Coast Guard has developed modeling capabilities to simulate the effect of the new capabilities on its ability to meet its missions. However, until additional assets become operational, progress toward this goal will be difficult to determine.

With regard to total ownership cost, the Coast Guard does not plan to implement our recommendation, despite concurring with it at the time of our March 2004 report. The Coast Guard has not adhered to its original plan, set forth in the Deepwater program management plan, of establishing as its baseline a cost not to exceed the dollar value of replacing the assets under a traditional approach (e.g., on an asset-by-asset basis rather than a system-of-systems approach). In addition to providing for greater synergies between air, sea, sensor and communications assets and equipment, the system-of-systems approach was to yield cost savings when compared with a traditional acquisition approach. Although the Coast Guard initially established a cost baseline consistent with the program management plan's approach, the Coast Guard has not updated it to reflect changes made to the system integrator's cost estimate baseline, and therefore is not being used to evaluate the contractor's progress in holding down total ownership cost. As a result, the cost baseline being used to measure total ownership cost is not the Coast Guard's, but rather is the system integrator's own cost estimate. As we reported in March 2004, we believe that measuring the system integrator's cost growth compared with its own cost proposal will tell the government nothing about whether it is gaining efficiencies by turning to the system-of-systems concept rather than the traditional asset-by-asset approach. Although the Deepwater program has undergone a number of alterations since the contract was awarded in 2002, the Coast Guard has not studied whether the system-of-systems approach is still more cost effective as opposed to a traditional acquisition approach. Thus, the Coast Guard will lack this information as it prepares to decide whether to award the first contract option beginning in June 2006.

Establishing Criteria and Documenting Changes to the Baseline

Coast Guard officials stated that the contract total ownership cost and operational effectiveness baseline is adjusted based on approved decision memorandums from the Agency Acquisition Executive, the Vice Commandant of the Coast Guard. Such memorandums were originally approved by the program executive officer on a case-by-case basis. As we

reported in March 2004,[29] establishing a solid baseline against which to measure progress in lowering total ownership cost is critical to holding the contractor accountable.

Coast Guard Reports Taking Steps to Hold the System Integrator Accountable for Competition

The Coast Guard reported that it is taking steps to address our recommendations concerning cost control through competition among second-tier suppliers and notification of "make" decisions.[30] While we have not assessed the effectiveness of the Coast Guard's actions regarding competition among second-tier suppliers, we are satisfied with its efforts regarding notification of make decisions. It should be noted, though, that we have not assessed the effectiveness of the following actions.

- *Competition among second-tier suppliers*. Coast Guard officials told us that in making the decision about whether to award the first contract option, the government will specifically examine the system integrator's ability to control costs by assessing the degree to which competition is fostered at the major subcontractor level. The evaluation will consider the subcontractors' project management structure and processes to control costs, as well as how market surveys of similar assets and major subsystems are implemented. The Coast Guard is focusing its attention on those areas that were priced after the initial competition for the Deepwater contract was completed, such as the HH-65 re-engining and the C-130J missionization.[31] For example, a new process implemented for the C-130J missionization was a requirement for competition in subcontracting and government approval of all subcontracts exceeding $2 million in order for the Coast Guard to monitor the integrator's competition efforts.

- *Notification of make decisions*. According to the Federal Acquisition Regulation, the prime contractor is responsible for managing contract performance, including planning, placing, and administering subcontracts as necessary to ensure the lowest overall cost and technical risk to the government.[32] The Federal Acquisition Regulation further provides that

[29] GAO-04-380.

[30] A "make item" means an item or work effort to be produced or performed by the prime contractor or its affiliates, subsidiaries, or divisions.

[31] The C-130J missionization, planned for the Coast Guard's six C-130J aircraft, is intended to modify and install mission-essential equipment to convert the aircraft into C-130J long-range surveillance maritime patrol aircraft.

[32] Federal Acquisition Regulation §15.407-2, "Make or Buy Programs."

when "make-or-buy programs" are required, the government may reserve the right to review and agree on the contractor's make-or-buy program when necessary to ensure negotiation of reasonable contract prices, among other things. We recommended that the Coast Guard be notified of make-or-buy decisions over $5 million in order to facilitate controlling costs through competition. We suggested the $5 million threshold because Lockheed Martin, one of the major subcontractors, considers that amount to be the threshold for considering its suppliers major. The Coast Guard has asked the system integrator, on a voluntary basis, to provide notification 1 week in advance of a make decision of $10 million or more based on the criteria in the make-or-buy program provisions of the Federal Acquisition Regulation. According to Coast Guard officials, to date, no make decision has exceeded $10 million since the request was made. The details implementing this recommendation have not yet been worked out, such as specifically who in the Coast Guard will monitor the subcontractors' make decisions to ensure that the voluntary agreement is complied with. We will continue to monitor the Coast Guard's progress in implementing this recommendation during our pending review of the revised Deepwater plan.

Concluding Observations

Our work suggests the costly and important Deepwater program will need constant monitoring and management attention to successfully accomplish its goals. In this respect, we identified three points that should be kept in mind in considering how to proceed with the program.

- First, the need to replace or upgrade deteriorating legacy assets is considerable. While the Coast Guard currently lacks measures that clearly demonstrate how this deterioration affects its ability to perform deepwater-related missions, it is clear that the deepwater legacy assets are insufficient for the task. As the Coast Guard continues to develop condition measures that are more robust and able to link the assets' condition with mission capabilities, and as it further develops and implements its Capital Asset Management System, it will be in a better position to make more informed decisions regarding where its budget should be spent to maximize the capabilities of its legacy assets as the Coast Guard transitions to the Integrated Deepwater System.

- Second, there are signs that as the Deepwater program moves ahead, the Coast Guard will continue to report more problems with sustaining existing assets, together with the attendant need for additional infusions of funding to deal with them. Some of these problems, such as those on the 378-foot cutters, are included in the compendium the Coast Guard uses to set sustainment priorities and plan budgets, but the Coast Guard has not allocated funds because the problems pertain to assets that are among the

first to be replaced. However, projects to address these problems are nevertheless likely to be needed. While the Coast Guard is moving to improve the information it uses to set budget priorities through development of CAMS, the system has not been implemented, and therefore, it is too soon to tell how effective the system will be. We will continue to work with the Coast Guard to monitor its progress on CAMS as a means for ensuring that there is a more systematic and comprehensive approach to keeping Congress abreast of the potential bill for sustaining these assets.

