United States Government Accountability Office

GAO

Report to Congressional Committees

July 2011

COAST GUARD

Action Needed As Approved Deepwater Program Remains Unachievable

GAO-11-743

July 2011

COAST GUARD

Action Needed As Approved Deepwater Program Remains Unachievable

GAO Accountability * Integrity * Reliability

Highlights

Highlights of GAO-11-743, a report to congressional committees

Why GAO Did This Study

The Deepwater Program includes efforts to build or modernize ships and aircraft, including supporting capabilities. In 2007, the Coast Guard took over the systems integrator role from Integrated Coast Guard Systems (ICGS) and established a $24.2 billion program baseline which included schedule and performance parameters. Last year, GAO reported that Deepwater had exceeded cost and schedule parameters, and recommended a comprehensive study to assess the mix of assets needed in a cost-constrained environment given the approved baseline was no longer feasible. GAO assessed the (1) extent to which the program is exceeding the 2007 baseline and credibility of selected cost estimates and schedules; (2) execution, design, and testing of assets; and (3) Coast Guard's efforts to conduct a fleet mix analysis. GAO reviewed key Coast Guard documents and applied criteria from GAO's cost guide.

What GAO Recommends

GAO is making recommendations to the Department of Homeland Security (DHS) that include identifying trade-offs to the planned Deepwater fleet and ensuring the Offshore Patrol Cutter (OPC) design is achievable and to the Coast Guard that include identifying priorities, incorporating cost and schedule best practices, increasing confidence that assets will meet mission needs, and reporting complete information on risks to Congress in a timely manner. DHS concurred with the recommendations. We also suggest that Congress consider including a permanent statutory provision that requires timely and complete information on risks.

View GAO-11-743 or key components.
For more information, contact John Hutton at (202) 512-4841 or huttonj@gao.gov.

What GAO Found

The Deepwater Program continues to exceed the cost and schedule baselines approved by DHS in 2007, but several factors continue to preclude a solid understanding of the program's true cost and schedule. The Coast Guard has developed baselines for some assets that indicate the estimated total acquisition cost could be as much as $29.3 billion, or about $5 billion over the $24.2 billion baseline. But additional cost growth is looming because the Coast Guard has yet to develop revised baselines for all assets, including the OPC—the largest cost driver in the program. In addition, the Coast Guard's most recent capital investment plan indicates further cost and schedule changes not yet reflected in the asset baselines, contributing to the approved 2007 baseline no longer being achievable. The reliability of the cost estimates and schedules for selected assets is also undermined because the Coast Guard did not follow key best practices for developing these estimates. Coast Guard and DHS officials agree that the annual funding needed to support all approved Deepwater baselines exceeds current and expected funding levels, which affects some programs' approved schedules. The Coast Guard's acquisition directorate has developed action items to help address this mismatch by prioritizing acquisition program needs, but these action items have not been adopted across the Coast Guard.

The Coast Guard continues to strengthen its acquisition management capabilities, but is faced with several near-term decisions to help ensure that assets still in design will meet mission needs. For example, whether or not the planned system-of-systems design is achievable will largely depend upon remaining decisions regarding the design of the command and control system. Important decisions related to the affordability, feasibility, and capability of the OPC also remain. For those assets under construction and operational, preliminary tests have yielded mixed results and identified concerns, such as design issues, to be addressed prior to initial operational test and evaluation. The Coast Guard is gaining a better understanding of cost, schedule, and technical risks, but does not always fully convey these risks in reports to Congress.

As lead systems integrator, the Coast Guard planned to complete a fleet mix analysis to eliminate uncertainty surrounding future mission performance and produce a baseline for Deepwater. This analysis, which the Coast Guard began in 2008, considered the current program to be the "floor" for asset capabilities and quantities and did not impose cost constraints on the various fleet mixes. Consequently, the results will not be used for trade-off decisions. The Coast Guard has now begun a second analysis, expected for completion this summer, which includes an upper cost constraint of $1.7 billion annually—more than Congress has appropriated for the entire Coast Guard acquisition portfolio in recent years. DHS is also conducting a study to gain insight into alternatives that may include options that are lower than the program of record for surface assets. A DHS official stated that this analysis and the Coast Guard's fleet mix analysis will provide multiple data points for considering potential changes to the program of record, but Coast Guard officials stated they have no intention of examining fleet mixes smaller than the current, planned Deepwater program.

Contents

Letter		1
	Background	3
	True Cost and Schedule of Deepwater Program Is Not Known	10
	Execution of the Deepwater Program Is Progressing, but Key Decisions Remain for the Design and Testing of Deepwater Assets	28
	Coast Guard Has Not Completed a Comprehensive Trade-Off Analysis for the Deepwater Assets	45
	Conclusions	48
	Recommendations for Executive Action	49
	Matter for Congressional Consideration	51
	Agency Comments and Our Evaluation	51
Appendix I	Scope and Methodology	57
Appendix II	Comments from the Department of Homeland Security and Coast Guard	60
Appendix III	Assessments of MPA and C4ISR Cost Estimates	65
Appendix IV	Assessments of MPA and NSC Schedules	69
Appendix V	Allocation of Deepwater Acquisition, Construction, and Improvement Dollars in the Fiscal Years 2008, 2009, 2010, and 2011 Capital Investment Plans (Then-Year Dollars)	77
Appendix VI	GAO Contacts and Staff Acknowledgments	78
Related GAO Products		79

Tables

Table 1: Information on Assets the Coast Guard Plans to Buy or Upgrade as Part of the Deepwater Program 7
Table 2: Increased Total Acquisition Cost Estimates for Deepwater Assets with Approved Baselines as of May 2011 (Then-Year dollars in millions) 12
Table 3: Fiscal Years 2012-2016 Capital Investment Plan for Deepwater Assets (Then-Year dollars in thousands) 27
Table 4: Current C4ISR System on Each Deepwater Asset Compared to Planned C4ISR System 35
Table 5: Alternative Fleet Mix Asset Quantities According to Coast Guard's Phase 1 Fleet Mix Analysis 46
Table 6: The 12 Steps of High-Quality Cost Estimating Mapped to the Steps of a High-Quality Cost Estimate 65
Table 7: Analysis of the MPA Cost Estimate 67
Table 8: Analysis of C4ISR Cost Estimate 68
Table 9: Analysis of the MPA 12-14 Contractor's Schedule 70
Table 10: Analysis of the NSC 3 Program Schedule 73

Figures

Figure 1: Key Events in the Deepwater Program 6
Figure 2: Deepwater Assets Within DHS Acquisition Phases and Decision Events as of May 15, 2011 10
Figure 3: Final Asset Delivery Dates for Selected Deepwater Assets Identified in the 2007 Deepwater Baseline, Revised Baselines, and Fiscal Years 2012-2016 Capital Investment Plan 16
Figure 4: Extent to which MPA and C4ISR Life-cycle Cost Estimates Meet Best Practices 18
Figure 5: Extent to which the Schedules for MPA 12-14 and NSC 3 Meet Best Practices 21
Figure 6: Allocation of Deepwater Acquisition, Construction, and Improvements Dollars in the Fiscal Years 2008, 2009, 2010, and 2011 Capital Investment Plans (Then-Year Dollars) 25
Figure 7: Deepwater System-of-Systems Concept 31
Figure 8: Allocation of Deepwater Acquisition, Construction, and Improvement Dollars in the Fiscal Years 2008, 2009, 2010, and 2011 Capital Investment Plans (Then-Year Dollars) 77

Abbreviations

ADE	Acquisition Decision Event
ASIST	Aircraft Ship Integrated Secure and Traverse
C4ISR	Command, Control, Communications, Computers, Intelligence, Surveillance, and Reconnaissance
DHS	Department of Homeland Security
DOD	Department of Defense
FRC	Fast Response Cutter
ICGS	Integrated Coast Guard Systems
MPA	Maritime Patrol Aircraft
NSC	National Security Cutter
OPC	Offshore Patrol Cutter
QARC	Quarterly Acquisition Report to Congress
UAS	Unmanned Aircraft Systems

GAO
Accountability * Integrity * Reliability

United States Government Accountability Office
Washington, DC 20548

July 28, 2011

Congressional Committees

The Deepwater Program—the largest acquisition program in the Coast Guard's history—began in 1996 as an effort to recapitalize the Coast Guard's operational fleet. The program now includes projects to build or modernize five classes each of ships and aircraft, and procurement of other capabilities such as improved command, control, communications, computers, intelligence, surveillance, and reconnaissance (C4ISR).[1] Our prior work on the Deepwater Program identified problems in the areas of costs, management, and oversight that have led to delivery delays and other operational challenges for certain assets, but it also recognized several steps the Coast Guard has taken to improve Deepwater management. For example, beginning in 2007, the Coast Guard assumed the role of lead systems integrator for the Deepwater Program, a role which the Coast Guard had previously contracted to Integrated Coast Guard Systems (ICGS).[2] In assuming this role, the Coast Guard has taken a number of steps to manage the Deepwater projects, including reorganizing its acquisition directorate, applying the knowledge-based acquisition policies and practices outlined in its *Major Systems Acquisition Manual*, and developing baselines for each asset. These steps have given the Coast Guard better insight into asset-level capabilities and costs, but we have reported that the $24.2 billion program as envisioned in 2007 is no longer feasible, in terms of cost and schedule. Furthermore, we also reported that it is unlikely that system-level performance baselines established in 2007 will be met. Given this situation, we recommended last year that the Commandant of the Coast Guard present to Congress a comprehensive review of the Deepwater Program that clarifies the overall cost, schedule, quantities, and mix of assets required to meet mission needs, including trade-offs in light of fiscal constraints,

[1]The Department of Homeland Security's (DHS) fiscal year 2012 budget request to Congress included a proposal to eliminate the term "Integrated Deepwater System" from its annual appropriation. At the time of this report, Congress had not passed the fiscal year 2012 DHS appropriations act; therefore, this report continues to use the term Deepwater.

[2]ICGS is a business entity jointly owned by Northrop Grumman and Lockheed Martin.

given that the currently approved Deepwater baseline is no longer feasible.[3]

Under the Comptroller General's Authority, we assessed (1) the extent to which the Deepwater Program's planned cost and schedule baselines have been exceeded and the credibility of cost estimates and schedules for selected assets; (2) the progression of the execution, design, and testing of the assets within the Deepwater Program; and (3) whether the Coast Guard has undertaken a fleet mix study that addresses trade-offs in a cost-constrained environment.

To conduct our work, we reviewed the Coast Guard's *Major Systems Acquisition Manual*, capital investment plans, and key asset documents including operational requirements documents, acquisition strategies and plans, acquisition program baselines, life-cycle cost estimates, test reports, and contracts. We obtained and analyzed schedule and cost estimates for selected assets using the best practices criteria set forth in our cost guide.[4] We also reviewed a Coast Guard analysis of various fleet mixes—termed fleet mix analysis phase I—which was completed in December 2009. We also reviewed the charter and contractor's statement of work for the phase 2 analysis. We interviewed Coast Guard officials in the acquisitions directorate as well as officials in the directorates responsible for budgeting and resources and for assessing and developing operational requirements for Deepwater assets (the capabilities directorate). In addition, we interviewed Department of Homeland Security (DHS) officials from the Acquisition Program Management Directorate, Cost Analysis Division, Program Analysis and Evaluation Division, and the Science and Technology Test & Evaluation and Standards Division. We discussed the Coast Guard's Quarterly Acquisition Reports to Congress with Office of Management and Budget and DHS's Office of the Chief Financial Officer officials. We interviewed contractor representatives from Northrop Grumman Shipbuilding and Bollinger Shipyards and toured their respective shipyards. We also met with Coast Guard officials at the Navy's Commander Operational Test and Evaluation Force and Coast Guard operators at the Aviation Training

[3]GAO, *Coast Guard: Deepwater Requirements, Quantities, and Cost Require Revalidation to Reflect Knowledge Gained*, GAO-10-790 (Washington, D.C.: July 27, 2010).

[4]GAO, *GAO Cost Estimating and Assessment Guide: Best Practices for Developing and Managing Capital Program Costs*, GAO-09-3SP (Washington, D.C.: March 2009).

Center. We relied in part on our past work on the Deepwater Program. Appendix I contains more information regarding our scope and methodology.

We conducted this performance audit from September 2010 to July 2011 in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

Background

The Coast Guard is a multimission, maritime military service within DHS. The Coast Guard has a variety of responsibilities including port security and vessel escort, search and rescue, and polar ice operations. To carry out these responsibilities, the Coast Guard operates a number of vessels, aircraft, and information technology programs. Since 2001, we have reviewed the Deepwater Program and reported to Congress, DHS, and the Coast Guard on the risks and uncertainties inherent with this program. In our July 2010 report, we found that DHS and Coast Guard acquisition policies and processes continued to evolve, further establishing the Coast Guard as systems integrator, and that the Coast Guard continued to improve its acquisition workforce and develop means to further reduce vacancies. We also found that as the Coast Guard's understanding of the assets evolved, achievement of the DHS-approved May 2007 acquisition program baseline of $24.2 billion for the Deepwater Program was not feasible due to cost growth and schedule delays.[5] We concluded that while the Coast Guard had deepened its understanding of the resources needed and capabilities required on an asset level, the Coast Guard had not revalidated its system-level requirements and lacked the analytical framework needed to inform Coast Guard and DHS decisions about asset trade-offs in the future.

A Brief History of the Deepwater Program

At the start of the Deepwater Program in the late 1990s, the Coast Guard chose to use a system-of-systems acquisition strategy. A system-of-systems is a set or arrangement of assets that results when independent

[5] GAO-10-790.

assets are integrated into a larger system that delivers unique capabilities. The Coast Guard contracted with ICGS in June 2002 to be the systems integrator for Deepwater and provided ICGS with broad, overall performance specifications—such as the ability to interdict illegal immigrants—and ICGS determined the assets needed and their specifications. According to Coast Guard officials, ICGS submitted and priced its proposal as a package; that is, the Coast Guard bought the entire solution and could not reject any individual component.

In 2002, the Coast Guard conducted a performance gap analysis that determined the Deepwater fleet as designed by ICGS would have significant capability gaps in meeting emerging mission requirements following the September 11, 2001, terrorist attacks. The Coast Guard decided, due to fiscal constraints, not to make significant changes to the ICGS planned Deepwater fleet, but did approve several asset capability changes.[6] Following these changes, the Coast Guard submitted a revised cost, schedule, and performance baseline for the overall Deepwater Program to DHS in November 2006. The new baseline established the total acquisition cost of the ICGS solution at $24.2 billion and projected the Coast Guard would complete the acquisition in 2027. DHS approved the baseline in May 2007, shortly after the Coast Guard—acknowledging that it had relied too heavily on contractors to do the work of the government and that government and industry had failed to control costs—announced its intention to take over the role of systems integrator.

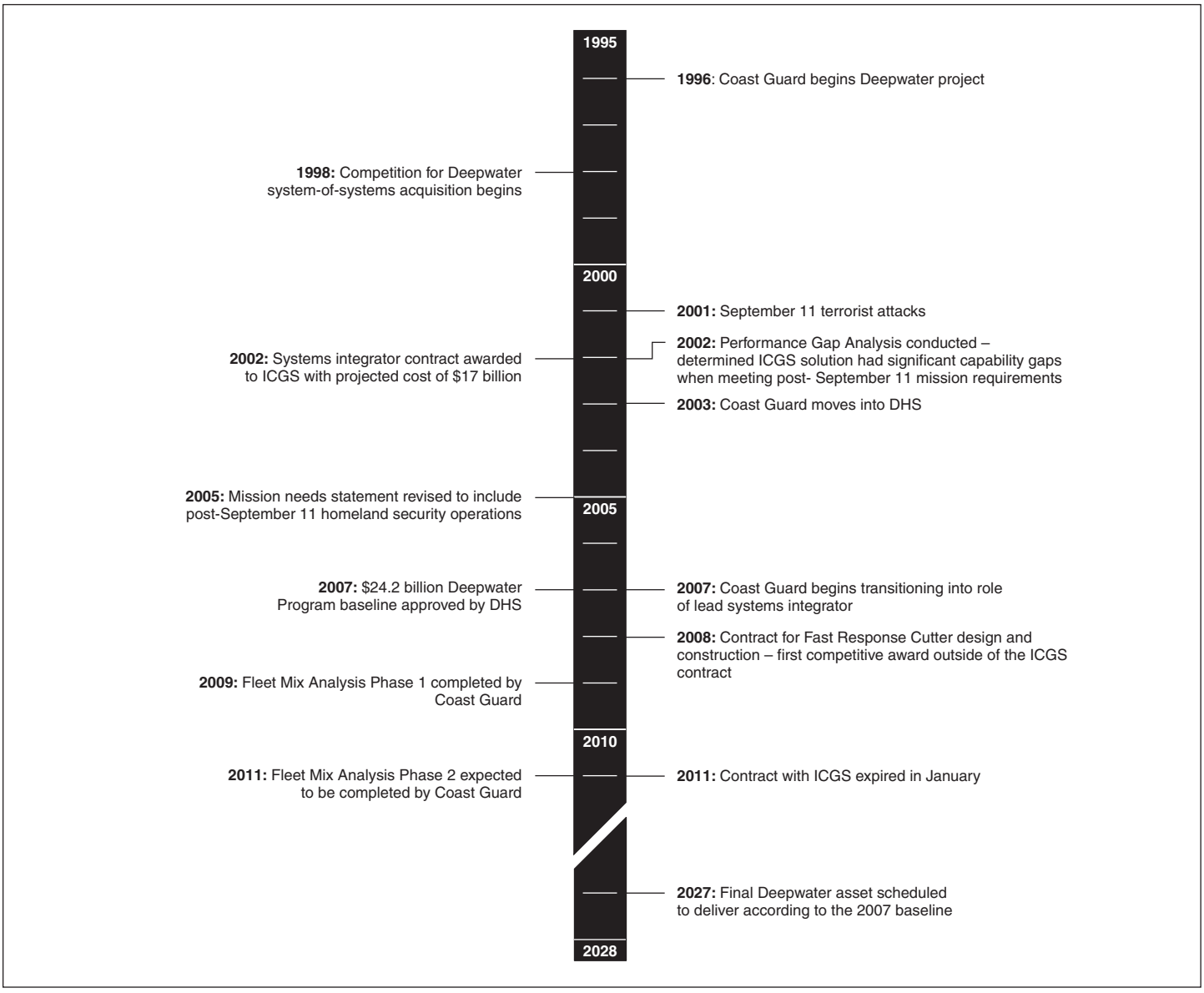
With limited insight into how ICGS's planned fleet would meet overall mission needs, the Coast Guard has acknowledged challenges in justifying the proposed capabilities and making informed decisions about possible trade-offs. In October 2008, the capabilities directorate initiated a fleet mix analysis intended to be a fundamental reassessment of the capabilities and mix of assets the Coast Guard needs to fulfill its Deepwater mission. As we reported last year, officials stated that this analysis did not impose fiscal constraints on the outcome and therefore, the results were unfeasible. As a result of discussions with DHS, the Coast Guard started a second, cost-constrained analysis—fleet mix

[6] These changes were reflected in the 2005 Integrated Deepwater Mission Needs Statement.

analysis phase 2.[7] Figure 1 provides a time line of key events in the Deepwater Program.