- Third, although the need to replace and upgrade assets is strong, there still are major risks in the Coast Guard's acquisition approach. The cost increases and schedule slippages that have already occurred are warning signs. While the Coast Guard has initiated actions to address problems we have raised involving system integration, cost and schedule management, and integrated product teams, we remain concerned that the program still carries major risks. We will continue to work with the Coast Guard to determine how best to manage these risks so that the Deepwater missions can be accomplished in the most cost-effective way.

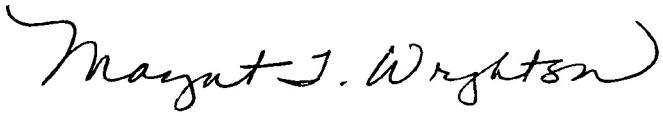
Agency Comments

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

We are providing copies of this report to the Secretary of the Department of Homeland Security, the Commandant of the U.S. Coast Guard, and interested congressional committees. The report will also be made available to others upon request. In addition, the report will be available at no charge on GAO's Web site at http//www.gao.gov.

For information about this report, please contact me at (415) 904-2200, or wrightsonm@gao.gov. Contact points for our Offices of Congressional

Relations and Public Affairs may be found on the last page of this report. Individuals making key contributions to this report are listed in appendix III.



Margaret T. Wrightson
Director, Homeland Security and Justice Issues

Appendix I: Objectives, Scope, and Methodology

This report examines the condition of the U. S. Coast Guard's Deepwater legacy assets and the acquisition management challenges the Coast Guard faces. Our work focused on three key questions: (1) How has the condition of the Coast Guard's deepwater legacy assets changed during fiscal years 2000 through 2004? (2) What actions has the Coast Guard taken to maintain, upgrade, and better manage its deepwater legacy assets? (3) What are the management challenges the Coast Guard faces in acquiring new assets, especially if a more aggressive schedule is adopted?

In assessing how the condition of the deepwater legacy assets has changed during fiscal years 2000 through 2004, we analyzed what Coast Guard officials told us were the best available condition measures. For deepwater aircraft, we obtained concurrence from Coast Guard Office of Aeronautical Engineering officials that the appropriate measures to use for aircraft condition included the availability index (percentage of time aircraft were available to complete missions), cost per flight hour, labor hours per flight hour, programmed flight hours per year, scheduled versus unscheduled maintenance expenditures, and estimated deferred maintenance. For cutters, we obtained concurrence from the Office of Naval Engineering and the Office of Cutter Forces that the appropriate measures to use for cutter condition were the number of major (category 3 and 4) casualties, the percent of time free of major casualties, scheduled versus unscheduled maintenance, and estimated deferred maintenance. We also reviewed data on mishaps and the dispatch reliability index for aircraft, and lost cutter days and unscheduled maintenance days for cutters, but we did not use these measures because the data were either not relevant to our analysis, incomplete, not available for the entire time period covered by our review, or not sufficiently reliable for our purposes. We supplemented our analyses of these measures with documentation from relevant reports and studies, as well as from interviews of asset program managers and crews for each type of deepwater legacy aircraft and cutter. For aircraft, we collected data from the Aircraft Repair and Supply Center in Elizabeth City, North Carolina; and visited selected air stations in Kodiak, Alaska; Miami, Florida; and Elizabeth City, North Carolina; to provide coverage of each of the four types of Deepwater aircraft—HC-130 and HU-25 fixed wing aircraft, and the HH-60 and HH-65 rotary aircraft. For cutters, we collected data at the Maintenance and Logistics Commands in Alameda, California; and Norfolk, Virginia; and visited selected Coast Guard facilities in Kodiak, Alaska; Portsmouth, Virginia; and Miami, Florida; to provide coverage of each of the three types of Deepwater vessels—high-endurance cutters, medium-endurance cutters, and patrol boats. We also reviewed Coast Guard policies and standards, including the *Coast Guard Cutter Employment Standards*,

Coast Guard Aircraft Employment Standards for Days Employed Aboard Ship and Days Away from Home Station, and the *Coast Guard Environmental Health and Safety Manual*. In addition, to assess the reliability of the Coast Guard's data and condition measures, we questioned knowledgeable officials and reviewed existing documentation about the data and the systems that produced the data. On the basis of our assessments, we determined that the data were sufficiently reliable for the purposes of this report.

To determine the actions that the Coast Guard has undertaken to maintain, upgrade, and better manage its deepwater legacy assets, we reviewed documentation such as the Systems Integrated Near Term Support Strategy (SINTSS), which is a compendium of information on proposed asset sustainment projects, and spoke with various Coast Guard program officials from the Offices of Naval and Aeronautical Engineering, as well as the Atlantic Area Maintenance and Logistics Command, regarding the need to perform increasing maintenance on assets between deployments. To determine additional efforts that Coast Guard plans to undertake to better manage these assets, we met with Coast Guard officials from the Office of Naval Engineering to discuss the development of measures that the Coast Guard hopes will more accurately measure the impact that the declining condition of its legacy assets has on mission capabilities and reviewed documentation relevant to these measures. We also reviewed plans and guidance for the newly developed Capital Asset Management Strategy (CAMS), which the Coast Guard intends to use in establishing priorities for determining which Deepwater asset maintenance and sustainment projects to fund. In addition, we also met with officials at the Pacific Area Command and Maintenance and Logistics Command to discuss their fleet sustainment initiative for keeping the high-endurance cutters operational until their replacement by the National Security Cutter.

To determine what management challenges the Coast Guard faces in acquiring new assets, we followed up on actions the Coast Guard has taken to implement the 11 recommendations in our report *Contract Management: Coast Guard's Deepwater Program Needs Increased Attention to Management and Contractor Oversight* (GAO-04-380), of March 9, 2004; and the 1 recommendation from our report *Coast Guard: Deepwater Program Acquisition Schedule Update Needed*, (GAO-04-695), of June 14, 2004. We received briefings and held several meetings with the Deepwater Program Executive Officer, the Deputy Program Executive Officer, and a number of Deepwater staff, including contracting officers. We also held a discussion with representatives of the system integrator to get their views on progress made in implementing the recommendations.