[7] GAO-10-790.

Figure 1: Key Events in the Deepwater Program



Source: GAO presentation of Coast Guard data.

Key directorates involved in the management of the Deepwater Program include the capabilities, resources, C4 and information technology, and acquisition directorates. Most of the Deepwater assets are considered

major acquisitions, as outlined in the Coast Guard's *Major Systems Acquisition Manual*. Acquisitions with life-cycle cost estimates equal to or greater than $1 billion are considered level I, and those with cost estimates from $300 million to less than $1 billion are considered level II. These major acquisition programs are to receive oversight from DHS's acquisition review board, which is responsible for reviewing acquisitions for executable business strategies, resources, management, accountability, and alignment with strategic initiatives. The Coast Guard provides oversight to programs that have life-cycle cost estimates less than $300 million (level III). Table 1 describes in more detail the assets the Coast Guard plans to buy or upgrade under the Deepwater Program, the associated investment level if known, and planned and delivered quantities.

Table 1: Information on Assets the Coast Guard Plans to Buy or Upgrade as Part of the Deepwater Program

Asset/acquisition level	Planned quantity (as of May 15, 2011)	Delivered quantity (as of May 15, 2011)	Description
National Security Cutter (NSC) Level I	8 cutters	2 cutters	The NSC is intended to be the flagship of the Coast Guard's fleet, with an extended on-scene presence, long transits, and forward deployment. The cutter and its aircraft and small boat assets are to operate worldwide.
Offshore Patrol Cutter (OPC) Level I (projected)	25 cutters	0	The OPC is intended to conduct patrols for homeland security functions, law enforcement, and search and rescue operations. It will be designed for long-distance transit, extended on-scene presence, and operations with multiple aircraft and small boats.
Fast Response Cutter (FRC) Level I	58 cutters	0	The FRC, also referred to as the Sentinel class, is a patrol boat envisioned to have high readiness, speed, adaptability, and endurance to perform a wide range of missions.
Medium Endurance Cutter Sustainment Level I	27 cutters	16 cutters	The Medium Endurance Cutter Sustainment project is intended to improve the cutters' current operating and cost performance by replacing obsolete, unsupportable, or maintenance-intensive equipment.
Patrol Boat Sustainment Level II	17 boats	13 boats	The patrol boat sustainment project is intended to improve the 110' patrol boats' operating and cost performance by replacing obsolete, unsupportable, or maintenance-intensive equipment.
Cutter Small Boats Level III	27 boats	0	Cutter small boats are an integral component of the planned capabilities for the larger cutters and patrol boats and are critical to achieving success in all operational missions.
HC-144A Maritime Patrol Aircraft (MPA) Level I	36 aircraft with mission system pallets	11 aircraft 12 mission system pallets	The MPA is a transport and surveillance, fixed-wing aircraft intended to be used to perform search and rescue missions, enforce laws and treaties, and transport cargo and personnel. The mission system pallet is a roll-on, roll-off suite of electronic equipment intended to enable the aircrew to compile data from the aircraft's multiple integrated sensors and transmit and receive information.

Asset/acquisition level	Planned quantity (as of May 15, 2011)	Delivered quantity (as of May 15, 2011)	Description
HC-130J Long-Range Surveillance Aircraft Level II	8 aircraft	6 aircraft	The HC-130J is a four-engine turbo-prop aircraft that the Coast Guard has deployed with improved interoperability, C4ISR, and sensors to enhance surveillance, detection, classification, identification, and prosecution.
HC-130H Long-Range Surveillance Aircraft Level I	16 aircraft	Segments 1 through 5 -not complete	The HC-130H is the legacy Coast Guard long-range surveillance aircraft, which the Coast Guard intends to update in multiple segments.
HH-65 Multi-mission Cutter Helicopter Level I	102 aircraft	Segments 1 and 2 -complete Segments 3 through 6 -not complete	The HH-65 Dolphin is the Coast Guard's short-range recovery helicopter. It is being upgraded to improve its engines, sensors, navigation equipment, avionics, ability to land on the NSC, and other capabilities in multiple segments.
HH-60 Medium Range Recovery Helicopter Level I	42 aircraft	Segments 1 through 4 -not complete	The HH-60 is a medium-range recovery helicopter designed to perform search and rescue missions offshore in all weather conditions. The Coast Guard has planned upgrades to the helicopter's avionics, sensors, radars, and communication systems in multiple segments.
Unmanned Aircraft Systems (UAS) Level I (projected)	To be decided	0	The Coast Guard is exploring the use of UASs to supplement the service's cutter-and land-based aviation capabilities.
C4ISR Level I	8 segments	Segment 1 -complete Segments 2-8 -not complete	The Coast Guard is incrementally acquiring C4ISR capabilities, including upgrades to existing cutters and shore installations, acquisitions of new capabilities, and development of a common operating picture to provide operationally relevant information and knowledge across the full range of Coast Guard operations.

Source: Coast Guard data with GAO presentation.

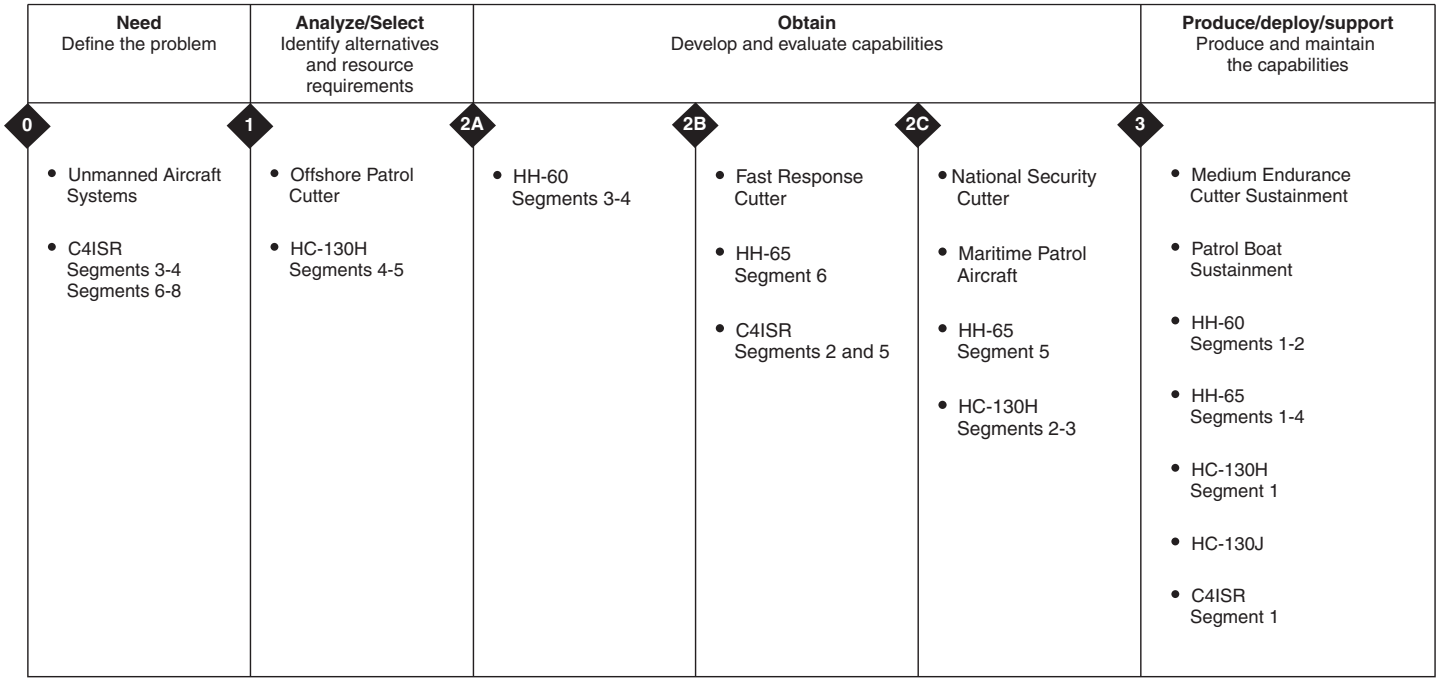
DHS's acquisition review board not only provides oversight for major acquisition programs, but also supports the department's Acquisition Decision Authority in determining the appropriate direction for an acquisition at key Acquisition Decision Events (ADE). At each ADE, the Acquisition Decision Authority approves acquisitions to proceed through the acquisition life-cycle phases upon satisfaction of applicable criteria. Additionally, Component Acquisition Executives at the Coast Guard and other DHS components are responsible in part for managing and overseeing their respective acquisition portfolios, as well as approving level III systems acquisitions. The DHS four-phase acquisition process is:

- Need phase—define a problem and identify the need for a new acquisition. This phase ends with ADE 1, which validates the need for a major acquisition program.

- Analyze/Select phase—identify alternatives and select the best option. This phase ends with ADE-2A, which approves the acquisition to proceed to the obtain phase and includes the approval of the acquisition program baseline.
- Obtain phase—develop, test, and evaluate the selected option and determine whether to approve production. During the obtain phase, ADE-2B approves a discrete segment if an acquisition is being developed in segments and ADE-2C approves low-rate initial production.[8] This phase ends with ADE-3 which approves full-rate production.
- Produce/Deploy/Support phase—produce and deploy the selected option and support it throughout the operational life cycle. Figure 2 depicts where level I and II Deepwater assets currently fall within these acquisition phases and decision events.

[8] For assets not being developed in segments, a combined ADE-2A/2B approves the acquisition to proceed to the obtain phase.

Figure 2: Deepwater Assets Within DHS Acquisition Phases and Decision Events as of May 15, 2011



Source: Coast Guard data with GAO presentation.

True Cost and Schedule of Deepwater Program Is Not Known

The Deepwater Program as a whole continues to exceed the cost and schedule baselines approved by DHS in May 2007, but several factors preclude a solid understanding of the true cost and schedule of the program. The Coast Guard has developed baselines for some assets, most of which have been approved by DHS, that indicate the estimated total acquisition cost could be as much as $29.3 billion, or about $5 billion over the $24.2 billion baseline. But additional cost growth is looming because the Coast Guard has yet to develop revised baselines for all the Deepwater assets, including the Offshore Patrol Cutter (OPC)—the largest cost driver in the Deepwater Program. In addition, the Coast Guard's most recent 5-year budget plan, included in DHS's fiscal year 2012 budget request, indicates further cost and schedule changes not yet reflected in the asset baselines. The reliability of the cost estimates and schedules for selected assets is also undermined because the Coast Guard did not follow key best practices for developing these estimates. Coast Guard and DHS officials agree that the annual funding needed to support all approved Deepwater baselines exceeds current and expected funding levels in this fiscal climate. This contributes to churn in program

baselines when programs are not able to execute schedules as planned. The Coast Guard's acquisition directorate has developed several action items to help address this mismatch by prioritizing acquisition program needs, but these action items have not been adopted across the Coast Guard.

Additional Cost Growth and Schedule Delays beyond Those in Approved Program Baselines Are Looming

The estimated total acquisition cost of the Deepwater Program, based on approved program baselines as of May 2011, could be as much as approximately $29.3 billion, or about $5 billion more than the $24.2 billion baseline approved by DHS in 2007.[9] This represents an increase of approximately 21 percent. As of May 2011, DHS had approved eight revised baselines from the 2007 program and the Coast Guard had approved two based on a delegation of approval authority from DHS. The increase in acquisition cost for these programs alone is about 43 percent. Table 2 compares each Deepwater asset's acquisition cost estimate from the 2007 program baseline with revised baselines, if available.

[9] An acquisition program baseline formally summarizes the project's critical cost, schedule, and performance parameters, expressed in measurable, quantitative terms that must be met in order to accomplish the project's goals. By tracking and measuring actual project performance against this formal baseline, project management is alerted to potential problems, such as cost growth, schedule slip, or requirements creep, giving it the ability to take early corrective action.

Table 2: Increased Total Acquisition Cost Estimates for Deepwater Assets with Approved Baselines as of May 2011 (Then-Year dollars in millions)

Asset	2007 baseline	Revised baseline[a]	Percentage change from 2007 baseline to revised baseline
NSC	$3,450	$4,749	38
FRC	3,206	4,243	32
OPC	8,098	No revised baseline	n/a
Cutter Small Boats	110	No revised baseline[b]	n/a
Medium Endurance Cutter Sustainment	317	321	1
Patrol Boat Sustainment	117	194	66
MPA	1,706	2,400	41
HC-130J[c]	11	176	1500
HC-130H	610	745	22
HH-65[d]	741	1242	68
HH-60	451	487	8
UAS	503	No revised baseline	n/a
C4ISR	1,353	2,522	86
Other Deepwater Costs[e]	3,557	No new baseline will be developed	n/a
Total	24,230	29,347	21

Source: GAO analysis of Coast Guard data.

Note: If the revised baselines present both threshold costs (the maximum costs allowable before a breach occurs) and objective costs (the minimum cost expected), threshold costs are used. An acquisition program baseline breach of cost, schedule, or performance is an inability to meet the threshold value of the specific parameter.

[a] When a revised baseline is not available, the 2007 baseline cost is carried forward for calculating the total revised baseline cost.

[b] The cutter small boat program includes two different versions of small boats. Only one had an approved revised baseline as of May 2011.

[c] The acquisition costs are related to the mission system. The original HC-130J baseline only included costs associated with the fleet introduction of missionized aircraft and did not include the cost of acquiring the mission system and logistics support of the first six aircraft, and the revised baseline corrected this omission.

[d] The 2007 approved baseline did not include airborne use of force, National Capital Region Air Defense, and the surface search radar for the HH-65. The addition of these capabilities constitutes about $420 million of the revised costs.

[e] Includes other Deepwater costs, such as program management, that the Coast Guard states do not require a new baseline.

As we reported last year, these revised baselines reflect the Coast Guard's and DHS's efforts to understand acquisition costs of individual

Deepwater assets, as well as insight into the drivers of the cost growth. We previously reported on some of the factors contributing to increased costs for the NSC, MPA, and FRC.[10] For example, the Coast Guard has attributed the more than $1 billion rise in FRC's cost to a reflection of actual contract costs from the September 2008 contract award and costs for shore facilities and initial spare parts not included in the original baseline. More recently, DHS approved the revised baseline for the C4ISR program in February 2011, 2 years after the Coast Guard submitted it to the department. The revised baseline includes more than $1 billion in additional acquisition costs to account for factors such as post-September 11 requirements and the need to maintain a common core system design beyond the previously established fiscal year 2014 end date.

Additional cost growth is looming because the Coast Guard has yet to develop revised baselines for all of the Deepwater assets and even the approved baselines do not reflect all known costs. The Coast Guard has not submitted to DHS revised baselines for the OPC or the UAS because these two projects are pre-ADE-2. These two assets combined accounted for over 35 percent of the original baseline. The uncertainty regarding the OPC's cost estimate presents a key difficulty in determining what the Deepwater program may end up costing. The original 2007 estimate for one OPC was approximately $320 million.[11] However, the Coast Guard's fiscal years 2012-2016 capital investment plan cites a planned $640 million in fiscal year 2015 for the lead cutter.[12] Coast Guard resource and acquisition directorate officials stated that this $640 million is a point estimate for the lead cutter, some design work, and project management, but the estimate was not based on an approved life-cycle

[10] GAO-09-682 and GAO-10-790.

[11] The 2007 Deepwater acquisition program baseline does not include an estimate for the lead cutter. The program acquisition unit cost is approximately $320 million in then-year dollars.

[12] The Coast Guard's capital investment plan is a 5-year plan presented to Congress that includes Acquisition, Construction and Improvements. The Coast Guard updates the capital investment plan annually, and it represents the Coast Guard's submission for the President's Budget in any given year.

cost estimate and the Coast Guard has identified affordability as a risk for this program.[13]

Coast Guard officials stated that some of the approved acquisition program baselines fall short of the true funding needs. This not only exacerbates the uncertainty surrounding the total cost of the Deepwater acquisition, but also contributes to the approved Deepwater Program no longer being achievable. For example, the NSC program's approved baseline reflects a total acquisition cost of approximately $4.7 billion.[14] However, Congress has already appropriated approximately $3.1 billion for the program and the Coast Guard's fiscal years 2012-2016 capital investment plan indicates an additional $2.5 billion is needed through fiscal year 2016 for a total of $5.6 billion to complete the acquisition. This would represent an increase of approximately 19 percent over the approved acquisition cost estimate for eight NSCs. According to section 575 of Title 14 of the U.S. Code, the Commandant must submit a report to Congress no later than 30 days after the Chief Acquisition Officer of the Coast Guard becomes aware of a likely cost overrun for any level I or level II acquisition program that will exceed 15 percent. If the likely cost overrun is greater than 20 percent, the Commandant must include a certification to Congress providing an explanation for continuing the project. Senior Coast Guard acquisition officials stated that they cannot corroborate a total cost of $5.6 billion for the NSC program, or a cost increase of 19 percent, because the Coast Guard has not yet completed a life-cycle cost analysis for the program. However, these officials stated that a certification to Congress for the NSC program is pending as well as one for the MPA program.