We analyzed documentation supporting the Coast Guard's midterm assessment of the contractor's system integration and management performance in the third year of the contract, including written comments by the performance monitors. We also held discussions with Deepwater program performance monitors. We recently began an assessment of the third year of performance. However, we were not able to thoroughly review the documentation in time to include our observations in this report. We reviewed information on Deepwater integrated product teams, including membership lists and briefings provided by the Coast Guard on measures of effectiveness for the teams. We analyzed the Coast Guard's plans to increase communications to field operators, including its August 2004 Integrated Deepwater Systems Internal Communications Plan, and received a briefing on how the plan is being implemented. We compared the September 2003 Deepwater Human Capital Plan with the February 2005 revised plan to identify changes that had been made and discussed Deepwater program office staffing numbers and plans with Coast Guard officials. Finally, we discussed with Coast Guard officials steps the Coast Guard has taken to hold the system integrator accountable for "make" versus "buy" decisions by the two major subcontractors and reviewed a January 2005 letter on this subject from the Director of Subcontracts for Integrated Coast Guard Systems to the subcontractors.

We performed our review from July 2004 to June 2005 in accordance with generally accepted government auditing standards at various Coast Guard offices and facilities.

Appendix II: Information on Deepwater Legacy Aircraft and Cutters

HC-130 Long-Range Surveillance Aircraft

HC-130 Fleet Overview

The HC-130 is a long-range, fixed-wing, multimission aircraft used for search and rescue, drug interdiction, alien and migrant interdiction, living marine resources, and defense readiness and logistics missions. Manufactured by Lockheed Martin Aero, the HC-130 aircraft entered Coast Guard service beginning in 1972. There are currently 27 HC-130 aircraft within the Coast Guard. The estimated service life is approximately 30 years or 40,000 flight hours.

Performance Trends

The HC-130 fleet's performance data show that while there was a decline in fiscal year 2004, fleet availability has steadily improved since 2000 and remains near the Coast Guard's 71 percent availability standard. Similarly, the number of labor hours per flight hour remained fairly stable from fiscal year 2000 to 2003 but increased slightly in fiscal year 2004. Programmed flight hours have also remained reasonably stable, with some year-to-year fluctuations after a decline in fiscal year 2001. These performance measures are summarized in table 6.

Table 6: HC-130 Fleet Performance Data for Fiscal Years 2000-2004

Fiscal year	Availability index[a]	Programmed flight hours[b]	Labor hours per flight hour[c]
2000	63.5%	20,805	15.3
2001	65.9%	19,027	16.0
2002	71.0%	18,824	16.7
2003	73.3%	19,006	16.9
2004	68.6%	18,800	20.0

Source: U.S. Coast Guard.

[a] The availability index indicates the percentage of time that aircraft assigned to Coast Guard air stations are available to perform Coast Guard missions. The historical availability standard is 71 percent, driven in part by the Coast Guard's goal of each air station with at least three aircraft having at least one aircraft ready to launch within 30 minutes of a distress signal.

[b] Programmed flight hours are the number of hours per year assigned to a particular type of aircraft based on budget considerations for operation and maintenance costs.

[c] Labor hours per flight hour represent the average of the number of maintenance labor hours expended by field units versus the number of flight hours produced by those units, for each asset class.

Maintenance Trends

The HC-130 fleet's maintenance costs have generally increased during fiscal years 2000 through 2004. Overall, the fleet's cost per flight hour and scheduled maintenance expenditures have risen, driven by an increase in the scope of depot-level maintenance to improve the fleet's material condition. Also, depot-level maintenance schedule delays have led to a backlog, thereby increasing the amount of fleet deferred maintenance, as shown in table 7.

Table 7: HC-130 Fleet Maintenance Data for Fiscal Years 2000-2004, in Fiscal Year 2004 Dollars

Fiscal year	Cost per flight hour[a]	Estimated scheduled maintenance expenditures	Estimated unscheduled maintenance expenditures[b]	Estimated deferred maintenance costs
2000	$1,347	$8,415,000	$9,051,000	$4,549,000
2001	$1,637	$9,769,000	$7,226,000	$14,295,000
2002	$2,202	$9,309,000	$6,354,000	$4,976,000
2003	$2,077	$12,891,000	$7,593,000	$7,223,000
2004	$2,357	$18,641,000	$10,142,000	$5,737,000

Source: GAO analysis of U.S. Coast Guard data.

Note: Cost per flight hour, estimated maintenance expenditures and deferred maintenance cost data in this and other aircraft fleet maintenance data tables were adjusted for inflation using U.S. Department of Labor producer price indices for aircraft maintenance and repair, and are presented in fiscal year 2004 dollars.

[a] The cost per flight hour measure represents the variable costs of spare parts and depot-level maintenance associated with operating each aircraft type. This figure is derived by dividing historical aircraft part demand data by the number of hours flown during the same period. The current year data are combined with that of the 2 previous fiscal years, adjusted for inflation, to calculate a weighted average. The model does not address deferred maintenance or inventory holes but reports how much it costs to operate each fleet for a given number of hours in a given fiscal year.

[b] The Coast Guard does not normally track aviation unscheduled maintenance expenditures in relation to scheduled maintenance expenditures. However, at GAO's request, Coast Guard officials estimated the unscheduled maintenance expenditures for each type of deepwater aircraft based on the classification of air station requests for certain spare parts.

Sustainment Issues

Obsolescence of the HC-130's Surface Search Radar System

According to Coast Guard officials, there is an urgent need to replace the HC-130's APS-137 surface search radar system. The radar system—part of the aircraft's original configuration—is subject to frequent failures and is quickly becoming unsupportable, according to the Coast Guard officials. Replacement parts are very difficult to locate. While HC-130 flight crews will work around any failures, without the system, the flight crews are reduced to looking out windows for targets, thereby greatly reducing mission capabilities for performing search and rescue, alien-migrant interdiction, and drug interdiction missions. In the conference report

accompanying the Coast Guard's fiscal year 2005 appropriation, the conferees directed $9 million for the radar system.[1] Total system replacement costs are estimated to be $78 million and are to be completed in fiscal year 2008.