We previously reported several schedule delays for assets based on the revised baselines and noted that as the Coast Guard reevaluates its baselines, it gains improved insight into the final delivery dates for all of the assets.[15] While the Coast Guard's revised baselines identify schedule delays for almost all of the programs, these baselines do not reflect the extent of some of these delays as detailed in the Coast Guard's fiscal

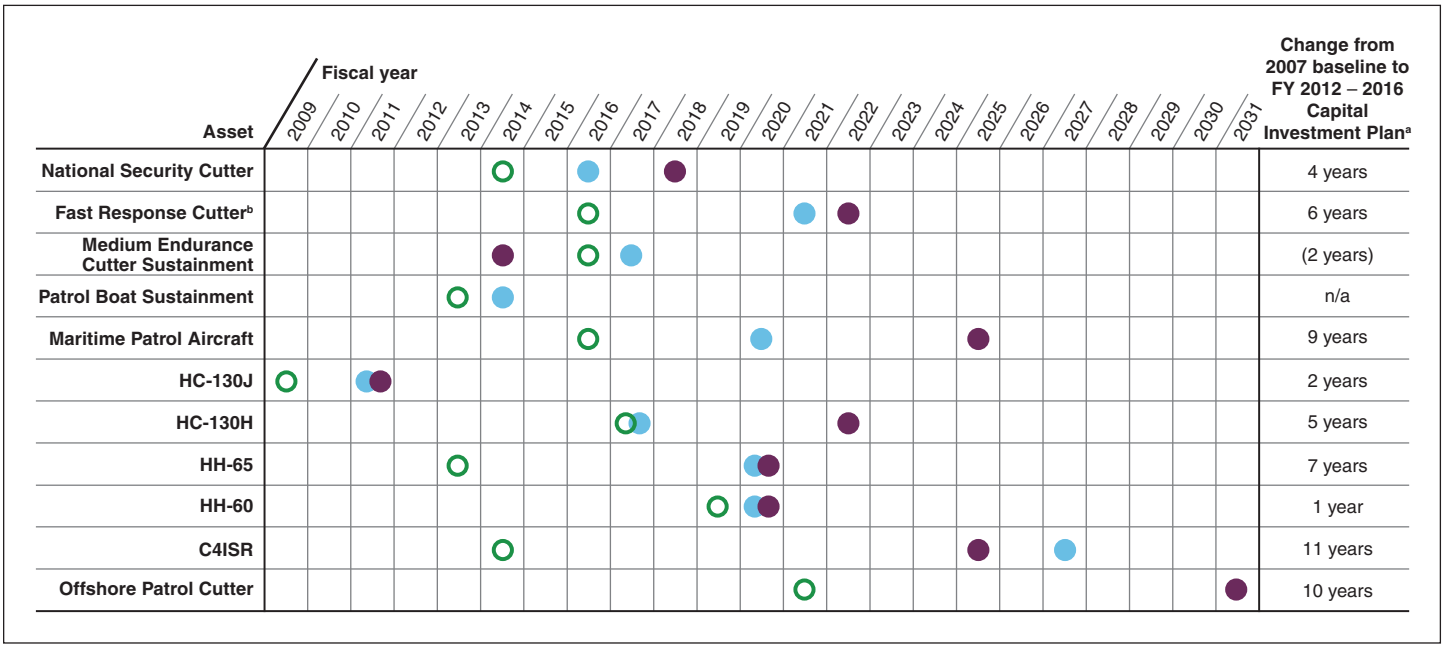
[13] A life-cycle cost estimate is intended to provide an exhaustive and structured accounting of all resources and associated cost elements required to develop, produce, deploy, and sustain a particular program.

[14] The total acquisition cost of $4.7 billion is in then-year dollars.

[15] GAO-09-682 and GAO-10-790.

years 2012-2016 capital investment plan. For example, the MPA's revised baseline has final asset delivery in 2020—a delay of 4 years from the 2007 baseline—but the capital investment plan indicates final asset delivery in 2025—an additional 5-year delay not reflected in the baseline. Coast Guard resource officials responsible for preparing this plan acknowledged that the final asset delivery dates in most of the revised baselines are not current. The forthcoming delays identified in the fiscal years 2012-2016 capital investment plan indicate that the final asset delivery dates approved in the 2007 Deepwater baseline are no longer achievable for most assets. Figure 3 shows delays in final asset delivery dates according to (1) the 2007 baseline; (2) the asset's revised baseline, if available; and (3) the fiscal years 2012-2016 capital investment plan submitted to Congress.

Figure 3: Final Asset Delivery Dates for Selected Deepwater Assets Identified in the 2007 Deepwater Baseline, Revised Baselines, and Fiscal Years 2012-2016 Capital Investment Plan



Source: GAO analysis of Coast Guard data.

[a] To calculate the change from the final asset delivery date reported in the 2007 Deepwater baseline to the final asset delivery date reported in the fiscal years 2012-2016 capital investment plan, we used the first month of each fiscal year. If the approved baselines provide both threshold and objective dates, threshold dates (which are the latest allowable dates) are used.

[b] In the 2007 baseline, costs for two variants of the FRC were presented. For the 2007 baseline we used the last date reported for final asset delivery.

Coast Guard's Cost Estimates and Schedules for Selected Assets Did Not Reflect Key Best Practices

Our analysis of selected assets' life-cycle cost estimates found that the Coast Guard did not fully follow best practices for developing reliable life-cycle cost estimates, which is at the core of successfully managing a project within cost and affordability guidelines. The *Major Systems Acquisition Manual* cites our Cost Estimating and Assessment Guide as a source for guidance and best practice information.[16] Furthermore, we found that the Coast Guard is not receiving reliable schedules for selected assets from its contractors, which should be inputs into a programwide schedule. We reviewed the MPA program's life-cycle cost estimate and schedule because this program has the highest life-cycle cost estimate of all Deepwater assets and has experienced schedule delays. We also reviewed the NSC program's schedule because this program has the second highest life-cycle cost estimate and has also experienced schedule delays. The Coast Guard was not able to provide us with a current NSC life-cycle cost estimate to review because the program is revising its estimate, an effort that was directed in a December 2008 DHS acquisition decision memorandum. Therefore, we reviewed the C4ISR program's life-cycle cost estimate because the estimate was complete, but the program did not yet have a DHS-approved acquisition program baseline and there was uncertainty concerning the direction of the program.

Reliable life-cycle cost estimates reflect four characteristics. They are (1) well-documented, (2) comprehensive, (3) accurate, and (4) credible.[17] These four characteristics encompass 12 best practices for reliable program life-cycle cost estimates that are identified in appendix III. The results of our review of the MPA and C4ISR life-cycle cost estimates are summarized in figure 4. Appendix III contains a more detailed discussion of the extent to which the two cost estimates met the four best practices criteria.

[16] GAO-09-3SP.

[17] GAO-09-3SP.

Figure 4: Extent to which MPA and C4ISR Life-cycle Cost Estimates Meet Best Practices

Best practice	Best practice description	MPA August 2009	C4ISR December 2009
Well-documented	The cost estimates should be supported by detailed documentation that describes the purpose of the estimate, the program background and system description, the scope of the estimate, the ground rules and assumptions, all data sources, estimating methodology and rationale, and the results of the risk analysis. Moreover, this information should be captured in such a way that the data used to derive the estimate can be traced back to, and verified against, their sources.	◕	◕
Comprehensive	The cost estimates should include costs of the program over its full life-cycle, provide a level of detail appropriate to ensure that cost elements are neither omitted nor double-counted, and document all cost-influencing ground rules and assumptions.	◕	◕
Accurate	The cost estimate should be based on an assessment of most likely costs (adjusted for inflation), documented assumptions, and historical cost estimates and actual experiences on other comparable programs. Estimates should be cross-checked against an independent cost estimate for accuracy, double counting, and omissions.[a] In addition, the estimate should be updated to reflect any changes.	◑	◑
Credible	The cost estimates should discuss any limitations of the analysis because of uncertainty, or biases surrounding data or assumptions. Risk and uncertainty analysis should be performed to determine the level of risk associated with the estimate. Further, the estimate's results should be cross-checked against an independent estimate.	◕	◔

○ Not met
◔ Minimally met
◑ Partially met
◕ Substantially met
● Fully met

Source: GAO analysis based on information provided by the Coast Guard.

Note: "Not met" means the Coast Guard provided no evidence that satisfies any of the criterion.

"Minimally met" means the Coast Guard provided evidence that satisfies a small portion of the criterion.

"Partially met" means the Coast Guard provided evidence that satisfies about half of the criterion.

"Substantially" means the Coast Guard provided evidence that satisfies a large portion of the criterion.

"Fully met" means the Coast Guard provided evidence that completely satisfies the criterion.

[a]An independent cost estimate is another estimate based on the same technical information that is used to validate and cross-check the baseline estimate, but is prepared by a person or organization that has no stake in the approval of the project.

While both life-cycle cost estimates addressed elements of best practices, their effectiveness is limited because they do not reflect the current program and have not been updated on a regular basis, which is considered a best practice for an accurate cost estimate. For example, the MPA life-cycle cost estimate was completed in August 2009. While

the Coast Guard has obtained actual costs, the program office has not updated the formal estimate with these actual costs. This limits the program's ability to analyze changes in program costs and provide decision makers with accurate information. The Coast Guard did include a sensitivity analysis to identify cost drivers, but this analysis did not examine possible effects of funding cuts—an area of risk for the MPA program. The Coast Guard completed the C4ISR life-cycle cost estimate in December 2009. DHS reviewed this estimate, but did not validate it. We found that this estimate was minimally credible for several reasons, including that the program did not complete a sensitivity analysis of cost drivers—even though cost drivers were identified and major funding cuts occurred which led to a program breach. C4ISR program officials told us that they are currently revising the 2009 estimate because it is no longer reflective of the current program. Coast Guard C4ISR officials agreed with our analysis and stated that they plan to incorporate the best practices going forward.

We found that neither the MPA nor the NSC programs are receiving schedule data from their contractors that fully meet schedule best practices. Our guidance identifies nine interrelated scheduling best practices that are integral to a reliable and effective master schedule. For example, if the schedule does not capture all activities, there will be uncertainty about whether activities are sequenced in the correct order and whether the schedule properly reflects the resources needed to accomplish work. MPA and NSC contractor schedule data should feed into each program's integrated master schedule in order to reliably forecast key program dates. However, the NSC program does not have an integrated master schedule that would account for all planned government and contractor efforts for the whole program. The program is currently managing a schedule for only the third cutter out of a total planned eight cutters. The MPA program does have an integrated master schedule which it updates with the contractor schedule data. However, our assessment found the contractor's schedule for aircraft 12-14 is unreliable. Because an integrated master schedule is intended to connect all government and contractor schedule work, unreliable contractor schedule data will result in unreliable forecasted dates within the integrated master schedule. Figure 5 summarizes the results of our

review of the MPA contractor's schedule for aircraft 12-14 and the NSC 3 schedule.[18] Appendix IV includes a detailed discussion of our analysis.

[18] The Coast Guard's program of record includes 36 MPAs and 8 NSCs.

Figure 5: Extent to Which the Schedules for MPA 12-14 and NSC 3 Meet Best Practices

Best Practice	Best Practice Description	Extent to which schedule met best practices	
		MPA 12-14	NSC 3
Capturing all activities	A schedule should reflect all activities as defined in the program's work breakdown structure to include activities to be performed by the government and the contractor.	◑	◑
Sequencing all activities	The schedule should be planned so that it can meet program critical dates.	◔	◑
Assigning resources to activities	The schedule should realistically reflect what resources (i.e., labor, material, and overhead) are needed to do the work, whether all required resources will be available when needed, and whether any funding or time constraints exist.	◔	◕
Establishing the duration of all activities	The schedule should reflect how long each activity will take to execute.	◑	◑
Integrating schedule activities horizontally and vertically	The schedule should be horizontally integrated, meaning that it should link the products and outcomes associated with already sequenced activities. These links are commonly referred to as "hand offs" and serve to verify that activities are arranged in the right order to achieve aggregated products or outcomes. The schedule should also be vertically integrated, meaning that traceability exists among varying levels of activities and supporting tasks and sub-tasks. Such mapping or alignment among levels enables different groups to work to the same master schedule.	◔	◑
Establishing the critical path	The schedule should identify a critical path—the longest duration path through the sequenced list of activities—developed using scheduling software. The establishment of a program's critical path is necessary for examining the effects of any activity slipping along this path. Potential problems that may occur on or near the critical path should also be identified and reflected in the scheduling of the time for high risk activities.	○	◑
Identifying reasonable float between activities	The schedule should identify float—the time that a predecessor activity can slip before the delay affects successor activities—so that schedule flexibility can be determined. As a general rule, activities along the critical path typically have the least amount of float.	◔	◑
Conducting a schedule risk analysis	The schedule should reflect a schedule risk analysis conducted using a good critical path method schedule and data about project schedule risks as well as statistical techniques to predict the level of confidence in meeting a program's completion date, the amount of time contingency needed for a level of confidence, and the identification of high-priority risks. This analysis focuses not only on critical path activities but also on other schedule paths that may become critical.	○	○
Updating the schedule using logic and durations to determine dates	The schedule should use logic and durations in order to reflect realistic start and completion dates. The schedule should be continually monitored to determine when forecasted completion dates differ from the planned dates, which can be used to determine whether schedule variances will affect future work.	○	◕

○ Not met
◔ Minimally met
◑ Partially met
◕ Substantially met
● Fully met

Source: GAO analysis based on information provided by the Coast Guard.

Note: "Not met" means the Coast Guard provided no evidence that satisfies any of the criterion. "Minimally" means the Coast Guard provided evidence that satisfies a small portion of the criterion. "Partially" means the Coast Guard provided evidence that satisfies about half of the criterion.

"Substantially" means the Coast Guard provided evidence that satisfies a large portion of the criterion.

"Fully met" means the Coast Guard provided evidence that completely satisfies the criterion.

As shown above, the MPA contractor's schedule for aircraft 12-14 did not substantially or fully meet any of the nine best practices. Based on our discussions with the program manager, this condition stems, in part, from a lack of program management resources, as the program office does not have trained personnel to create and maintain a schedule. In addition, while program officials stated that they do conduct meetings to provide oversight on production and delivery schedules, it does not appear that management is conducting proper oversight of existing schedule requirements. Program officials stated that they were not interested in obtaining a detailed schedule, even though it is a deliverable in the production contract, because the MPA contract is fixed price and the contractor's past delivery has been good. However, regardless of contract type, best practices call for a schedule to include all activities necessary for the program to be successfully completed. After we raised concerns about the Coast Guard paying for a detailed schedule that the program office does not plan to request or use, program officials told us that the contractor has been very responsive to Coast Guard's subsequent direction to update the schedule to incorporate best practices. They said the Coast Guard has modified the schedule reporting procedures so that the contractor will provide monthly reporting of the data.

The NSC 3 schedule substantially met two best practices and partially met six best practices, but the program office did not conduct a schedule risk analysis to predict a level of confidence in meeting the completion date. The purpose of the analysis is to develop a probability distribution of possible completion dates that reflect the project and its quantified risks. This analysis can help project managers understand the most important risks to the project and focus on mitigating them. A schedule risk analysis will also calculate schedule reserve, which can be set aside for those activities identified as high risk. Without this reserve, the program faces the risk of delays to the scheduled completion date if any delays were to occur on critical path activities.[19] Senior Coast Guard acquisition officials stated that the Coast Guard has high confidence in the projected delivery date and uses a full range of project tools, including the schedule, to

[19] A critical path represents the chain of dependent activities with the longest total duration. If any activity along the critical path slips, the entire program will be delayed.

project the delivery date. Collectively though, we found that the weaknesses in not meeting the nine best practices for the NSC 3 program integrated master schedule increase the risk of schedule slippages and related cost overruns and make meaningful measurement and oversight of program status and progress, as well as accountability for results, difficult to achieve.