Avionics Modernization and Wing-Rewiring Projects

The Coast Guard has identified several additional HC-130 sustainment projects in its latest Systems Integrated Near Term Support Strategy. Included in these projects are an avionics modernization and a related wing-rewiring project. According to the Coast Guard, the HC-130's avionics suite utilizes 1960s technology that is costly to maintain and will soon be unsupportable because of a lack of spare and repair parts. This cockpit modernization project is aimed at enabling the HC-130 aircraft to better support maritime safety and security and national defense and logistics missions. The Coast Guard estimates this project will cost $305 million and take 4 years to complete. The wing-rewiring project is designed to provide more power to an upgraded avionics suite and to ward off potential safety issues due to deteriorating wiring, such as electrical shorts and probability of fire. Coast Guard officials estimate the project will cost nearly $11 million and will take 5 years to complete.

HC-130 Center Wing Box Structural Issues

Five of the 27 operational HC-130s have recently been placed under operational restrictions at the request of the aircraft's manufacturer, Lockheed Martin Aero, because of a problem associated with the aircraft's center wing box. The restrictions include limitations on weight, airspeeds, maneuvering, and mission endurance. As of early June 2005, the Coast Guard was awaiting the release of inspection criteria from Lockheed Martin. Nevertheless, the Coast Guard estimates that the inspections will cost $2 million for the 5 aircraft. This problem is not limited to Coast Guard aircraft, but is affecting HC-130s worldwide. The remaining Coast Guard HC-130s are not subject to the operational restrictions but will likely have to undergo similar limitations and inspections beginning in fiscal year 2006.

[1]H.R. Conf. Rep. No. 108-774, at 57 (2004).

HU-25 Medium-Range Surveillance Aircraft

HU-25 Fleet Overview

The HU-25 is a medium-range, fixed-wing, multimission aircraft used for search and rescue, drug interdiction, alien/migrant interdiction, fisheries law enforcement, defense readiness, and essential logistics missions. Manufactured by Falcon Jet, the HU-25 entered the Coast Guard aviation fleet in 1982. The Coast Guard's fleet contains 23 aircraft. The Coast Guard maintained a fleet of 26 operational HU-25 aircraft in fiscal year 2000 but reduced the fleet because of budgetary constraints in fiscal year 2002. The original estimated service life was 20 years or 20,000 flights (landings) or 30,000 flight hours.

Performance Trends

The HU-25 fleet's programmed flight hours have fluctuated during fiscal years 2000 through 2004 with changes in fleet size. In fiscal year 2004, the fleet flew 86 percent of the fiscal year 2001 programmed flight hours with 29 percent fewer aircraft. Moreover, the fleet's availability index has generally improved during fiscal years 2000 through 2003, in large part because of the enhanced reliability of the HU-25's ATF-3 engine. Though it consistently remained below the Coast Guard's 71 percent availability standard, it has improved from fiscal year 2000 levels. The fleet's labor hours per flight hour have also remained fairly consistent since fleet reduction. Table 8 provides a summary of the HU-25's key performance measures.

Table 8: HU-25 Fleet Performance Data for Fiscal Years 2000-2004

Fiscal year	Availability index	Programmed flight hours	Labor hours per flight hour
2000	59.0%	16,322	10.9
2001	57.4%	15,616	13.4
2002	62.4%	11,200	12.9
2003	67.2%	14,122	12.9
2004	65.8%	13,500	13.5

Source: U.S. Coast Guard.

Maintenance Trends

The maintenance measures for the HU-25 show varied results. During fiscal years 2000 through 2004, the fleet's cost per flight hour has generally

declined, scheduled and unscheduled maintenance expenditures fluctuated, and the amount of deferred maintenance dropped significantly. Table 9 provides a summary of the key maintenance measures.

Table 9: HU-25 Fleet Maintenance Data for Fiscal Years 2000-2004, in Fiscal Year 2004 Dollars

Fiscal year	Cost per flight hour	Estimated scheduled maintenance expenditures	Estimated unscheduled maintenance expenditures	Estimated deferred maintenance costs
2000	$1,980	$17,616,000	$16,572,000	$12,338,000
2001	$1,979	$15,184,000	$18,979,000	$4,230,000
2002	$1,917	$13,264,000	$11,065,000	0
2003	$1,833	$18,447,000	$9,868,000	$207,000
2004	$1,897	$16,524,000	$11,961,000	0

Source: GAO analysis of U.S. Coast Guard data.

Sustainment Issues

Engines

According to Coast Guard officials, the HU-25's Honeywell ATF-3 engines are complex, have been historically unreliable, and are time-consuming to maintain—requiring as long as 4 days to re-install a repaired engine. Some of the engine problems have been mitigated by improvements in sensor capabilities that allow the aircraft to fly at higher altitudes for longer periods of time during surveillance missions. Flying at higher altitudes reduces the amount of saltwater introduced into the engines, thereby reducing corrosion and placing less stress on the engines. According to Coast Guard officials, this has contributed to increasing engine reliability and improvements in HU-25 fleet availability.

Sensors

The sensors on the six HU-25D models were recently upgraded at a cost of $43 million in acquisition, capital, and investment (AC&I) funding. Five of the six upgraded HU-25D aircraft are stationed at air station Miami. According to the air station's commanding officer, the upgraded sensors, while critical to mission success, also have a relatively high rate of inoperability. Sensor inoperability is a function of the aircraft's poor air conditioning system. When the cabin becomes too warm, the sensors fail. Air conditioning system and sensor failure does not present a safety of flight issue but does degrade mission capability. According to Coast Guard officials this problem is limited to the HU-25D models.

HH-60 Medium-Range Recovery Helicopter

HH-60 Fleet Overview

The HH-60 helicopter is used for ports, waterways, and coastal security; drug interdiction; alien/migrant interdiction; defense readiness; search and rescue; ice operations; living marine resources; and marine environmental protection missions. Manufactured by Sikorsky Aircraft Corporation, the HH-60 entered into the Coast Guard fleet in 1990. The Coast Guard has a total of 41 HH-60 aircraft. The original estimated service life was approximately 20 years.

Performance Trends

The HH-60's deteriorating subsystems, such as the avionics suite, are requiring increasing amounts of maintenance and thereby reducing fleet performance. Nevertheless, the HH-60 fleet has maintained a relatively high availability level, remaining close to or exceeding the Coast Guard's 71 percent availability standard since fiscal year 2000. The fleet's number of programmed flight hours has experienced some year-to-year fluctuations but has been relatively stable. At the same time, increasing subsystem failures are requiring more unit-level maintenance, as reflected by the fleet's general rise in the number of labor hours per flight hour. Further, Coast Guard officials have told us that flight crews and maintenance personnel have to work harder and longer to maintain the fleet's high availability levels. Table 10 provides a summary of the key performance measures.

Table 10: HH-60 Fleet Performance Data for Fiscal Years 2000-2004

Fiscal year	Availability index	Programmed flight hours	Labor hours per flight hour
2000	71.4%	24,109	16.5
2001	70.8%	22,115	18.6
2002	68.1%	24,915	20.2
2003	72.4%	26,014	19.8
2004	69.8%	24,832	21.5

Source: U.S. Coast Guard.

Maintenance Trends

In constant dollars, the HH-60 fleet's estimated scheduled and unscheduled maintenance expenditures generally trended downward during fiscal years 2000 through 2004, while the cost per flight hour has

fluctuated. In contrast, the amount of HH-60 deferred maintenance incurred by the Coast Guard has nearly doubled since fiscal year 2000. HH-60 fleet product line managers attribute this increase to budget constraints and an expansion in the scope of the HH-60 overhauls without a corresponding increase in the number of maintenance personnel. Table 11 provides a summary of the key maintenance measures.

Table 11: HH-60 Fleet Maintenance Data for Fiscal Years 2000-2004, in Fiscal Year 2004 Dollars

Fiscal year	Cost per flight hour	Estimated scheduled maintenance expenditures	Estimated unscheduled maintenance expenditures	Estimated deferred maintenance costs
2000	$1,062	$18,968,000	$17,897,000	$10,067,000
2001	$1,294	$20,787,000	$15,450,000	$11,374,000
2002	$1,568	$17,848,000	$15,845,000	$8,094,000
2003	$1,516	$17,189,000	$12,017,000	$9,715,000
2004	$1,387	$17,254,000	$12,596,000	$18,824,000

Source: GAO analysis of U.S. Coast Guard data.

Sustainment Issues

HH-60 Avionics Replacement

According to HH-60 flight crews and maintenance staff, the reliability of the aircraft's 1970s era avionics system is steadily declining. The system's increasing failure rate is directly affecting the HH-60 fleet's mission capabilities, as avionics system failures are occurring every 11 flight hours, on average. Further, according to the Coast Guard, HH-60 avionics repair vendors will phase out system component repairs in fiscal year 2007. For these reasons, the Coast Guard has implemented an HH-60 avionics upgrade to replace the current system with a state-of-the-art open architecture system that Coast Guard officials claim will meet the future needs of HH-60 missions. The Coast Guard estimates that this program will cost about $84 million and will be completed in fiscal year 2010. The Coast Guard has allocated $30.8 million through fiscal year 2005 for the program.

The HH-60 Service Life Extension Program

The Coast Guard has developed a service life extension program for the HH-60 fleet to upgrade structural components such as beams, fittings, and frames, and will increase depot-level maintenance production to nine aircraft per year. According to the Coast Guard, the program will extend the service life of the HH-60 fleet through 2022.

HH-65 Short-Range Recovery Helicopter

HH-65 Fleet Overview

The HH-65 is a twin-engine, short-range recovery helicopter used for ports, waterways and coastal security; drug interdiction; alien-migrant interdiction; defense readiness; search and rescue; ice operations; and marine environmental missions. The HH-65 entered Coast Guard service beginning in 1984. The helicopter's airframe is manufactured by Eurocopter, and most HH-65s are equipped with Honeywell-manufactured LTS-101-750 engines. However, these engines are currently being replaced (see details below). The Coast Guard maintains 95 aircraft in the fleet. The original estimated service life for the HH-65 aircraft was 20 years, but according to Coast Guard aviation staff, the engine replacement program should extend the service live beyond that estimate.

Performance Trends

Despite safety and reliability concerns related to its engines, the HH-65 fleet has consistently maintained an availability level above the 71 percent Coast Guard standard during fiscal years 2000 through 2004. Moreover, the number of fleet programmed flight hours has steadily increased since fiscal year 2000. The fleet's labor hours per flight hour have remained stable since fiscal year 2001. However, it should be noted that the number of fleet mishaps, particularly engine-related mishaps, increased sharply in 2004, primarily because of the engine and engine control system's poor reliability. Table 12 provides a summary of the key performance measures.

Table 12: HH-65 Fleet Performance Data for Fiscal Years 2000-2004

Fiscal year	Availability index	Programmed flight hours	Labor hours per flight hour
2000	76.6%	46,451	11.4
2001	75.0%	45,212	13.0
2002	73.4%	50,840	13.0
2003	75.5%	51,380	13.6
2004	80.9%	51,745	13.3

Source: U.S. Coast Guard.

Maintenance Trends

The HH-65 fleet has sustained a comparatively high level of availability even though maintenance data show that the fleet has had challenges related to poor engine performance. Fleet cost per flight hour steadily increased during fiscal years 2000 through 2004. The Coast Guard has not

deferred any maintenance for the HH-65 fleet from fiscal year 2000 through 2004. Table 13 provides a summary of the key maintenance measures.

Table 13: HH-65 Fleet Maintenance Data for Fiscal Years 2000-2004, in Fiscal Year 2004 Dollars

Fiscal year	Cost per flight hour	Estimated scheduled maintenance expenditures	Estimated unscheduled maintenance expenditures	Estimated deferred maintenance costs
2000	$908	$36,034,000	$18,377,000	0
2001	$976	$31,793,000	$17,690,000	0
2002	$1,089	$33,296,000	$21,458,000	0
2003	$1,107	$36,623,000	$22,388,000	0
2004	$1,312	$31,431,000	$22,815,000	0

Source: GAO analysis of U.S. Coast Guard data.

Sustainment Issues

The HH-65 Re-engining Program

The increasing trend in the number and seriousness of safety-related HH-65 incidents prompted a Coast Guard decision in January 2004 to replace the existing engines and the associated engine control systems within 24 months. However, the Coast Guard now anticipates that the re-engining of all 84 operational HH-65 helicopters will take until February 2007. Total program costs are estimated to be nearly $350 million, or about $3.7 million per helicopter.