Budget Planning for Deepwater Does Not Reflect the Realities of a Cost Constrained Environment, Exacerbating Program Uncertainties

Coast Guard and DHS officials agreed that the annual funding needed to support all approved Deepwater acquisition program baselines exceeds current and expected funding levels, particularly in this constrained fiscal climate. For example, Coast Guard acquisition officials stated that up to $1.9 billion per year would be needed to support the approved Deepwater baselines, but they expect Deepwater funding levels to be closer to $1.2 billion annually over the next several years.[20] Therefore the Coast Guard is managing a portfolio—which includes many revised baselines approved by DHS—that is expected to cost more than what its annual budget will likely support. Our previous work on Department of Defense (DOD) acquisitions shows that when agencies commit to more programs than resources can support, unhealthy competition for funding is created among programs. This situation can lead to inefficient funding adjustments, such as moving money from one program to another or deferring costs to the future.[21]

When a program's projected funding levels are lower than what the program was previously projected to receive, the program is more likely to have schedule breaches and other problems, as the program can no longer remain on the planned schedule. From September-October 2010, the Coast Guard reported potential baseline breaches to DHS for the C4ISR, HC-130H, and HH-60 programs that were caused, at least in part,

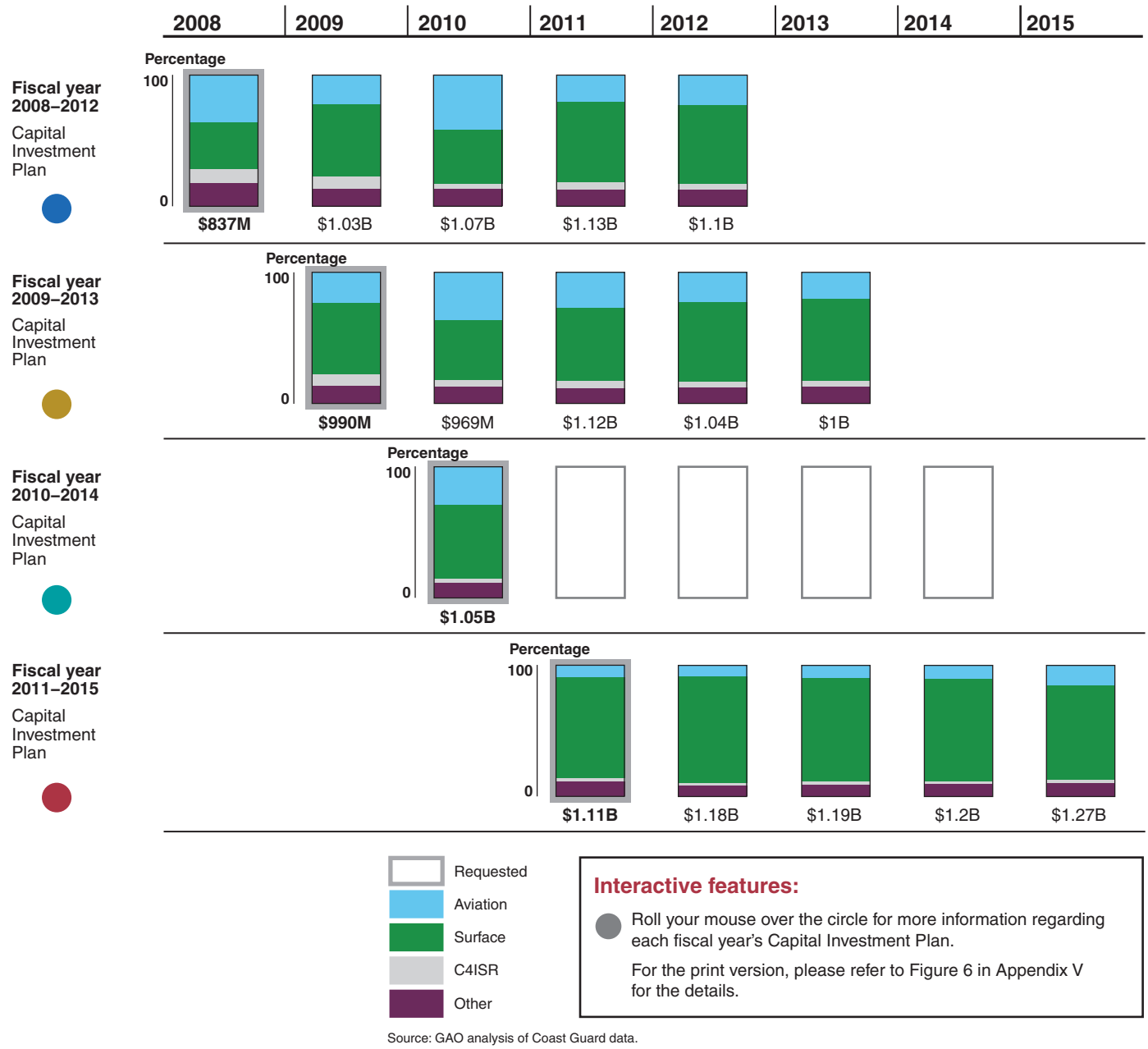
[20] In addition to the mismatch of funding, the DHS Inspector General identified in November 2009 several weaknesses in the Coast Guard's internal control over financial reporting in areas including financial management and reporting, and fund balance with the U.S. Treasury. For example, the DHS Inspector General found that the Coast Guard has not developed a comprehensive process to ensure that fund balances with U.S. Treasury transactions are recorded in the general ledger timely, completely, and accurately—a condition which can increase the risk of Anti-Deficiency Act violations.

[21] GAO, *DOD Acquisition Outcomes: A Case for Change*, GAO-06-257T (Washington, D.C.: Nov. 15, 2005) and GAO, *Defense Acquisitions: A Knowledge-Based Funding Approach Could Improve Major Weapon System Program Outcomes*, GAO-08-619 (Washington, D.C.: July 2, 2008).

by reduced funding profiles in the fiscal years 2011-2015 capital investment plan.[22] For example, in the fiscal years 2008 and 2009 capital investment plans, the Coast Guard had anticipated allocating 20-27 percent of its planned $1.1 billion fiscal year 2011 Deepwater budget to its aviation projects. In its actual fiscal year 2011 budget request, however, the Coast Guard only allocated about 9 percent of the $1.1 billion to aviation projects. The percentage of dollars allocated to surface projects increased—largely driven by an increase of dollars allocated to the FRC program. Figure 6 illustrates how the allocation of acquisition, construction, and improvements dollars in the Coast Guard's budget request in fiscal years 2008, 2009, 2010, and 2011 differed from prior year plans.

[22] Coast Guard officials stated that other factors causing the HC-130H breach include schedule effects due to a more complex integration effort than was originally planned, moving some requirements from one segment to another segment to avoid diminishing manufacturing supply issues (obsolescence) and integration rework, and delays in awarding an essential hardware contract. Officials also stated that other factors causing the HH-60 breach include schedule effects from delaying two segments' operational test and evaluation to facilitate a more accurate assessment of the operational capability and associated logistical support of the upgraded aircraft in its operational environment.

Figure 6: Allocation of Deepwater Acquisition, Construction, and Improvements Dollars in the Fiscal Years 2008, 2009, 2010, and 2011 Capital Investment Plans (Then-Year Dollars)



Source: GAO analysis of Coast Guard data.

Note: The Coast Guard's fiscal years 2010-2014 capital investment plan did not include a plan for years 2011-2014.

In the October 2010 *Blueprint for Continuous Improvement* (*Blueprint*), signed by the Commandant, the Coast Guard's Assistant Commandant for Acquisition identified the need to develop and implement effective decision making to maximize results and manage risk within resource constraints. The *Blueprint* outlines several action items, expected to be completed by the end of fiscal year 2011, to accomplish this goal. The action items include:

- promoting stability in the Coast Guard's capital investment plan by measuring the percentage of projects stably funded year to year in the plan,
- ensuring acquisition program baseline alignment with the capital investment plan by measuring the percentage of projects where the acquisition program baselines fit into the capital investment plan, and
- establishing Coast Guard project priorities.

Acquisition officials responsible for implementing the *Blueprint* action items acknowledged that successful implementation requires buy-in from leadership. Senior resource directorate officials responsible for capital investment planning told us that the action items in the *Blueprint* are "noble endeavors," but that the directorates outside of the acquisition directorate are not held responsible for accomplishing them. According to the *Major Systems Acquisition Manual*, the Component Acquisition Executive (Vice-Commandant), to whom both the acquisition and resource directorates report, is responsible for establishing acquisition processes to track the extent to which requisite resources and support are provided to project managers.

In addition to the acquisition directorate's recognition of the need to establish priorities to address known upcoming resource constraints, in August 2010, the Coast Guard's flag-level Executive Oversight Council—chaired by the Assistant Commandant for Acquisition with representatives from other directorates—tasked a team to recommend strategies to revise acquisition program baselines to better align with annual budgets.[23] This acknowledgment that program baselines must be revised to fit fiscal constraints, however, is not reflected in the Coast Guard's most recent capital investment plan. Table 3 presents planned funding projections for

[23] The oversight council advised the team to use a $1.4 billion constraint for fiscal year 2011-2016 followed by a 3 percent growth per year. This budget constraint was for Deepwater and other major Coast Guard acquisitions.

Deepwater assets as outlined in the fiscal years 2012-2016 capital investment plan. With the exception of fiscal year 2012, the Coast Guard is planning for funding levels well above the expected funding level of $1.2 billion.[24]

Table 3: Fiscal Years 2012-2016 Capital Investment Plan for Deepwater Assets (Then-Year dollars in thousands)

	FY2012	FY2013	FY2014	FY2015	FY2016
Fiscal Years 2012-2016 Capital Investment Plan	$870,240	1,374,500	1,417,100	2,039,300	1,419,400

Source: Coast Guard.

This outyear funding plan seems unrealistic, especially in light of the rapidly building fiscal pressures facing our national government and DHS's direction for future budget planning. To illustrate, in fiscal year 2015, the Coast Guard plans to request funding for construction of three major Deepwater surface assets: NSC, OPC, and FRC, but the Coast Guard has never requested funding for construction of three major Deepwater surface assets in the same year before. In a recent testimony, the Commandant of the Coast Guard stated that the plan for fiscal year 2015 reflects the Coast Guard's actual need for funding in that year. If program costs and schedules are tied to this funding plan and it is not executable, these programs will likely have schedule and cost breaches. When a program has a breach, the program manager must develop a remediation plan that explains the circumstances of the breach and propose corrective action and, if required, revise the acquisition program baseline.

[24] Fiscal year 2012 is lower than other years because the Coast Guard did not request funding for a NSC.

Execution of the Deepwater Program Is Progressing, but Key Decisions Remain for the Design and Testing of Deepwater Assets

The Coast Guard continues to strengthen its acquisition management capabilities. As lead systems integrator, the Coast Guard is faced with several decisions to help ensure that the promised capabilities of assets still in design are achieved. For example, whether or not the planned system-of-systems design is achievable largely depends on the Coast Guard's ability to make important decisions regarding the design of the C4ISR program, as the Coast Guard has continued to define and redefine its strategy for this program since 2007. For those assets already under construction and operational, preliminary tests have yielded mixed results and identified issues that need to be addressed prior to upcoming test events. As part of its role as lead systems integrator, the Coast Guard is gaining a better understanding of each asset's cost, schedule, and technical risks, but this information is not always fully conveyed in the Coast Guard's quarterly reports to Congress.

Coast Guard Continues to Strengthen Its Acquisition Management Capabilities

The Coast Guard continues to strengthen its acquisition management capabilities in its role of lead systems integrator and decision maker for Deepwater acquisitions. We recently reported that the Coast Guard updated its *Major Systems Acquisition Manual* in November 2010 to better reflect best practices, in response to our prior recommendations, and to more closely align its policy with the DHS Acquisition Management Directive 102-01.[25] We also reported that according to the Coast Guard, it currently has 81 interagency agreements, memorandums of agreement, and other arrangements in place, primarily with DOD agencies, which helps programs leverage DOD expertise and contracts. To further facilitate the acquisition process, the Coast Guard's Acquisition Directorate has increased the involvement of the Executive Oversight Council as a structured way for flag-level and senior executive officials in the requirements, acquisition, and resources directorates, among others, to discuss programs and provide oversight on a regular basis.

In addition to these efforts to strengthen its management capabilities, the Coast Guard has significantly reduced its relationship with ICGS. ICGS's

[25] DHS Acquisition Management Directive 102-01, revision no.1 was finalized in January 2010. The directive provides guidance on planning and executing acquisitions by providing a number of review points for senior acquisition officials to oversee investments and by linking DHS requirements, resourcing, and acquisition processes. For a recent GAO report, see GAO, *Coast Guard: Opportunities Exist to Further Improve Acquisition Management Capabilities*, GAO-11-480 (Washington, D.C.: Apr. 13, 2011).

remaining responsibilities include completing construction of the third NSC and a portion of the C4ISR project. In moving away from ICGS, the Coast Guard has awarded fixed-price contracts directly to prime contractors. For example, since our last report in July 2010, the Coast Guard: (1) awarded a sole source fixed price contract for the fourth NSC and long lead materials for the fifth NSC to Northrop Grumman Shipbuilding Systems, (2) exercised fixed price options for four additional FRCs on the contract with Bollinger Shipyards, and (3) awarded a fixed price contract to EADS for three MPAs with options for up to six additional aircraft, following a limited competition in which EADS made the only offer.[26] In addition, the Coast Guard has developed acquisition strategies intended to inject competition into future procurements where possible. For example, the Coast Guard is planning to buy a "reprocurement data licensing package" from Bollinger Shipyards. This information package, according to project officials, is expected to provide the Coast Guard with the specifications to allow full and open competition of future FRCs. Our previous work has shown that when the government owns technical specifications, its does not need to rely on one contractor to meet requirements.[27] As part of its acquisition strategy for the OPC, the Coast Guard plans to award multiple preliminary design contracts and then select the best value contract design for a detailed design and production contract. This planned acquisition strategy will also include an option for a data and licensing package, similar to the FRC. In May 2011, the Coast Guard released a draft of the OPC specifications for industry review in advance of releasing a request for proposals, currently planned to occur in the fall of 2011. Lastly, the Coast Guard is in the process of holding a competition for the over-the-horizon cutter small boat through a small business set-aside acquisition approach.

[26] The NSC requires the advanced procurement of certain materials, such as the engines and air search radar, referred to as long lead time materials. Northrop Grumman Shipbuilding Systems has recently spun-off its ship unit as Huntington Ingalls Industries Inc., which includes the shipyard in Pascagoula, Mississippi, where the NSC is built.

[27] GAO, *Federal Contracting: Opportunities Exist to Increase Competition and Assess Reasons When Only One Offer is Received*, GAO-10-833 (Washington, D.C.: July 26, 2010).

Key Decisions Remain for Assets in Design to Ensure Promised Capabilities Are Achieved

Several Deepwater assets remain in the "analyze/select" or "need" phases of the Coast Guard's acquisition process which involve decisions that affect the system-of-systems design. At the start of our review, these included portions of the C4ISR project, OPC, cutter small boats, unmanned aircraft system, and portions of the HH-60 helicopter.

C4ISR

The Deepwater Program was designed to improve the detection and engagement of potential targets in the maritime domain. Key to the Coast Guard's success is engaging targets of interest, such as a terrorist activity within the U.S. maritime domain. To do this, the Coast Guard goes through a process of surveying the maritime domain, detecting and classifying targets, and then responding to the situation. The planned system-of-systems design connects the Deepwater assets through a single command and control architecture—C4ISR—that is designed to increase the probability of mission success by improving the accuracy and speed of this process. For example, as envisioned, the MPA would conduct more efficient searches in conjunction with other assets. During a search for a missing vessel, the MPA would receive information from the operational commander regarding the location of the distress signal and then communicate search information back to the commander and with other on-scene Coast Guard assets. The commander and the MPA could then increase the speed of the response by locating the closest available cutter and informing it of injuries and other issues.

Figure 7 depicts the Deepwater concept of using information technology to more quickly and successfully execute missions.

Figure 7: Deepwater System-of-Systems Concept

Source: © 2001 Integrated Coast Guard Systems, LLC. Provided courtesy of Integrated Coast Guard Systems, LLC

To achieve the system-of-systems design, the Coast Guard planned for C4ISR to be the integrating component of Deepwater. This was expected to improve mission performance by increasing the success rate and frequency of engaging targets. However, the $600 million ICGS-developed Coast Guard command and control system, currently on the NSC, MPA, and HC-130J, does not achieve the system-of-systems vision. After taking over as lead systems integrator in 2007, the Coast Guard has changed its C4ISR strategy multiple times in an effort to achieve a common software system for all Deepwater assets that facilitates data sharing between these assets and external partners. But as the Coast Guard continues to change its strategy, decisions remain regarding how to achieve this promised capability in a feasible manner. These decisions relate to realizing the overall goal of sharing data between all of the Deepwater assets, creating and updating acquisition documents, and developing a strategy for designing and managing the C4ISR technical baselines.

The Coast Guard has yet to achieve the promised capability of an interoperable system with communication and data sharing between all assets and may limit some of the planned capability. According to the approved Deepwater mission needs statement, data sharing, centralized

networks, and information from sensors are critical for the Coast Guard and DHS to achieve mission performance in a resource-constrained world. While according to information technology officials, the Coast Guard has voice communications between assets, the currently operational Deepwater assets— NSC, MPA, HC-130J, HH-60, and HH-65—do not yet have the capability to fully share data with each other or commanders. In addition, the Coast Guard has not fully established a centralized network for C4ISR, creating communications problems. For example, the NSC and MPA use classified systems to record and process C4ISR data while the HC-130J and HC-130H have unclassified systems. According to operators, sharing data gathered by the MPA during the Deepwater Horizon oil spill incident was difficult because all information gathered by the MPA was maintained on a classified system. According to senior officials, the Coast Guard recognizes that classification issues inhibit fully sharing data and is working to address these issues through changes to Coast Guard policies, which have not been finalized.

Furthermore, it is unclear whether or not full data interoperability between all assets remains a goal for the Deepwater program. Overall, according to the Coast Guard's recent cost estimating baseline document, the C4ISR system will be installed on only 127 air and surface assets, which is fewer than half of the approximately 300 assets within the Deepwater acquisition. For example, senior acquisition officials stated that the helicopters are not going to be equipped with the C4ISR software that is planned to enable data sharing with commanders and other assets, but this has not yet been reflected in project documentation.[28] A senior official with the information technology directorate questioned the extent to which the level of shared data communications as set forth in the mission needs statement would help the Coast Guard more efficiently achieve mission success because some Coast Guard assets, such as the cutters, rarely work in tandem. Additionally, project officials stated that the vision of full data-sharing capability between assets, depicted above, is transforming into a "hub and spoke" model where assets share data with shore-based command centers that maintain the operating picture and maritime awareness; this also has yet to be detailed in project documentation. Given these uncertainties, the Coast Guard does not have a clear vision of the C4ISR required to meet its missions.

[28] Coast Guard officials stated that the rotary wing assets are equipped with sensors and communications gear provided by the aviation project offices, not the C4ISR project office.

The Coast Guard is also currently managing the C4ISR program without key acquisition documents, including an acquisition program baseline that reflects the planned program, a credible life-cycle cost estimate, and an operational requirements document for the entire program.

- The Coast Guard has replanned the C4ISR project baseline multiple times since 2007, which, under ICGS, contained a high-level description of the system with no requirements document to provide further detail. In November 2009, the Coast Guard submitted a revised baseline to DHS that provided some additional detail of the planned capabilities, including capabilities designed to protect the homeland, but also delayed development of these capabilities due to concerns about the reliability and affordability of the ICGS system. DHS approved the baseline in February 2011, but by that time it was out of date. For example, according to this baseline, the Coast Guard was planning to reach a milestone for developing improved capabilities on selected assets in early fiscal year 2010—an event that was indefinitely deferred before the baseline was approved and is now scheduled to take place no sooner than 2017. Coast Guard officials stated that a revised acquisition program baseline is currently being drafted.
- A key input into the acquisition program baseline is a credible life-cycle cost estimate, but the Coast Guard is currently revising the C4ISR estimate and officials stated that the current cost estimate no longer reflects the current status of the program.
- An operational requirements document for the entire project has not yet been completed; project officials told us that requirements documents for portions of the system are in the review process or under development. However, the documents in review do not include C4ISR requirements for the OPC. C4ISR project officials stated that those requirements are included in the OPC's operational requirements document, but acknowledged that these requirements are vague.