As of June 7, 2005, 5 HH-65 aircraft have been successfully re-engined, 14 are under production at the Coast Guard's Aircraft Repair and Supply Center, and an additional aircraft is under production at the American Eurocopter's facility in Columbus, Mississippi. Upon completion of this test case, the Coast Guard will determine if the American Eurocopter facility is suitable to serve as the site for a second re-engining production line.

Other Multimission Cutter Helicopter Conversion Elements

According to the Coast Guard, the HH-65 was selected for conversion to the Deepwater program's multimission cutter helicopter (MCH) beginning in fiscal year 2007. As such, the converted HH-65 helicopters will be part of the Deepwater program moving forward. There are several steps constituting the full MCH conversion, of which the current HH-65 re-engining program is one element. Other elements include the replacement of the HH-65's landing gear and tail rotors. The HH-65's new engine should allow the helicopter to support an increase in maximum gross weight. However, the current landing gear cannot support such an increase. The

current tail rotors also need to be replaced because the product manufacturer is discontinuing production of the rotors, though supplies on hand should last until May 2005.

Other elements of the MCH conversion, such as an upgrade of the avionics, will increase the aircraft's service life and capabilities. These conversion elements are scheduled for integration beginning in fiscal year 2007.

378-Foot High-Endurance Cutter

378-foot High-Endurance Cutter Fleet Overview

The 378-foot cutters are the largest cutters in the deepwater fleet, with a crew size of 19 officers and 147 enlisted. The Coast Guard has 12 of the 378-foot cutters in its deepwater fleet, with 10 of these stationed in the Pacific Area Command and the remaining 2 in the Atlantic Area Command. The 378-foot cutters typically operate 185 days away from home port per year. The 378-foot cutters are used in a number of missions, such as defense operations; maritime security/law enforcement; search and rescue; living marine resources; ports, waterway, and coastal security; alien-migrant interdiction; and drug interdiction. These cutters were commissioned by the Coast Guard during 1967 to 1972 and have an estimated service life of about 40 years, affected in part by the Fleet Rehabilitation and Modernization (FRAM) program, which is discussed in further detail below.

Performance Trends

The 378-foot cutters are considered by the Coast Guard to generally be deteriorating in condition, and this assertion is supported by the Coast Guard's data measures. Major casualties[2] per cutter have increased from fiscal year 2000 through 2004, and the percent of time free (POTF) of major casualties has fluctuated, but it has remained well below the target of 72 percent. Table 14 provides a summary of the key performance measures.

Table 14: 378-Foot Cutter Fleet Performance Data for Fiscal Years 2000-2004

Fiscal year	Major casualties per cutter	POTF of major casualties
2000	10.7	30%
2001	15.3	22%
2002	15.3	38%
2003	17.1	26%
2004	17.3	7%

Source: U.S. Coast Guard.

[2]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.

Maintenance Trends

Both scheduled and unscheduled maintenance expenditures for the 378-foot cutters have been on a general upward trend during fiscal years 2000 through 2004, with some fluctuations. The increasing age of these cutters, along with equipment obsolescence, appears to be driving these costs. Table 15 provides a summary of the key maintenance measures.

Table 15: 378-Foot Cutter Fleet Maintenance Data for Fiscal Years 2000-2004, in Fiscal Year 2004 Dollars

Fiscal year	Scheduled maintenance costs	Unscheduled maintenance costs	Total maintenance costs
2000	$13,376,901	$2,641,025	**$16,017,925**
2001	$19,842,996	$4,230,497	**$24,073,493**
2002	$15,109,120	$3,416,032	**$18,525,152**
2003	$15,523,775	$6,487,666	**$22,011,440**
2004	$17,131,625	$4,686,052	**$21,817,677**

Source: GAO analysis of U.S. Coast Guard data.

Note: The data in this and other cutter maintenance expenditure tables are adjusted for inflation using U.S. Department of Labor producer price indexes for ship repair, conversion, reconversion, and the U.S. military.

Sustainment Issues

The average age of the 378-foot cutters is 36.3 years. Each 378-foot cutter underwent the FRAM at approximately 20 years of age, beginning in the late 1980s and ending in 1992. As part of the FRAM, each cutter received an overhaul, costing anywhere from $70 million to $90 million, that Pacific Area Command officials estimated would add about 15 additional years of service—a mark that many of the cutters are beginning to reach. Many major propulsion and hull systems, however, were merely overhauled but not upgraded or replaced, and these systems are now at or near the end of their useful service life. In addition, the Coast Guard regularly compiles a list of the top 10 maintenance issues affecting each cutter class. The most recent top 10 list has identified service boilers, the gyrocompass navigation system, and propulsion shafting and shaft bearings, among other things, as the most critical sustainment issues for the 378-foot cutters.

270-Foot Medium-Endurance Cutter

270-Foot Medium-Endurance Cutter Fleet Overview

The Coast Guard's 270-foot cutter fleet consists of 13 cutters, all of which are stationed in the Atlantic Area Command. These cutters were commissioned between 1983 and 1991, have an estimated service life of 30 years, and operate with a crew of 13 officers and 85 enlisted personnel. The 270-foot cutters typically operate 185 days away from home port each year and are used for maritime security/law enforcement; search and rescue; living marine resources; ports, waterway, and coastal security; alien-migrant interdiction; drug interdiction; and defense missions.

Performance Trends

Officials at Coast Guard headquarters stated that the condition of the 270-foot medium endurance cutters is generally worsening, and key condition measures seem to bear this out, though there were some improvements in fiscal year 2004. Major casualties per cutter saw a major increase from fiscal year 2000 to 2001, remained fairly steady during fiscal years 2002 and 2003, and then decreased in fiscal year 2004. The POTF of major casualties fluctuated during fiscal years 2000 through 2004 but remained well below the POTF target rate of 72 percent. Table 16 provides a summary of the key performance measures.

Table 16: 270-Foot Cutter Fleet Performance Data for Fiscal Years 2000-2004

Fiscal year	Major casualties per cutter	POTF of major casualties
2000	11.7	38%
2001	15.1	35%
2002	14.2	47%
2003	14.7	32%
2004	11.9	42%

Source: U.S. Coast Guard.

Maintenance Trends

Scheduled maintenance expenditures fluctuated for the 270-foot medium-endurance cutters from fiscal years 2000 to 2004, with a major increase in fiscal year 2003. Coast Guard officials attribute this increase in expenditures to the age and poor structural condition of the cutters, the replacement of obsolete equipment, and upgrades. The increased cutter maintenance that occurred in fiscal year 2003 was sourced from supplemental appropriations. Unscheduled maintenance expenditures saw

a small amount of fluctuation for the 270-foot cutters during fiscal years 2000 through 2004. Table 17 provides a summary of the key maintenance measures.

Table 17: 270-Foot Cutter Fleet Maintenance Data for Fiscal Years 2000-2004, in Fiscal Year 2004 Dollars

Fiscal year	Scheduled maintenance costs	Unscheduled maintenance costs	Total maintenance costs
2000	$9,175,918	$1,419,443	**$10,595,360**
2001	$10,253,382	$1,365,576	**$11,618,957**
2002	$8,814,319	$1,527,919	**$10,342,238**
2003	$15,744,978	$1,690,038	**$17,435,015**
2004	$6,098,884	$1,620,839	**$7,719,723**

Source: GAO analysis of U.S. Coast Guard data.

Sustainment Issues

The average age of the 270-foot cutters is 18.0 years. During fiscal year 2005, the Coast Guard began a Mission Effectiveness Project (MEP) on the medium-endurance cutters (270-foot and 210-foot) in order to extend their service lives. The MEP includes replacement of the major systems, such as evaporators and gyrocompasses, as well as other auxiliary systems. The first 270-foot cutter entered the MEP in May 2005 at a cost of $7.5 million, funded from the Deepwater program's acquisition, construction, and improvement account. Overall, the 270-foot cutter MEP is projected to cost $193.5 million, and the work will extend 10 years, into fiscal year 2015. In addition, regularly scheduled maintenance should continue to address the principal maintenance problems for the 270-foot cutters as identified in the top 10 list, including the air conditioning and refrigeration systems, the main propulsion control and monitoring system, and the auxiliary saltwater and sewage piping systems.

210-Foot Medium-Endurance Cutter

210-Foot Medium-Endurance Cutter Fleet Overview

The Coast Guard's 210-foot cutter fleet consists of 14 cutters, 11 of which are stationed in the Atlantic Area Command, and the remaining 3 are based in the Pacific Area Command. These cutters were commissioned between 1964 and 1969, have an estimated service life of 43 to 49 years and operate with a crew of 12 officers and 63 enlisted personnel. The 210-foot cutters typically operate 185 days away from home port each year, during which time they perform missions such as maritime security/law enforcement; search and rescue; living marine resources; ports, waterway, and coastal security; alien-migrant interdiction; and drug interdiction.

Performance Trends

Officials at Coast Guard headquarters stated that the condition of the 210-foot medium endurance cutters is generally worsening, and key condition measures seem to bear this out, though there were some improvements in fiscal year 2004. Major casualties per cutter saw a major increase from fiscal year 2000 to 2001, a smaller increase during fiscal years 2002 and 2003, and then a decrease in fiscal year 2004. The POTF of major casualties has generally declined for the 210-foot cutters during fiscal years 2000 through 2004, and consistently remained well below the POTF target rate of 72 percent. Table 18 provides a summary of the key performance measures.

Table 18: 210-Foot Cutter Fleet Performance Data for Fiscal Years 2000-2004

Fiscal year	Major casualties per cutter	POTF of major casualties
2000	7.1	52%
2001	11.1	48%
2002	12.1	40%
2003	12.6	37%
2004	11.1	41%

Source: U.S. Coast Guard.

Maintenance Trends

Scheduled maintenance expenditures fluctuated for the 210-foot medium-endurance cutters from fiscal years 2000 to 2004, with a major increase in fiscal year 2003. Coast Guard officials attribute this increase in expenditures to the age and poor structural condition of the cutters, the

replacement of obsolete equipment, and upgrades. The increased cutter maintenance that occurred in fiscal year 2003 was sourced from supplemental appropriations. Unscheduled maintenance expenditures saw a small amount of fluctuation during fiscal years 2000 through 2004. Table 19 provides a summary of the key maintenance measures.

Table 19: 210-Foot Cutter Fleet Maintenance Data for Fiscal Years 2000-2004, in Fiscal Year 2004 Dollars

Fiscal year	Scheduled maintenance costs	Unscheduled maintenance costs	Total maintenance costs
2000	$9,994,463	$1,899,895	**$11,894,358**
2001	$8,801,109	$1,783,393	**$10,584,502**
2002	$6,168,837	$1,443,401	**$7,612,238**
2003	$15,209,055	$1,541,610	**$16,750,666**
2004	$6,362,468	$1,176,492	**$7,538,960**

Source: GAO analysis of U.S. Coast Guard data.

Sustainment Issues

The average age of the 210-foot cutters is 38.3 years. The first 210-foot cutter will enter the MEP beginning in September 2005 at a projected cost of $5 million, funded from the Deepwater program's acquisition, construction, and improvement account. Overall, the 210-foot cutter MEP is projected to cost a total of $98.5 million, and the work will extend into fiscal year 2009. In addition, regularly scheduled maintenance should continue to address the principal maintenance problems for the 210-foot cutters as identified in the top 10 list, such as the air conditioning system, refrigeration system, oily water separators, and supportability of the emergency diesel generators.

110-Foot and 123-Foot Patrol Boats

110-Foot and 123-Foot Patrol Boat Fleet Overview

Overall, there are currently 49 patrol boats in the Coast Guard Deepwater fleet. Of these, 41 are 110 feet long, with 29 of those stationed in the Atlantic Area Command and the remaining 12 stationed in the Pacific Area Command. Six of the Atlantic Area Command's 110-foot patrol boats are currently serving in the Persian Gulf. These 110-foot patrol boats were acquired between 1986 and 1992, have estimated service lives of 14 to 20 years, and operate with a crew of 2 officers and 14 enlisted personnel. The patrol boats generally operate at 1,800 hours per year. The 110-foot patrol boats are used in a variety of missions, such as defense operations; maritime security/law enforcement; search and rescue; living marine resources; ports, waterway, and coastal security; alien-migrant interdiction; and drug interdiction.