In addition to inadequate or incomplete acquisition documentation, the Coast Guard also lacks technical planning documents necessary to both articulate the vision of a common C4ISR baseline—a key goal of the C4ISR project—and to guide the development of the C4ISR system in such a way that the system on each asset remains true to the vision. While Coast Guard officials told us that their goal is still a common software baseline, we have identified at least four software variants in operation or under development but whose commonality is not clear:

- the legacy Coast Guard system prior to Deepwater,

- the ICGS-developed Coast Guard command and control system (ICGS system),
- a Coast Guard-developed command and control system called Seawatch, and
- a forthcoming Seawatch-ICGS hybrid system for the NSC.

The Coast Guard continues to maintain a legacy C4ISR system which is operational on the 210-foot and 270-foot cutters and maintains the ICGS system on the NSC, MPA, and HC-130J. The Coast Guard also planned to put the ICGS system on the 110-foot patrol boats that were to be converted to 123-foot boats.[29] According to FRC program officials, after this conversion failed for structural reasons and the FRC program was accelerated to offset the loss of planned patrol boat capability, the Coast Guard planned to use the legacy C4ISR system for the FRC. However, due to obsolescence of the legacy system, the Coast Guard's information technology directorate developed a new system called Seawatch for FRC. The Coast Guard has since decided to also incorporate Seawatch into the upgrades to the original ICGS system for NSCs five through eight and plans to do so for NSCs one through four, but this effort is currently not funded. Until this Seawatch-ICGS hybrid system is installed on the first four NSCs, the Coast Guard will have to maintain two systems for the NSC. Further, according to C4ISR project officials, the Coast Guard is currently analyzing the extent to which the Seawatch-ICGS hybrid system meets the requirements for the OPC.

The C4ISR project has yet to identify a software system that will meet the requirements of the HC-130H, HH-60, and HH-65 aircraft and that is also compatible with surface assets. The Coast Guard is redesigning the ICGS system currently on the MPA and HC-130J to replace some parts that are now obsolete so that the Coast Guard can hold a competition for the system. The goal is to develop a common software baseline for the MPA and the HC-130J to address variations in the ICGS system currently on these assets. Once the Coast Guard finishes developing this common software baseline for the MPA and HC-130J, it will be a new baseline in addition to the four baselines identified above. While some officials in the capabilities directorate told us that Seawatch could become the common command and control system for the Coast Guard, Seawatch system

[29] The Coast Guard originally intended to convert all 49 of its 110-foot patrol boats to 123-foot patrol boats. However, hull buckling and other structural problems among the 8 converted patrol boats led the Coast Guard to halt all further conversions.

developers in the information technology directorate told us that Seawatch is not currently suitable for aviation assets. Table 4 shows the software system currently installed on each asset and the anticipated system for the asset.

Table 4: Current C4ISR System on Each Deepwater Asset Compared to Planned C4ISR System

Asset	Current C4ISR system	Planned C4ISR system
NSCs 1-4	ICGS Developed System	Seawatch-ICGS hybrid system
NSCs 5-8	n/a	Seawatch-ICGS hybrid system
OPC	n/a	Unknown pending Coast Guard analysis
FRC	Coast Guard developed system (Seawatch)	Coast Guard developed system (Seawatch)
MPA	ICGS Developed System	Unknown pending Coast Guard analysis
HC-130J	ICGS Developed System	Unknown pending Coast Guard analysis
HC-130H	Legacy System (prior to ICGS)	Unknown pending Coast Guard analysis
HH-60/65	None	Unknown pending Coast Guard analysis

Source: GAO analysis of Coast Guard information.

Note: “n/a” indicates that the system is currently not in use while “none” indicates that the system does not have a C4ISR system though it has voice communications, an avionics system, and sensors.

According to Coast Guard information technology officials, the abundance of software baselines could increase the overall instability of the C4ISR system and complexity of the data sharing between assets. Moreover, additional baselines may continue to proliferate because each asset is now responsible for managing and funding technology obsolescence as opposed to having a Coast Guard-wide technology obsolescence prevention program. From 2008 to 2010, the Coast Guard had funded a technology obsolescence program to avoid costly C4ISR system replacements by proactively addressing out-of-date technology. For example, program officials stated that the Coast Guard established a uniform software baseline for 12 MPA mission system pallets under this program. The Coast Guard is currently developing a policy to manage obsolete technology now that the technology obsolescence program is no longer funded.

Offshore Patrol Cutter

Important decisions remain to be made regarding the OPC, the largest cost driver in the Deepwater program. DHS approved the OPC's requirements document in October 2010 despite unresolved concerns about three key performance parameters—seakeeping, speed, and range—that shape a substantial portion of the cutter's design. For example, DHS questioned the need for the cutter to conduct full operations during difficult sea conditions, which impact the weight of the cutter and ultimately its cost. The Coast Guard has stated that limiting the ability to conduct operations during difficult sea conditions would preclude operations in key mission areas. While it approved the OPC requirements document, DHS at the same time commissioned a study to further examine these three key performance parameters. According to Coast Guard officials, the study conducted by the Center for Naval Analysis found that the three key performance parameters were reasonable, accurate, and adequately documented. By approving the operational requirements document before these factors were resolved, DHS did not ensure that the cutter was affordable, feasible, and unambiguous and required no additional trade-off decisions, as outlined in the *Major Systems Acquisition Manual*. Our previous work on DHS acquisition management found that the department's inability to properly execute its oversight function has led to cost overruns, schedule delays, and assets that do not meet requirements.[30]

In addition to the three performance parameters discussed above, other decisions, with substantial cost and capability implications for the OPC, remain unresolved. For example, it is not known which C4ISR system will be used for the OPC, whether the cutter will have a facility for processing classified information, and whether the cutter will have air search capabilities. The Coast Guard's requirements document addressed these capabilities but allowed them to be removed if design, cost, or technological limitations warrant. According to Coast Guard officials, remaining decisions must be made before the acquisition program baseline is approved as part of the program's combined acquisition decision event 2A/B and the request for proposals is issued, both of which are planned for the fall of 2011. In addition, following the approval of the requirements document, the Coast Guard formed a ship design team tasked with considering the affordability and feasibility of the OPC.

[30] GAO, *Department of Homeland Security: Billions Invested in Major Programs Lack Appropriate Oversight*, GAO-09-29 (Washington, D.C.: Nov. 18, 2008).

This team has met with Assistant Commandants from across the Coast Guard on several occasions to discuss issues that impact the affordability and feasibility of the cutter, including, among others, the size of the living quarters, the aviation fuel storage capacity, and the range of the cutter. The Coast Guard has stated that affordability is a very important aspect of the OPC project and that the request for proposal process will inform the project's efforts to balance affordability and capability.

Cutter Small Boats

The cutter small boats project was delayed when the initial ICGS plan was halted due to unrealistic requirements that we have reported on in the past.[31] The Coast Guard has since made decisions on providing small boats for the NSC, but key decisions remain regarding the Coast Guard's overall strategy for buying a standard cutter small boat fleet, including quantities. According to project officials, a standard cutter boat fleet is an important capability for the Coast Guard because it permits shared training and maintenance and allows for sharing small boats among the larger cutters, potentially reducing acquisition and maintenance costs.

There are two types of cutter small boats that the Coast Guard plans to use to engage targets—a 36-foot version launched from the NSC and potentially the future OPC and a 25-foot version planned for the three largest Deepwater cutters: NSC, OPC, and FRC. Following the failure of ICGS' cutter small boats, the Coast Guard identified requirements for the cutter small boat project to supply the three large cutters with at least 135 small boats. However, in August 2010, DHS changed the project to a nonmajor acquisition after the Coast Guard downsized the scope of the project to only 27 cutter small boats—which includes a mix of 25-foot and 36-foot boats—for the NSC, thus lowering the life-cycle cost for the project. As a result, the program is no longer subject to DHS's review or independent testing. Project officials told us that despite this change in quantities, a standard cutter boat for all three cutters nevertheless remains a key goal; in fact, the current 25-foot small boat project plan recognizes the potential for the project to buy up to 101 small boats, which includes the ability for other DHS components to buy boats off of

[31] GAO, *Coast Guard: Better Logistics Planning Needed to Aid Operational Decisions Related to the Deployment of the National Security Cutter and Its Support Assets,* GAO-09-497 (Washington, D.C.: July 17, 2009) and GAO-10-790.

that contract.[32] The project plan for the 36-foot boats is not yet complete. If the Coast Guard intends to still buy a standard cutter boat fleet, depending on the mix, the life-cycle cost of the project could mean the project is actually a major system acquisition subject to DHS review.

Unmanned Aircraft Systems

The UAS was envisioned as a key component of the Deepwater system that would enhance surveillance capability on board the NSC and OPC and also from land. Congress has appropriated over $100 million since 2003 to develop an unmanned aerial vehicle, but the Coast Guard terminated the program due to cost increases and technical risks in June 2007. In February 2009, DHS approved a strategy for the Coast Guard to acquire UASs, but the Coast Guard has not yet decided what specific solutions are required to perform operations. Lead asset delivery was originally scheduled for 2008, but the Coast Guard is waiting until Navy technology for cutter-based UASs advances and is partnering with Customs and Border Protection for use of the maritime land-based UAS, Guardian. There are some indications that the Coast Guard UAS program will continue to incur substantial delays. For example, there is currently no funding for the program in the Coast Guard's fiscal years 2012-2016 capital investment plan and the Coast Guard does not expect the C4ISR software for the UAS to share data with other assets to be ready for operations until 2024. Until the Coast Guard buys UASs, the planned capability of the major cutter fleet is limited.[33] Without a UAS, for instance, the DHS Inspector General estimates that the aerial surveillance capability of the NSC is reduced from 58,160 square nautical miles to 18,320 square nautical miles, a 68 percent decline.[34]

HH-60

The HH-60 project office is continuing to make progress upgrading the Coast Guard's largest helicopter, but decisions remain concerning the extent to which the Coast Guard will use the helicopter for surveillance. According to the current acquisition program baseline, the Coast Guard plans to replace the existing weather radar on the HH-60 with a surface

[32] According to Commandant Instruction 5000.11, a project plan for a nonmajor acquisition includes the acquisition strategy, life-cycle cost estimate, master test plan, and project schedule. COMDTINST 5000.11, Non-Major Acquisition Process Table 1 (Apr. 22, 2009).

[33] GAO-09-497.

[34] Department of Homeland Security Office of Inspector General, *U.S. Coast Guard's Acquisition of the Vertical-Takeoff-and-Landing Unmanned Aerial Vehicle*, OIG-09-82 (Washington, D.C.: June 24, 2009).

search radar to improve detection and classification capabilities. The project office originally planned to begin this work in fiscal year 2006, but is now planning to begin the work in fiscal year 2012. Officials at the Coast Guard's Aviation Logistics Center, where the helicopter depot maintenance is conducted, stated that funding for the workforce currently conducting the upgrades on the HH-60 will expire in the summer of 2014. These officials expressed concern that if the Coast Guard delays surface search radar work further, there will be a loss of learning on the production line, leading to an increase in the cost of the project due to production restart costs. Furthermore, project officials told us that the Coast Guard is developing a preliminary-operational requirements document that will address requirements for the HH-60's C4ISR capabilities. These remaining decisions for the HH-60 will shape the extent to which the helicopter shares information collected by the surface search radar with operational commanders and other Coast Guard assets.

Preliminary Test Events Have Yielded Mixed Results in Advance of Initial Operational Testing

None of the Deepwater assets have completed initial operational test and evaluation, a major test event which identifies deficiencies by evaluating operational effectiveness during the execution of simulated operational missions. The NSC, MPA, and FRC are scheduled to complete this testing in fiscal years 2012 and 2013. The HC-130J will not undergo any operational testing or assessments by an independent operational test authority, and the other Deepwater assets are not yet scheduled to start this testing. In advance of this testing, the Coast Guard has completed preliminary tests for the NSC, MPA, and FRC, such as operational assessments, which the Coast Guard is using to mitigate risk and address problems during asset development prior to initial operational test and evaluation. The Coast Guard also conducts acceptance testing, which helps ensure that the functionality of the delivered asset meets contract requirements and may help demonstrate that it will meet defined mission needs. Using these tests, officials have identified issues that need to be addressed prior to initial operational testing on the following assets.

NSC

During acceptance testing for the second NSC in October 2010, Coast Guard officials identified five key issues, also identified on NSC 1 in an operational assessment completed in September 2010:

- reliability and maintenance problems with the crane on the back of the cutter,
- an unsafe ammunition hoist for the main gun,

- instability with the side davit for small boat launch,
- insufficient power to a key system used for docking the cutter, and
- an impractical requirement for using the side rescue door in difficult sea conditions.

Senior acquisition directorate officials stated that there are currently workarounds for some of these issues and the cutters do meet contractual requirements. Program officials added that funding and design changes have yet to be finalized for these five issues and in some cases, correcting these issues will likely require costly retrofits.

In January 2011, Coast Guard officials canceled the Aircraft Ship Integrated Secure and Traverse (ASIST)—a system intended to automate the procedure to land, lock down, and move the HH-65 helicopter from the deck to the hangar on the NSC—after significant deficiencies were identified during testing conducted by the U.S. Naval Air Warfare Center. Examples of deficiencies included increased pilot workload during landing, excessive stress on the helicopter components as the aircraft moved across the deck into the hangar, and failure to reduce the number of people needed to secure the helicopter as the system was designed to do. In addition, testing officials determined that the system could cause injury to the aircrew because the landing operator could not communicate with the pilot in a timely manner, and the system demonstrated unpredictable failures to locate the aircraft while it was hovering over the NSC's flight deck. The ASIST system was identified by ICGS as a solution to a Coast Guard requirement. Several Coast Guard officials told us that the Coast Guard was aware of potential problems with ASIST as early as 2007, but the Coast Guard moved forward with it until testing was complete. The Coast Guard invested approximately $27 million to install the system on three NSCs, purchase long lead materials for the fourth NSC, and modify one HH-65 helicopter for the test event. The Coast Guard is now exploring solutions in use by the Navy to replace the system. For the two operational NSCs, officials stated that operators secure the HH-65 using legacy cutter technology.

MPA

In a May 2009 operational assessment, an independent test authority—the Navy's Commander Operational Test and Evaluation Force—found that, while the MPA airframe provides increased capability for cargo and passenger transport, the C4ISR system on the aircraft's mission system pallet is a significant area of risk. Deficiencies included poor performance of the two main sensors used to identify and track targets, need for system reboots that result in system downtime—which we observed during our visit with the pallet operators in Mobile, Alabama in January

2011—and a lack of training equipment. The operators told us that issues with these capabilities persist and that other aspects of the system prevent operators from working efficiently. For example, the operators stated that the screens on the pallet are too small for the number of applications that normally run simultaneously and the main camera needs to be held on target manually because it cannot automatically locate previously identified targets. Since our visit, the Coast Guard has installed a software upgrade which officials stated corrected several problems inherent with the previous version. DHS Test and Evaluation officials told us that the Coast Guard is not permitted to buy additional pallets until successful completion of initial operational testing, scheduled for September 2011. These officials told us that they were optimistic that testing would be successful.

The MPA's acquisition plan does not include a strategy to buy additional mission system pallets; currently, the Coast Guard has received all 12 of the pallets under contract with ICGS. According to officials, the Coast Guard is planning to seek a full-rate production decision for the MPA by the end of fiscal year 2012, at which point almost one-third of the planned 36 MPA airframes will have been purchased. Prior to a full-rate production decision, in accordance with the *Major Systems Acquisition Manual*, the program must have identified a preferred solution and an acquisition plan for buying the pallet. Currently, the Coast Guard is assessing how to buy future pallets. Options include continuing to buy the pallet directly from Lockheed Martin or conducting a full and open competition to determine if another vendor can build the pallet. Senior Coast Guard acquisition officials stated that they determined the Coast Guard does not have sufficient capability to build the pallet itself.

FRC

The FRC program is planning to use the first cutter for initial operational test and evaluation. The original delivery date for the lead cutter was scheduled for January 2011, but that date has slipped to December 2011. Officials told us that the delay is due to a last minute design change, directed by the Coast Guard's engineering and logistics technical authority, to enhance the structure of the cutter. An early operational assessment that reviewed design plans for the FRC was completed in August 2009 and identified 74 design issues, 69 of which were corrected during the assessment. Officials explained that they are confident in the reliability of the FRC design and do not expect any major operational issues to arise during initial operational testing and evaluation. In addition, program officials explained that the Coast Guard has used a lead vessel for initial operational test and evaluation in the past and is now also planning to conduct an operational assessment on the lead FRC to

reduce risk. Officials from the Navy's Commander Operational Test and Evaluation Force, however, stated that there are risks associated with using the first cutter for initial operational test and evaluation; operators are not as familiar with the system, the logistics enterprise may not be fully operational to support the asset, and enough time may not have passed to collect sufficient data on what operational issues need to be addressed prior to testing.

HC-130J

The Coast Guard currently has 6 HC-130Js in operation, but the aircraft did not undergo any operational testing or assessments by an independent operational test authority. As we reported last year, DHS and Coast Guard had agreed that no further testing or documentation was necessary for the HC-130J because production of the aircraft was complete, and a report was developed that defines the aircraft's performance by describing the demonstrations that have already been conducted to quantify the characteristics of the aircraft and mission systems.[35] However, since our last report, the Navy received funding to buy two additional HC-130Js for the Coast Guard. As a result, DHS officials stated that they may revisit the decision to not fully test the HC-130J. Officials at the Aviation Logistics Center stated that they are concerned that initial operational test and evaluation was never completed and that current operations essentially serve as an assessment of capability. The mission system, a C4ISR suite of components which is similar to the suite on the MPA, has had problems such as unplanned reboots. These officials stated that operational testing might have helped to identify these issues sooner. Also, since HC-130J spare parts have not been sufficient, these officials explained that the Coast Guard has "demissionized" two HC-130Js to provide spare parts for the remaining four HC-130Js. These two HC-130Js are now partially mission capable, meaning they cannot use the electronic suite of C4ISR equipment. Coast Guard acquisition officials told us that fiscal year 2011 funding for HC-130J spares should allow the Coast Guard to re-missionize these assets.

[35] GAO-10-790.

Coast Guard's Quarterly Reports to Congress Do Not Fully Capture Program Risks

As part of its role in program execution, the Coast Guard is gaining a better understanding of each asset's cost, schedule, and technical risks, but not all of this information is transparent to Congress. The Coast Guard maintains two different quarterly reports to track information on its major acquisitions, including narrative and mitigation actions pertaining to risks, and Coast Guard officials told us that the same database is used to populate both reports. One is the Quarterly Project Report which is an internal acquisition report used by Coast Guard program managers. The other, known as the Quarterly Acquisition Report to Congress (QARC), was required by various appropriations laws to be submitted to the congressional appropriations committees and to rank on a relative scale the cost, schedule, and technical risks associated with each acquisition project. We found that this statutory requirement is no longer in effect.[36] However, the Coast Guard and DHS continue to submit the QARC pursuant to direction in committee and conference reports and the Coast Guard's *Major Systems Acquisition Manual*.[37] These committee and conference reports generally reiterate an expectation that the Coast Guard submit the QARC by the 15th day of the fiscal quarter.

We found that the Coast Guard's fiscal year 2010 QARCs did not always include risks identified in the Quarterly Project Reports. The Coast Guard's *Major Systems Acquisition Manual* states that the QARC incorporates the Quarterly Project Report for each major acquisition project.[38] The Quarterly Project Report includes, among other things, the top three project risks. In comparing both sets of reports—the Quarterly

[36] *See* Department of Transportation and Related Agencies Appropriations Act, 2001, Pub. L. No. 106-346, § 350 (2000); Department of Transportation and Related Agencies Appropriations Act, 2002, Pub. L. No. 107-87, § 348 (2001); Consolidated Appropriations Resolution, 2003, div. I, Transportation and Related Agencies Appropriations Act, 2003, Pub. L. No. 108-7, § 360. There is a presumption that any provision in an annual appropriations act is effective only for the covered fiscal year because appropriations acts are, by their nature, nonpermanent legislation. For this reason, a provision contained in an annual appropriation act is not to be construed to be permanent legislation unless the language used or the nature of the provision makes it clear that Congress intended it to be permanent. B-319414, June 9, 2010. Here, the requirement for the Coast Guard to submit a quarterly report on major acquisition projects cannot be construed to be permanent legislation because there are no words in the statute indicating Congress's intent to make the reporting requirement permanent.

[37] *See, e.g.*, H.R. Conf. Rep. No. 111-298, at 83 (2009); S. Rep. No. 111-222, at 80 (2010); COMDTINST M5000.10B, *Major Systems Acquisition Manual* page 7-3 (Nov. 1, 2010).

[38] COMDTINST M5000.10B, *Major Systems Acquisition Manual*, page 7-3 (Nov. 1, 2010).

Project Report and the QARC—from fiscal year 2010, we found that over 50 percent of medium and high risks identified in the internal Quarterly Project Reports were not included in the QARC. For example, the Coast Guard reported to Congress that the OPC program had no risks in fiscal year 2010, but several were identified in the internal report—including concerns about affordability. In addition, for all of fiscal year 2010, the Coast Guard reported no risks for the MPA project in the QARC even though several were identified in the internal report.

Before transmittal to Congress, the QARCs are reviewed by officials within the Coast Guard's resource directorate, the DHS Chief Financial Officer's office, and the Office of Management and Budget. Resource directorate officials told us they do not include risks in the QARC if those risks contradict the Coast Guard's current budget request. For example, the resource directorate did not include the risk related to spare parts for the MPA in the fiscal year 2010 reports to Congress because the Coast Guard did not request funding for spare parts. DHS officials told us that they do not remove medium and high risks from the report. Office of Management and Budget officials stated that they will discuss several items with the Coast Guard, including factors that the agency may want to consider with regard to the medium and high risks identified in their draft submissions, but that the Office of Management and Budget does not direct the Coast Guard to remove medium or high risks from the reports before they are transmitted. We could not obtain documentation to determine at what point in the review process the decision is made to not include risks.

For all four quarters of fiscal year 2010, the QARC was submitted consistently late. And as of May 2011, the Coast Guard had not submitted the first quarter fiscal year 2011 report to Congress—a delay of at least 4 months—but the second quarter fiscal year 2011 internal report was already complete. According to senior Coast Guard acquisition directorate officials, the QARC is intended to be the program manager's communication with Congress about risks. However, when risks are not included, the Coast Guard is not presenting to Congress a complete and timely picture of the risks some assets face.

Coast Guard Has Not Completed a Comprehensive Trade-Off Analysis for the Deepwater Assets

To support its role as systems integrator, the Coast Guard planned to complete a fleet mix analysis in July 2009 to eliminate uncertainty surrounding future mission performance and to produce a baseline for the Deepwater acquisition. We previously reported that the Coast Guard expected this analysis to serve as one tool, among many, in making future capability requirements determinations, including future fleet mix decisions.[39] The analysis, which began in October 2008 and concluded in December 2009, is termed fleet mix analysis phase 1. Officials from the Coast Guard's capabilities directorate comprised the majority of the project team for the analysis, which also included contractor support to assist with the analysis. As of May 2011, DHS had not yet released phase 1 to Congress. We received the results of the analysis in December 2010.

To conduct the fleet mix analysis, the Coast Guard assessed asset capabilities and mission demands in an unconstrained fiscal environment to identify a fleet mix—referred to as the "objective fleet mix"—that would meet long-term strategic goals. The objective fleet mix resulted in a fleet that would double the quantity of assets in the program of record, the $24.2 billion baseline.[40] For example, the objective fleet mix included 66 cutters beyond the program of record. Given the significant increase in the number of assets needed for this objective fleet mix, the Coast Guard developed, based on risk metrics, incremental fleet mixes to bridge the objective fleet mix and the program of record. Table 5 shows the quantities of assets for each incremental mix, according to the Coast Guard's analysis.

[39] GAO, *Coast Guard: Observations on Acquisition Management and Efforts to Reassess the Deepwater Program*, GAO-11-535T (Washington, D.C.: Apr. 13, 2011).

[40] For fleet mix analysis phase 1, the Coast Guard adjusted the $24.2 billion program of record to account for changes in characteristics and requirements for several of the Deepwater assets that had occurred since the last performance gap analysis. For example, the per-flight hours for the HC-144A were reduced from 1,200 to 800 based on an initial capabilities assessment and the number of unmanned aircraft systems was reduced. Officials stated that these adjustments did not result in significant changes to the program of record.

Table 5: Alternative Fleet Mix Asset Quantities According to Coast Guard's Phase 1 Fleet Mix Analysis

Surface/aviation platforms	Program of record	Fleet mix 1	Fleet mix 2	Fleet mix 3	Fleet mix 4 (objective)
NSC	8	9	9	9	9
OPC	25	32	43	50	57
FRC	58	63	75	80	91
HC-130	22	32	35	44	44
MPA HC-144A	36	37	38	40	65
HH-60	42	80	86	99	106
HH-65	102	140	159	188	223
UAS, Land-Based	12	19	21	21	22
UAS, Cutter-Based	18	15	19	19	19

Source: December 2009 Coast Guard data.

While the analysis provided insight on the performance of fleets larger than the program of record, the analysis was not cost-constrained. The Coast Guard estimated the total acquisition costs associated with the objective fleet mix could be as much as $65 billion—about $40 billion higher than the approved $24.2 billion baseline. As a result, as we reported last year, Coast Guard officials stated that they do not consider the results to be feasible due to cost and do not plan to use it to provide recommendations on a baseline for fleet mix decisions.[41] Since we last reported, Coast Guard officials stated that phase 1 supports continuing to pursue the program of record.

Because the first phase of the fleet mix analysis was not cost constrained, it does not address our July 2010 recommendation that the Coast Guard present to Congress a comprehensive review of the Deepwater Program that clarifies the overall cost, schedule, quantities, and mix of assets required to meet mission needs, including trade-offs in light of fiscal constraints given that the currently approved Deepwater Program is no longer feasible. The Coast Guard has undertaken what it refers to as a cost-constrained analysis, termed fleet mix analysis phase 2; however, according to the capabilities directorate officials responsible for the analysis, the study primarily assesses the rate at which the Coast Guard

[41] GAO-10-790.

could acquire the Deepwater program of record within a high ($1.7 billion) and low ($1.2 billion) bound of annual acquisition cost constraints.[42] These officials stated that this analysis will not reassess whether the current program of record is the appropriate mix of assets to pursue and will not assess any mixes smaller than the current program. Alternative fleet mixes are being assessed, but only to purchase additional assets after the program of record is acquired, if funding remains within the yearly cost constraints. The Coast Guard expects to complete its phase 2 analysis in the summer of 2011. As we reported in April 2011, because phase 2 will not assess options lower than the program of record, it will not prepare the Coast Guard to make the trade-offs that will likely be needed in the current fiscal climate.[43]

Further, despite Coast Guard statements that phase 2 was cost constrained, there is no documented methodology for establishing the constraints that were used in the analysis, and we found confusion about their genesis. The acquisition directorate, according to the study's charter, was to provide annual funding amounts, but Coast Guard officials responsible for phase 2 told us that DHS's Program Analysis & Evaluation office provided the lower bound and the acquisitions directorate provided the upper bound. An official from the Program Analysis & Evaluation office stated that DHS informally suggested using historical funding levels of $1.2 billion to establish an average annual rate but was unaware that the Coast Guard was using this number as the lower bound for the study. A senior Coast Guard acquisition directorate official stated that the directorate agreed with using the $1.2 billion as the lower constraint and had verbally suggested the upper bound of $1.7 billion. Based on our review of historical budget data, $1.7 billion for Deepwater is more than Congress has appropriated for the entire Coast Guard's acquisition portfolio since 2007 and as such, is not likely a realistic constraint. Coast Guard officials stated that the upper bound was not necessarily a realistic level, rather an absolute upper bound to establish the range of possible acquisition levels. In addition, the Coast Guard does not have documentation of the cost constraints; according to a Coast Guard official, these cost constraints were verbally communicated to the contractor.

[42] Coast Guard officials stated that all cost constraints for the fleet mix analysis phase 2 are in constant fiscal year 2012 dollars.

[43] GAO-11-535T.

In addition to the Coast Guard's analysis, DHS's Program Analysis & Evaluation office is conducting a study, at the request of the Office of Management and Budget, to gain insight into alternatives to the Deepwater surface program of record. Office of Management and Budget officials told us that they recommended DHS conduct this study because DHS was in a position to provide an objective evaluation of the program and could ensure that the analysis of the trade-offs of requirements in a cost constrained environment would align with the Department's investment priorities. A DHS official involved in the study stated that the analysis will examine performance trade-offs between the NSC, OPC, a modernized 270' cutter, and the Navy's Littoral Combat Ship.[44] The official also explained that the analysis is based on a current estimate of surface asset acquisition costs, which serves as a cap to guide surface asset trade-offs. This cutter study is expected to be completed in the summer of 2011. This official also stated that the cutter study is not expected to contain recommendations, but Office of Management and Budget officials told us they plan to use the results to inform decisions about the fiscal year 2013 budget. A DHS official responsible for this study stated that this analysis and the Coast Guard's fleet mix analysis will provide multiple data points for considering potential changes to the program of record, including reductions in the quantities planned for some of the surface assets. However, as noted above, Coast Guard capabilities directorate officials have no intention of examining fleet mixes smaller than the current, planned Deepwater program.

Conclusions

Over the past 4 years, the Coast Guard has strengthened its acquisition management capabilities in its role as lead systems integrator and decision maker for Deepwater acquisitions. Now, the Coast Guard needs to take broader actions to address the cost growth, schedule delays, and expected changes to planned capabilities that have made the Deepwater program, as presented to Congress, unachievable. Today's climate of rapidly building fiscal pressures underscores the importance of assessing priorities—from an acquisition, resource, and capabilities perspective—so that more realistic planned budgets can be submitted to Congress. Such a step would help alleviate what has become a pattern of churn in revising program baselines when planned funding does not materialize.

[44] According to a DHS official involved in this analysis, the characteristics of the OPC are based on the operational requirements document and the characteristics of the modernized 270' are theoretical because this cutter does not exist.

At the same time, decision makers in the Coast Guard and Congress need accurate and timely information. Cost and schedule estimates that are not based on current and comprehensive information do not provide an effective basis for assessing the status of acquisition programs. Further, the quarterly acquisition reports to Congress were intended by the Coast Guard to convey program risks, but the Coast Guard is not consistent in reporting cost, schedule, and technical risks and has not submitted the reports in the time frame requested by Congress. From a broader perspective, it is unclear how, or whether, DHS and the Coast Guard will reconcile and use the multiple studies—the DHS cutter study and the Coast Guard's two fleet mix analyses—to make trade-off decisions regarding the program of record that balance effectiveness with affordability. Without a process for doing so, decisions may not adequately balance mission needs and affordability.

At the individual project level, knowledge-based decisions are needed as Deepwater enters its fourth year with the Coast Guard as systems integrator. Uncertainties about the C4ISR systems, which were intended to be the key to making Deepwater a system of systems, continue and are compounded as assets are designed and delivered without a coherent vision for the overall program. This includes the MPA mission system pallet, which is needed to carry out the full range of this aircraft's planned missions but for which the Coast Guard has not developed an acquisition strategy. Because DHS approved the requirements document for the OPC despite significant unknowns concerning feasibility, capability, and affordability, future decisions about this asset must be based on a more rigorous knowledge base. And the ambiguities about cutter small boat quantities suggest that this program's risk level may need to be reassessed.

Recommendations for Executive Action

To provide Congress with information needed to make decisions on budgets and the number of assets required to meet mission needs within realistic fiscal constraints, we recommend that the Secretary of Homeland Security develop a working group that includes participation from DHS and the Coast Guard's capabilities, resources, and acquisition directorates to review the results of multiple studies—including fleet mix analysis phases 1 and 2 and DHS's cutter study—to identify cost, capability, and quantity trade-offs that would produce a program that fits within expected budget parameters. DHS should provide a report to Congress on the findings of the study group's review in advance of the fiscal year 2013 budget submission.

To help the Coast Guard address the churn in the acquisition project budgeting process and help ensure that projects receive and can plan to a more predictable funding stream, we recommend that the Commandant of the Coast Guard take the following two actions:

- Implement GAO's Cost Estimating and Assessment Guide's best practices for cost estimates and schedules as required by the *Major Systems Acquisition Manual*, with particular attention to maintaining current cost estimates and ensuring contractor's schedules also meet these best practices.
- As acquisition program baselines are updated, adopt action items consistent with those in the *Blueprint* related to managing projects within resource constraints as a Coast Guard-wide goal, with input from all directorates. These action items should include milestone dates as well as assignment of key responsibilities, tracking of specific actions, and a mechanism to hold the appropriate directorates responsible for outcomes, with periodic reporting to the Vice-Commandant.

To help ensure that Congress receives timely and complete information about the Coast Guard's major acquisition projects, we recommend that the Commandant of the Coast Guard and the Secretary of the Department of Homeland Security:

- include in the project risk sections of the Quarterly Acquisition Report to Congress the top risks for each Coast Guard major acquisition, including those that may have future budget implications such as spare parts; and
- submit the Quarterly Acquisition Report to Congress by the 15th day of the start of each fiscal quarter.

Because DHS approved the OPC operational requirements document although significant uncertainties about the program's feasibility, capability, and affordability remained, we recommend that the Secretary of DHS take the following two actions:

- ensure that all subsequent Coast Guard decisions regarding feasibility, capability, and affordability of the OPC's design are thoroughly reviewed by DHS in advance of the program's next acquisition decision event (ADE 2A/B); and
- determine whether a revised operational requirements document is needed before the program's next acquisition decision event (ADE 2A/B).

To increase confidence that the assets bought will meet mission needs, we recommend that the Commandant of the Coast Guard take the following three actions:

- As the Coast Guard reevaluates and revises its C4ISR project documentation—including the operational requirements document, acquisition program baseline, and life-cycle cost estimate—determine whether the system-of-systems concept for C4ISR is still the planned vision for the program. If not, ensure that the new vision is comprehensively detailed in the project documentation.
- Develop and finalize a strategy for the acquisition of the MPA mission system pallets before a full-rate production decision is made.
- Specify the quantities of cutter small boats that the Coast Guard plans to purchase, given that the current project plan does not clearly do so, and categorize the appropriate acquisition level in accordance with a life-cycle cost that reflects these planned quantities.

Matter for Congressional Consideration

To help ensure that it receives timely and complete information about the Coast Guard's major acquisition projects, Congress should consider enacting a permanent statutory provision that requires the Coast Guard to submit a quarterly report within 15 days of the start of each fiscal quarter on all major Coast Guard acquisition projects and require the report to rank for each project the top five risks and, if the Coast Guard determines that there are no risks for a given project, to state that the project has no risks. In addition, Congress should consider restricting the availability of the Coast Guard's Acquisition, Construction and Improvements appropriation after the 15th day of any quarter of any fiscal year until the report is submitted.

Agency Comments and Our Evaluation

DHS provided us with written comments on a draft of this report. In its comments, DHS concurred with all of the recommendations. The written comments are reprinted in appendix II. We also provided draft sections of the report to Office of Management and Budget officials, who provided us technical comments via e-mail; we incorporated their comments as appropriate.