The remaining 8 patrol boats either have undergone or are in the process of being converted into 123-foot patrol boats. These patrol boats are to be stationed in the Atlantic Area Command and, like the 110-foot patrol boats, are to operate with a crew of 2 officers and 14 enlisted personnel. The 123-foot patrol boats are slated to perform the same missions as the 110-foot patrol boats but will have the capability to generally operate 2,500 hours per year. The first converted 123-foot patrol boat (*Matagorda*) became operational in February 2005, and as of early June 2005, 4 additional 123-foot patrol boats are operational, with restrictions.[3]

Performance Trends

During fiscal years 2000 through 2004, the 110-foot patrol boats have experienced many problems, especially hull corrosion issues, which led to a worsening condition. However, the Coast Guard began addressing the hull condition issues (see details below), which likely contributed to the decreases in the major casualties in fiscal years 2003 and 2004. Table 20 provides a summary of the key performance measures.

[3]The patrol boats' operational restrictions require a reduction in speed based upon significant wave heights that might be encountered at sea.

Table 20: Patrol Boat Fleet Performance Data for Fiscal Years 2000-2004

Fiscal year	Major casualties per patrol boat	POTF of major casualties
2000	6.2	67%
2001	9.9	57%
2002	12.9	47%
2003	9.7	48%
2004[a]	7.7	44%

Source: U.S. Coast Guard.

[a]Fiscal year 2004 data include major casualties and POTF data from the newly converted 123-foot patrol boats.

Maintenance Trends

Scheduled and unscheduled maintenance expenditures saw large increases in fiscal years 2002 and 2003. These increases appear to be closely related to increased major casualties, deteriorating hull conditions, and an increase in operational tempo. In addition, increased cutter maintenance occurred during this time period due to supplemental appropriations. Table 21 provides a summary of the key maintenance measures.

Table 21: Patrol Boat Fleet Maintenance Data for Fiscal Years 2000-2004, in Fiscal Year 2004 Dollars

Fiscal year	Scheduled maintenance costs	Unscheduled maintenance costs	Total maintenance costs
2000	$12,713,001	$1,650,862	**$14,363,864**
2001	$12,891,098	$2,445,161	**$15,336,258**
2002	$21,406,754	$3,439,798	**$24,846,551**
2003	$23,713,280	$5,149,335	**$28,862,615**
2004[a]	$18,850,450	$3,625,459	**$22,475,909**

Source: GAO analysis of U.S. Coast Guard data.

[a]Fiscal year 2004 expenditure data also include maintenance expenditures for the newly-converted 123-foot patrol boats.

Sustainment Issues

The average age of the patrol boats is 16.4 years. A number of the 110-foot patrol boats have experienced significant hull deterioration. To combat these corrosion problems and add other capabilities to the 110-foot patrol boats, the Coast Guard developed the Hull Sustainment Project (HSP) and the 123-foot patrol boat conversion program.

The HSP was implemented to replace all deteriorated hull plates and structural members. The selected patrol boats were gutted, sandblasted, and thoroughly inspected, and all metal wasted beyond 15 percent was renewed. As of early June 2005, 9 of the original 49 110-foot patrol boats had completed the HSP. The Coast Guard believes that all remaining 110-foot patrol boats that have not had their hulls strengthened or replaced will eventually require such work. The Coast Guard is currently preparing a business case analysis in order to use $49.2 million in fiscal year 2005 supplemental appropriations[4] for a 110-foot patrol boat MEP. This project would include hull sustainment work.

In addition to the HSP, 8 patrol boats deemed to be among those in the worst condition were placed in the 123-foot conversion program. The Coast Guard had the option to place an additional 4 patrol boats (for a total of 12) in the 123-foot conversion program but has decided not to exercise this option. This program was implemented to renew the deteriorated hull structure and to add additional capability. Among the expected capability improvements are:

- enhanced and improved command, control, communications, computer, intelligence, surveillance, and reconnaissance capabilities;
- stern launch/recovery capability for the Short Range Prosecutor;
- renovation of some berthing areas, including relocation of aft berthing to a location forward and nonadjacent to the engine room; and
- renewing the pilot house to include a 360-degree bridge.

As of early June 2005, 7 of the 8 patrol boats have completed the conversion, and 5 converted patrol boats are operational (*Matagorda*, *Metompkin*, *Padre*, *Attu*, and *Vashon*, with all patrol boats currently under operating restrictions). The first patrol boat to come out of the conversion process, the *Matagorda*, was delivered to the Coast Guard in March 2004 but experienced a number of problems that prevented it from becoming operational until February 2005. Specifically, upon delivery, the

[4]Emergency Supplemental Appropriations Act for Defense, the Global War on Terror, and Tsunami Relief, 2005, Pub. L. No. 109-13, 119 Stat. 231, 270 (2005). In the conference report accompanying the bill that was enacted into law as Public Law 109-13, the conferees agreed that such funds may be used for procurement of new U.S. Coast Guard 110-foot patrol boats or major refits, renovation, and subsystem replacement. H.R. Conf. Rep. No. 109-72, at 138 (2005).

Coast Guard identified several discrepancies with the original performance specifications. One such discrepancy was the inability of the patrol boat to simultaneously launch or recover the short-range prosecutor while towing another vessel. In September 2004, *Matagorda* experienced hull buckling, and repairs were completed in December 2004. However, while en route from the shipyard to Key West, Florida, *Matagorda* encountered a storm, causing damage to the primary radar system and new cracks in the hull. These problems were resolved, and *Matagorda* began patrols in early February 2005. Additionally, the contractor that performed the work is applying lessons learned from the *Matagorda* conversion to the other patrol boats still undergoing conversion. Further, the contractor has increased the number of quality assurance personnel from one to four to improve oversight of the conversion process.

The Coast Guard top 10 list mentions several maintenance concerns, in addition to hull corrosion, that have negatively affected the condition of the 110-foot patrol boats. These include difficulties in obtaining parts for the fin stabilizer system, steering spaces holding moisture (which leads to rust and corrosion), and exhaust piping leaks. In addition, the Coast Guard has stated that mechanical and electrical subsystems need to be upgraded or replaced if the patrol boats are to operate for another 10 to 15 years, even the newly converted 123-foot patrol boats.

Appendix III: GAO Contact and Staff Acknowledgments

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Steven Calvo, Christopher Conrad, Adam Couvillion, Michele Fejfar, Geoffrey Hamilton, Julie Leetch, Michele Mackin, Stan Stenersen, and Linda Kay Willard.

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