With respect to our first recommendation, that DHS form a working group to review the results of the fleet mix and cutter studies and report to Congress in advance of the fiscal year 2013 budget, DHS agreed to initiate the review and analysis of the studies and report to Congress on the findings. However, DHS added that given available resources,

competing priorities and demands, and the Office of Management and Budget's timeline for fiscal year 2013 budget submission, this will occur as soon as reasonably practical. We understand that department officials have multiple demands on their time, but we believe that DHS should make every effort to report to Congress on the findings of this review before submitting its next budget. The Deepwater assets account for billions in acquisition dollars, and Office of Management and Budget officials told us that they plan to use the results of the DHS cutter study to inform the fiscal year 2013 budget. The working group's findings could provide the Congress with important insights into costs, capabilities, and quantity trade-offs prior to receiving the department's budget request.

In concurring with our recommendation to implement GAO's Cost Estimating and Assessment Guide's best practices for cost estimates and schedules as required by the *Major Systems Acquisition Manual*, the Coast Guard noted that implementing some of these best practices may not always be cost effective in a production environment. However, the Coast Guard agreed to establish an appropriate cost estimate update frequency for each project and review Integrated Master Schedules and make schedule adjustments as needed. Sustained attention to the Cost Estimating and Assessment Guide's practices will be very important, particularly as one of the largest acquisitions of the Deepwater program—the OPC—is expected to proceed to ADE-2A/B in fall 2011.

DHS also agreed with our recommendation that as the Coast Guard updates its acquisition program baselines, these baselines must conform to known resource constraints. However, in responding to this recommendation, DHS and the Coast Guard did not address plans for developing action items to manage projects within resource constraints as a Coast Guard-wide goal, citing instead the existing senior-level resource governance process and annual budget process. We recognize that part of the standard budget development process includes trade-off decisions regarding recapitalization versus operation and maintenance funding. However, under this standard process, DHS and the Coast Guard have continued to face the problem of approved acquisition programs not being feasible. We also recognize that the *Blueprint for Continuous Improvement* is an acquisition directorate document that does not reflect resource priorities across the entire budget. However, this key document is signed by the Commandant, and the October 2010 version does include several budget-related action items, such as establishing project priorities. Our recommendation, to adopt action items "consistent" with those in the *Blueprint* regarding managing projects within resource constraints—with input from all directorates—reflects our belief that the

Coast Guard needs to be more proactive in addressing its mismatch of expected funding levels and actual funding needs for approved acquisition programs.

With respect to our recommendations concerning the comprehensiveness and timeliness of the Coast Guard's quarterly acquisition reports to Congress, DHS agreed to report the top risks for each major acquisition and to submit the reports to Congress by the 15th day of the start of each fiscal quarter. However, DHS stated that OMB policy limits the Coast Guard's ability to report project risks that are pre-decisional or address out-year funding plans. We made this recommendation because no risks had been included in the quarterly reports to Congress for two programs in fiscal year 2010. DHS also noted that the it strives to submit the reports on time, but that this is difficult, especially given the time required to coordinate its release outside of the department. We believe that when risks are not included and the reports are not transmitted in a timely manner, Congress will not have a complete and timely picture of the risks some assets face.

DHS agreed to thoroughly review all subsequent Coast Guard decisions regarding feasibility, capability, and affordability of the OPC's design in advance of the program's ADE 2A/B. DHS also agreed with our recommendation to determine whether a revised operational requirements document is needed before ADE 2A/B. In its response, DHS stated that an independent validation study, directed by the Deputy Secretary as part of the approval of the OPC operational requirements document, found that the key parameters of range, speed, and sea-keeping were reasonable, accurate, and adequately documented. We have not yet reviewed this study.

DHS also agreed with our three recommendations to increase confidence that the assets bought will meet mission needs. With respect to C4ISR, DHS stated that the Coast Guard remains committed to the system-of-systems concept and plans to provide DHS with an affordable and executable C4ISR acquisition program baseline that leverages work already completed. With respect to the mission system pallet, DHS stated that the Coast Guard plans to present a revised mission system pallet acquisition strategy to the DHS Acquisition Review Board for the full-rate production decision planned for the fourth quarter fiscal year 2012. This will follow initial operational test and evaluation of the current configuration of both the Maritime Patrol Aircraft and the mission system pallet. Finally, DHS stated that the Coast Guard will work with the department to determine the appropriate acquisition level for the small

boats project. DHS also noted that the current approved project plan is for 27 small boats which have a life-cycle cost estimate that categorizes the project as a non major acquisition. The response, however, did not address the fact that the approved project plan recognizes the potential to buy up to 101 small boats. We maintain that, moving forward, the Coast Guard needs to specify the quantities of small boats it plans to purchase to ensure that the project's acquisition level is appropriately categorized.

Coast Guard also provided technical comments which we incorporated into the report as appropriate, such as when we were provided with documentation to support the comments. The Coast Guard requested that we remove the term "Deepwater" and replace it with "major acquisitions." We did not make this change because, at the time of this report, Congress had not yet passed the fiscal year 2012 appropriations act which may address DHS's and Coast Guard's proposal to eliminate the term "Integrated Deepwater System" from its annual appropriation. Furthermore, the program baseline for one of the Coast Guard's largest major acquisitions—the OPC—still remains part of the 2007 Deepwater acquisition program baseline.

We are sending copies of this report to interested congressional committees, the Secretary of Homeland Security, and the Commandant of the Coast Guard. This report will also be available at no charge on GAO's web site at http://www.gao.gov.

If you or your staff have any questions about this report or need additional information, please contact me at (202) 512-4841 or huttonj@gao.gov.

Contact points for our Offices of Congressional Relations and Public Affairs may be found on the last page of this report. Staff acknowledgments are provided in appendix VI.

John P. Hutton
Director
Acquisition and Sourcing Management

List of Congressional Committees

The Honorable John D. Rockefeller, IV
Chairman
The Honorable Kay Bailey Hutchison
Ranking Member
Committee on Commerce, Science, and Transportation
United States Senate

The Honorable Joseph I. Lieberman
Chairman
The Honorable Susan M. Collins
Ranking Member
Committee on Homeland Security and Governmental Affairs
United States Senate

The Honorable Mary Landrieu
Chairman
The Honorable Dan Coats
Ranking Member
Subcommittee on Homeland Security
Committee on Appropriations
United States Senate

The Honorable Claire McCaskill
Chairman
Subcommittee on Contracting Oversight
Committee on Homeland Security and Governmental Affairs
United States Senate

The Honorable Darrell E. Issa
Chairman
The Honorable Elijah Cummings
Ranking Member
Committee on Oversight and Government Reform
House of Representatives

The Honorable John L. Mica
Chairman
The Honorable Nick J. Rahall, II
Ranking Member
Committee on Transportation and Infrastructure
House of Representatives

The Honorable Robert B. Aderholt
Chairman
The Honorable David E. Price
Ranking Member
Subcommittee on Homeland Security
Committee on Appropriations
House of Representatives

Appendix I: Scope and Methodology

In conducting this review, we relied in part on the information and analysis in our past work, including reports completed in 2008, 2009, 2010, and 2011.[1] Additional scope and methodology information on each objective of this report follows.

To determine the extent to which the Deepwater Program's planned cost and schedule baselines have been exceeded, we reviewed the Deepwater Program's 2007 baseline and compared it to the revised baselines for individual assets that have been approved to date. We also reviewed budget documents and compared them against revised program baselines to identify any differences in reported cost and schedule estimates. To assess cost estimating and scheduling practices of selected Deepwater Programs, we selected the Maritime Patrol Aircraft (MPA), National Security Cutter (NSC), and command, control, communications, computers, intelligence, surveillance, and reconnaissance (C4ISR) programs. We reviewed the MPA program's cost estimate and schedule because this program has the highest life-cycle cost estimate of all Deepwater assets and has experienced schedule delays. We also reviewed the NSC program's schedule because the program has the second highest life-cycle cost estimate and has also experienced schedule delays. The Coast Guard was not able to provide us with a current NSC life-cycle cost estimate because the program is revising the estimate. As a result, we selected the C4ISR life-cycle cost estimate to review because the estimate was complete but the program did not yet have a Department of Homeland Security-approved acquisition program baseline and there was uncertainty concerning the direction of the program. In performing our analysis, we focused on the schedules and cost estimates available at the time of our review and evaluated them using the criteria set forth in GAO's cost guide.[2] In assessing the program's cost estimates, we used the GAO cost guide to evaluate the estimating methodologies, assumptions, and results to determine whether the life-cycle cost estimates were comprehensive, accurate, well-documented, and credible. We also used the GAO guide to determine the extent to which each schedule was prepared in accordance with the best practices that are fundamental to having a reliable schedule.

[1] GAO, *Coast Guard: Change in Course Improves Deepwater Management and Oversight, but Outcome Still Uncertain*, GAO-08-745 (Washington, D.C.: June 24, 2008) and GAO-09-682, GAO-10-790, and GAO-11-480.

[2] GAO-09-3SP.

We discussed the results of our assessments with the program offices and cost estimators. We supplemented these analyses by interviewing Coast Guard officials from the capabilities, acquisition, and resources directorates to determine any challenges the Coast Guard is facing in achieving these baselines as well as some of the potential implications of schedule and cost breaches. Further, we analyzed five capital investment plans that were included in the 2008 through 2012 budgets, breach memos, and the acquisition directorate's October 2010 *Blueprint for Continuous Improvement* to identify any funding issues and the extent to which they were factors leading to breaches in established program baselines. We also interviewed Coast Guard program staff and DHS officials from the Cost Analysis Division and Acquisition Program Management Division to corroborate program information.

To determine the progression of the execution, design, and testing of Deepwater assets, we reviewed the following documents: Coast Guard's *Major Systems Acquisition Manual*, asset operational requirements documents, acquisition strategies and plans, acquisition program baselines, program briefings to the Coast Guard's Executive Oversight Council and associated meeting minutes, acquisition decision memorandums, test reports, and contracts. We also reviewed Quarterly Project Reports, and Quarterly Acquisition Reports to Congress, and various appropriations laws and related committee and conference reports regarding the reports to Congress. For fiscal year 2010, we compared the program risks identified in the Quarterly Project Reports to the risks identified in the Quarterly Acquisition Reports to Congress. We also reviewed the dates the fiscal year 2010 Quarterly Acquisition Reports to Congress had been transmitted to Congress. We interviewed officials responsible for collecting and reviewing information for these reports including officials from the Coast Guard's acquisition and resources directorates, DHS's Chief Financial Officer's office, and the Office of Management and Budget. For design and testing, we also interviewed Coast Guard officials from the capabilities, resources, and acquisition directorates as well as the Navy's Commander Operational Test and Evaluation Force and DHS's Science and Technology Test & Evaluation and Standards Division. In addition, we met with Coast Guard operators at the Aviation Training Center in Mobile, Alabama, and Coast Guard officials at the Aviation Logistics Center. In addition, we also met with contractor and Coast Guard officials at Northrop Grumman Shipbuilding facilities in Pascagoula, Mississippi to discuss NSC construction and with a Bollinger Shipyards' official in Lockport, Louisiana to discuss Fast Response Cutter construction and toured their respective shipyards. We also met with Coast Guard officials at Lockheed Martin

facilities in Moorestown, New Jersey; and the Command, Control, and Communications Center in Portsmouth, Virginia to discuss their role in the C4ISR project.

To assess the current status of the Coast Guard's fleet mix analysis and determine how the Coast Guard and DHS are using the analysis to inform acquisition decisions, we reviewed key documents including charters and statement of works for the two fleet mix analysis phases. We also reviewed the December 2009 final report for the fleet mix analysis phase 1. We interviewed Coast Guard officials from the capabilities, resources, and acquisition directorates and Coast Guard officials overseeing work for phase 1 and phase 2. Additionally, we interviewed a senior DHS official from the office of Program Analysis and Evaluation and Office of Management and Budget officials to identify the scope of the Office of Management and Budget-directed cutter study and to understand similarities and differences between that study and the Coast Guard's fleet mix analysis.

We conducted this performance audit between September 2010 and July 2011 in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

Appendix II: Comments from the Department of Homeland Security and Coast Guard

U.S. Department of Homeland Security
Washington, DC 20528

Homeland Security

July 25, 2011

John P. Hutton
Director, Acquisition and Sourcing Management
U.S. Government Accountability Office
441 G Street, NW
Washington, DC 20548

Re: Draft Report GAO-11-743, "COAST GUARD: Action Needed As Approved Deepwater Program Remains Unachievable"

Dear Mr. Hutton:

Thank you for the opportunity to review and comment on this draft report. The U.S. Department of Homeland Security (DHS) appreciates the U.S. Government Accountability Office's (GAO's) work in planning and conducting its review and issuing this report.

The Department is pleased to note the report's positive acknowledgement that the U.S. Coast Guard (USCG) "has strengthened its acquisition capabilities in its role as lead systems integration and decision maker for Deepwater acquisitions." The report also recognizes USCG "has taken a number of steps to manage the Deepwater projects including reorganizing its acquisition directorate, applying the knowledge-based acquisition policies and practices outlined in its *Major Systems Acquisitions Manual* and developing baselines for each asset, [all of which] have given USCG better insight into asset-level capabilities and costs."

DHS and USCG have benefited from GAO oversight and used it to help ensure continued progress in USCG acquisition programs. For example, based in part on GAO input, a fixed-price incentive contract for the production and delivery of National Security Cutter (NSC) 4 was awarded in December 2010, increasing competition, decreasing risk to the government, and allowing costs for the NSC program to be more predictable in the future.

The draft report contains 10 recommendations directed at DHS, with which DHS concurs. As discussed below, actions have been taken or are currently in process to address each of these recommendations. Specifically:

Recommendation 1: The Secretary of Homeland Security should: "develop a working group that includes participation from DHS and the USCG capabilities, resources, and acquisition directorates to review the results of multiple studies–including fleet mix analysis phase 1 and 2

and DHS' cutter study–to identify cost, capability, and quantity tradeoffs that would produce a program that fits within expected budget parameters. DHS should provide a report to Congress on the findings of the study group's review in advance of the Fiscal Year (FY) 2013 budget submission."

Response: Concur. DHS will form a working group to review the results of studies that will assist DHS in identifying cost, capability, and quantity tradeoffs to meet current and anticipated future fiscal constraints. DHS will initiate the review and analysis and report on the findings, as appropriate, and as soon as reasonably practical given available resources, competing priorities and demands, and the Office of Management and Budget's timeline for the FY 2013 budget submission.

Recommendation 2: The Commandant of the USCG should: "implement GAO's Cost Estimating and Assessment Guide's best practices for cost estimates and schedules as required by the *Major Systems Acquisition Manual* with particular attention to maintaining current cost estimates and ensuring contractor's schedules also meet these best practices."

Response: Concur. The USCG *Major Systems Acquisition Manual* (MSAM) directs Project Managers to utilize the GAO Cost Estimating and Assessment Guide (GAO Guide) for developing cost estimates, while complying with all current DHS guidance.

However, in USCG's experience, certain GAO Guide practices/techniques regarding the timing of updates are not always cost effective in a production environment where many processes are repeated and historical (actual) schedule performance is available. To best implement the recommendation, for each project, the USCG will establish an appropriate cost estimate update frequency. The USCG will also review the Integrated Master Schedule as required by the MSAM, and make schedule adjustments as needed.

Recommendation 3: The Commandant of the USCG should: "as acquisition program baselines are updated, adopt action items consistent with those in the *Blueprint* related to managing projects within resource constraints as a USCG-wide goal, with input from all directorates. These action items should include milestone dates as well as assignment of key responsibilities, tracking of specific actions, and a mechanism to hold the appropriate directorates responsible for outcomes, with periodic reporting to the Vice-Commandant."

Response: Concur. DHS agrees that the USCG's updated acquisition program baselines must conform to known resource constraints. We note however, that the *Blueprint* for Acquisition reform does not define how the USCG accomplishes or articulates its resource priorities from a holistic perspective across the entire budget. A separate, but linked, resource governance process, overseen by the USCG's most senior leadership, including the Vice-Commandant, is used to prioritize resource needs including requests for all funding (including acquisition funds), across the entire service. The USCG balances its resource priorities across recapitalization and front-line operations – the USCG makes tradeoffs as part of the annual budget process to achieve

an optimal balance between the two. This process involves input from all USCG directorates. This effort is ongoing, and is part of the USCG's Planning, Programming, Budgeting, and Execution cycle.

Recommendation 4: The Commandant of the USCG and the Secretary of Homeland Security should: "include the top risks for each USCG major acquisition in the project risk sections of the quarterly acquisition report to Congress, including those that may have future budget implications such as spare parts."

Response: Concur. USCG agrees to report the top risks for each approved project, subject to the limitation noted in the last sentence of this paragraph. USCG is satisfied that the reports provided to Congress are consistent with applicable laws regarding communications about appropriations requests or Executive policy about information used in the President's Budget justifications. OMB Circular A-11 Section 22 provides policy on the release of information related to the communication of budget-related negotiations and out-year deliberations within the Executive Branch. The Executive Branch's internal deliberations regarding the various issues and options that are considered in the process leading to the President's decisions remain a matter of internal record. Thus, the USCG is limited in its ability to report project risks that are pre-decisional, deliberative budget information, or out-year funding plans that are not included as part of the current President's Budget.

Recommendation 5: The Commandant of the USCG and the Secretary of Homeland Security should: "submit the quarterly acquisition report to Congress by the 15th day of the start of each fiscal quarter."

Response: Concur. DHS agrees the quarterly acquisition report should be submitted to Congress by the 15th day and strives to do so. However, we note that 15 days is a very difficult timeframe to produce a quality report, given the time necessary to produce the report and coordinate its release outside the Department.

Recommendation 6: The Secretary of Homeland Security should: "ensure that all subsequent USCG decisions regarding feasibility, capability, and affordability of the OPC's design are thoroughly reviewed by DHS in advance of the program's next acquisition decision event (ADE 2A/B)."

Response: Concur. Consistent with DHS Acquisition Management Directive 102-01, all subsequent USCG decisions regarding feasibility, capability, and affordability of the OPC's design will be thoroughly reviewed by DHS in advance of the program's next acquisition decision event (ADE 2A/B).

Recommendation 7: The Secretary of Homeland Security should: "determine whether a revised operational requirements document is needed before the program's next acquisition decision event (ADE 2A/B)."

3

Response: Concur. DHS has taken an in-depth review of the OPC requirements document in advance of ADE 2A/B. Specifically, in the 6 months prior to the approval of the operations requirements document (ORD), the Office of Policy closely reviewed the requirements through their own internal analysis. When the Deputy Secretary approved the ORD on October 20, 2010, a follow-on, independent, validation study of three key performance parameters within the ORD was directed. DHS Acquisition Program Management Division led the follow-on analysis that found that key parameters of range, speed (maneuverability), and sea-keeping to be reasonable, accurate, and adequately documented.

Recommendation 8: The Commandant of the USCG should: "as the USCG reevaluates and revises its C4ISR project documentation including the operational requirements document, acquisition program baseline, and life cycle cost estimate - determine whether the system-of-systems concept for C4ISR is still the planned vision for the program. If not, ensure that the new vision is comprehensively detailed in the project documentation."

Response: Concur. The USCG remains committed to the system-of-systems approach for efficient and effective mission execution. The C4ISR project is revising its acquisition strategy and plans to deliver interoperable C4ISR capabilities to assets associated with the legacy Deepwater construct. The project will provide DHS with an affordable and executable C4ISR acquisition program baseline that leverages work already completed for the second project segment.

Recommendation 9: The Commandant of the USCG should: "develop and finalize a strategy for the acquisition of the Maritime Patrol Aircraft (MPA) Mission Systems Pallet (MSP) before a full rate production decision is made."

Response: Concur. USCG will conduct Initial Operational Test and Evaluation (IOT&E) on both the MPA and the MSP, beginning in 4th quarter FY 2011, before seeking a full rate production decision in FY 2012. During IOT&E, evaluators from the U.S. Navy Commander Operational Test and Evaluation Forces will complete a rigorous operational evaluation of the current configuration of the MPA and MSP, both of which have had a number of improvements incorporated to improve reliability and functionality. The revised MSP acquisition strategy will be presented to the DHS Acquisition Review Board for the full-rate production decision (ADE-3) planned for 4th quarter FY 2012.

Recommendation 10: The Commandant of the USCG should: "specify the quantities of cutter small boats that the USCG plans to purchase, given that the current project plan does not clearly do so, and categorize the appropriate acquisition level in accordance with a life-cycle cost that reflects these planned quantities."

Response: Concur. USCG will work with DHS to determine the appropriate acquisition level for the project. The current approved project plan is to acquire 19 OTH-IVs and 8 LRI-IIs. Per the DHS Acquisition Management Directive102-01, each project is classified as a DHS Level 3

4

non-major acquisition because the LCCEs for 19 OTH-IV cutters boats ($49.85M) and for 8 LRI-II cutter boats ($42.22M) (or combined into an overarching Cutter Boats Project for the OTH-IVs and LRI-IIs) are below the $300M threshold.

Again, thank you for the opportunity to review and comment on this draft report. Technical comments on this report were provided under separate cover. We look forward to working with you on future Homeland Security engagements.

Sincerely,

Jim H. Crumpacker
Director
Departmental GAO/OIG Liaison Office

5

Appendix III: Assessments of MPA and C4ISR Cost Estimates

This appendix provides the results of our analysis of the extent to which the processes and methodologies used to develop and maintain the MPA and C4ISR cost estimates meet the characteristics of high-quality cost estimates.[1] The four characteristics of high-quality estimates are explained and mapped to the 12 steps of such estimates in table 6.

Table 6: The 12 Steps of High-Quality Cost Estimating Mapped to the Steps of a High-Quality Cost Estimate

Characteristic	Explanation	Step
Well-documented	The documentation should address the purpose of the estimate, the program background and system description, its schedule, the scope of the estimate (in terms of time and what is and is not included), the ground rules and assumptions, all data sources, estimating methodology and rationale, the results of the risk analysis, and a conclusion about whether the cost estimate is reasonable. Therefore, a good cost estimate—while taking the form of a single number—is supported by detailed documentation that describes how it was derived and how the expected funding will be spent in order to achieve a given objective. For example, the documentation should capture in writing such things as the source data used and their significance, the calculations performed and their results, and the rationale for choosing a particular estimating method or reference. Moreover, this information should be captured in such a way that the data used to derive the estimate can be traced back to and verified against their sources, allowing for the estimate to be easily replicated and updated. Finally, the cost estimate should be reviewed and accepted by management to ensure that there is a high level of confidence in the estimating process and the estimate itself.	Step 1: Define the estimate's purpose, scope, and schedule Step 3: Define the program characteristics Step 5: Identify ground rules and assumptions Step 6: Obtain the data Step 10: Document the estimate Step 11: Present the estimate to management for approval
Comprehensive	The cost estimates should include both government and contractor costs of the program over its full life-cycle, from inception of the program through design, development, deployment, and operation and maintenance to retirement of the program. They should also completely define the program, reflect the current schedule, and be technically reasonable. Comprehensive cost estimates should provide a level of detail appropriate to ensure that cost elements are neither omitted nor double counted, and they should document all cost-influencing ground rules and assumptions. Establishing a product-oriented work breakdown structure is a best practice because it allows a program to track cost and schedule by defined deliverables, such as a hardware or software component.	Step 2: Develop the estimating plan Step 4: Determine the estimating structure Step 5: Identify ground rules and assumptions[a]

[1] GAO-09-3SP.

Characteristic	Explanation	Step
Accurate	The cost estimates should provide for results that are unbiased, and they should not be overly conservative or optimistic. Estimates are accurate when they are based on an assessment of most likely costs, adjusted properly for inflation, and contain few, if any, minor mistakes. In addition, the estimates should be updated regularly to reflect material changes in the program, such as when schedules or other assumptions change, and actual costs so that the estimate is always reflecting current status. Among other things, the estimate should be grounded in documented assumptions and a historical record of cost estimating and actual experiences on other comparable programs.	Step 7: Develop the point estimate[b] Step 12: Update the estimate to reflect actual costs and changes
Credible	The cost estimates should discuss any limitations of the analysis because of uncertainty or biases surrounding data or assumptions. Major assumptions should be varied, and other outcomes recomputed to determine how sensitive they are to changes in the assumptions. Risk and uncertainty analysis should be performed to determine the level of risk associated with the estimate. Further, the estimate's results should be crosschecked, and an independent cost estimate conducted by a group outside the acquiring organization should be developed to determine whether other estimating methods produce similar results. For management to make good decisions, the program estimate must reflect the degree of uncertainty, so that a level of confidence can be given about the estimate. Having a range of costs around a point estimate is more useful to decision makers because it conveys the level of confidence in achieving the most likely cost and also informs them on cost, schedule, and technical risks.	Step 7: Compare the point estimate to an independent cost estimate[c] Step 8: Conduct sensitivity analysis Step 9: Conduct risk and uncertainty analysis

Source: GAO-09-3SP.

[a] This step applies to two of the characteristics—well-documented and comprehensive.

[b] A point estimate is a single cost estimate number representing the most likely cost.

[c] This step applies to two of the characteristics—credible and accurate.

Tables 7 and 8 provide the detailed results of our analysis of the MPA and C4ISR program cost estimates. "Not met" means the Coast Guard provided no evidence that satisfies any of the criterion. "Minimally" means the Coast Guard provided evidence that satisfies a small portion of the criterion. "Partially" means the Coast Guard provided evidence that satisfies about half of the criterion. "Substantially" means the Coast Guard provided evidence that satisfies a large portion of the criterion. "Fully met" means the Coast Guard provided evidence that completely satisfies the criterion.

Table 7: Analysis of the MPA Cost Estimate

Four characteristics of high-quality cost estimates	Criterion met	Key examples of rationale for assessment
Well-documented	Substantially	The methodology, source of data, and equations are provided for each cost element. However, it is not possible for an unfamiliar analyst to recreate the estimate with the provided documentation. For instance, while the source of the data was provided, the actual data were not shown.
Comprehensive	Substantially	All costs appear to be included in the estimate. The ground rules and assumptions are included, but the assumptions are not tracked to the risk assessment. The technical information is available but not in one main document.
Accurate	Partially	The point estimate presented did not show the confidence level although the 80 percent level is also presented. There are not any apparent errors in the calculations and the program demonstrated procedures are in place to validate the estimates. However actual costs were not tracked and variances were not documented or explained.
Credible	Substantially	In addition to performing a risk analysis, the program conducted a sensitivity analysis, cross-checked cost drivers and completed an independent cost estimate. While several cost drivers were identified, no sensitivity was done to determine the impact of funding cuts on the program.

Source: GAO analysis based on information provided by the Coast Guard.

Table 8: Analysis of C4ISR Cost Estimate

Four characteristics of high-quality cost estimates	Criterion Met	Key examples of rationale for assessment
Well-documented	Substantially	The methodology, source of data, and equations are provided for each cost element. Further, it is possible for an unfamiliar analyst to recreate the estimate with the provided documentation, but knowledge of how to use the software is necessary. While the source of the data was provided, the actual data were not shown and the briefing to management did not provide a time-phased summary of costs or include recommendations for consideration.
Comprehensive	Substantially	All costs appear to be included in the estimate except for government labor costs. The ground rules and assumptions are included, but the cost effects of assumptions failing are not examined in the risk analysis. Finally, while substantial technical information is available to the cost estimators, it is not consolidated in one main document and has not yet been approved by management.
Accurate	Partially	The point estimate presented for the life-cycle cost estimate represents a 46 percent confidence level while the cost estimate for development was listed at the 32 percent level. Upon review of the cost estimate documentation, we found no apparent errors in the calculations. Further, the program demonstrated that procedures were in place to validate the estimates. However actual costs were not tracked and compared to original cost estimates. As a result, variances were not documented or explained.
Credible	Minimally	Although a full risk analysis was completed, the cost estimate is optimistic as the LCCE is presented at the 46 percent confidence level and the development cost estimate is only at the 32 percent confidence level. No contingency reserves were provided to bring the cost estimate to a higher level of confidence. In addition, the program did not do sensitivity analysis even though cost drivers were identified and major funding cuts have occurred causing the program to be in a cost breach situation. Finally, cross-checks have not been completed and an independent cost estimate is planned but has not yet occurred.

Source: GAO analysis based on information provided by the Coast Guard.

Appendix IV: Assessments of MPA and NSC Schedules

Tables 9 and 10 provide the results of our analysis of the extent to which the processes and methodologies used to develop and maintain schedules for the Maritime Patrol Aircrafts 12-14 and NSC 3 meet the nine best practices associated with effective schedule estimating.

“Not met” means the program provided no evidence that satisfies any of the criterion. “Minimally” means the Coast Guard provided evidence that satisfies a small portion of the criterion. “Partially” means the Coast Guard provided evidence that satisfies about half of the criterion. “Substantially” means the Coast Guard provided evidence that satisfies a large portion of the criterion. “Fully met” means the Coast Guard provided evidence that completely satisfies the criterion.

Table 9: Analysis of the MPA 12-14 Contractor's Schedule

Best practice	Criterion met	GAO analysis
1. Capturing all activities	Partially	Our analysis found that while the production schedule contains government and contractor activities for the procurement of three aircraft, the schedule does not have enough detail or information to meaningfully manage the work or monitor progress. If the schedule is not sufficiently detail planned, then opportunities for process improvement (e.g., identifying redundant activities) and risk mitigation will be missed. Moreover, if the schedule does not fully and accurately reflect the project, it will not serve as an appropriate basis for analysis and may result in unreliable completion dates, time extension requests, and delays. Our analysis also found that no activities in the schedule are mapped to a work breakdown structure. In addition, all activities within the schedule are marked as planned, even though the schedule start date is July 31, 2010, 5 months prior to the date we received the schedule for assessment. As such, there is no way to know how far along the plan is, what has been accomplished on time, what activities are late or in progress, and which activities are crucial to the timely delivery of aircraft and completion of the contract or program. Because MPA program management relies on contractor schedule data to update the government program-level integrated master schedule data, the government integrated master schedule will be unreliable. That is, if forecasted production milestone dates in the contractor schedules are unreliable, those dates will remain unreliable when inserted into a government program-level integrated master schedule.
2. Sequencing all activities	Minimally	Our analysis found significant issues with the sequencing logic within the schedule, which reduce the credibility of the calculated dates. For example, we found 112 activities (58 percent of remaining activities) with missing predecessor or successor logic, including 24 activities (12 percent) missing both predecessor and successor logic. Missing predecessor or successor links reduce the credibility of the calculated dates and have a cascading effect on other best practices. For example, if an activity that has no logical successor slips, the schedule will not reflect the effect on the critical path, float, or scheduled start dates of downstream activities. Our analysis also found 100 activities (52 percent) with lags: 34 activities (18 percent) have positive lags and 66 activities (34 percent) have negative lags, or leads. Lags represent the passing of time between activities but are often misused to put activities on a specific date or to insert a buffer for risk. In particular, finish-to-start logic ties with lags are generally not necessary and probably take the place of some actual work. Negative lags (or leads) are discouraged, as negative time is not demonstrable. Leads can often be replaced by additional tasks and appropriate finish-to-start logic. Leads are pervasive within the MPA schedule, but leads obfuscate management's view of activities that need to occur in logical sequence. In addition, the schedule contains six Must Finish On and three Must Start On constraints. Must Finish On and Must Start On constraints are considered "hard" constraints because—regardless of actual accomplished effort, assigned resources, or plan variations to date—these constrained dates will never move. The use of hard constraints is essentially the same as marking a date on a calendar, and therefore defeats the purpose of using a dynamic scheduling tool. Hard constraints are artificial and make the constrained activities appear to be on time when they may not be.
3. Assigning resources to all activities	Minimally	Program officials stated that the schedule was not resource loaded, and our analysis confirmed that resources are not appropriately assigned to activities. Assigning resources to activities ensures that resources are used to determine activity durations because resource requirements directly relate to the duration of an activity. Labor, material, equipment, burdened rates, and funding requirements are examined to determine the feasibility of the schedule, so that resources provide a benchmark of the total and per-period cost of the project. If the current schedule does not allow for insight into current or projected overallocation of resources, then the risk of the program slipping is significantly increased.

Best practice	Criterion met	GAO analysis
4. Establishing the duration of all activities	Partially	A significant portion of activities (71 percent) within the MPA production schedule meet best practices for activity duration, being 44 days (or 2 working months) or less. Several long-duration tasks represent procurement activities, for instance equipment procurement and parts production. Representing external procurement activities by long durations instead of simple delivery milestones is considered a best practice. This way, management can monitor progress and not be surprised at the sudden appearance of a delivery milestone that may have been off track for awhile. However, other long-duration activities have vague names and do not convey in any detail the work that needs to be performed. Management should examine these latter activities closely to see if it is possible to break them in smaller increments to improve the management of those activities. In general, activity durations should be as short as possible to facilitate objective measurement of accomplished effort. In addition, while the schedule correctly accounts for holidays that occur in the prime contractor's country and therefore affect production, it does not account for U.S. holidays that would affect U.S. government activities.
5. Integrating schedule activities horizontally and vertically	Minimally	Vertical integration—that is, the ability to consistently trace work breakdown structure elements between detailed and summary master schedules—is demonstrated somewhat because lower level tasks and milestones roll up into higher level summary tasks. However, because the schedule lacks enough detail to meaningfully manage the work and monitor progress, lower level detail work cannot be clearly traced to upper-tiered milestones. As a result, it is difficult, if not impossible, for the schedule to be used by different teams to work to the same schedule expectations. Issues with missing dependencies, overuse of lags, and date constraints prevent the program schedule from complying with the requirement of horizontal integration—that is, the overall ability of the schedule to depict relationships between different program elements and product hand-offs. Finally, the MPA schedule does not reflect any product hand-offs or receipts related to the pallet system and the C4ISR system, two systems integral to the MPA mission. Unless the schedule is fully horizontally integrated, the effects of slipped tasks on succeeding work cannot be determined. Horizontal integration demonstrates that the overall schedule is rational, planned in a logical sequence, accounts for interdependencies between work and planning packages, and provides a way to evaluate current status.
6. Establishing the critical path for all activities	Not met	MPA officials stated that there is no critical path through the program schedule, and our analysis of the production schedule confirms that a realistic critical path cannot be calculated. Unless all activities are included in the schedule and properly linked, it is not possible to generate a true critical path. Without clear insight into a critical path at the project level, management will not be able to monitor critical or near-critical detail activities that may have a detrimental impact on downstream activities if delayed.
7. Identifying reasonable float	Minimally	Program officials stated that they are not monitoring float within the schedule, although float may be monitored informally through communication with the contractor. As noted above, the network is missing over one half of its relationships and numerous constraints are affecting float calculations. As such, the schedule is displaying unrealistically high float. The majority of unrealistic float resides in the summary work element Aircraft Assembly. According to the schedule, approximately 30 percent of all activities within the Aircraft Assembly category are able to slip 100-199 days without affecting the delivery of the 14th aircraft unit. Unrealistic float is directly related to incomplete sequencing logic. Without reliable float estimates management may be unable to allocate resources from noncritical activities to activities that cannot slip without affecting the project finish date.

Best practice	Criterion met	GAO analysis
8. Conducting a schedule risk analysis	Not met	Officials stated that they have not conducted a schedule risk analysis on the schedule and are uncertain whether or not such analysis was conducted on the contractor schedule. Officials stated that getting to this level of analysis would be difficult because they do not have dedicated schedulers in the program office. Officials stated that because they have negotiated a firm fixed price contract, the government has put the risk onto the contractor. Additionally, milestone payments are tied directly to contractor performance. However, risks to government activities can have a severe impact on the schedule. For example, program office officials believed an operational assessment could be performed for MPA in lieu of a full-up operational test and evaluation. DHS officials disagreed with this approach, and required the program to perform additional testing beyond an operational assessment. As a result, the program breached its schedule and the full-rate production decision was delayed. MPA program officials also stated that an unstable budget is a large risk to the program. Regardless of contract type or award fee structure, a comprehensive schedule risk analysis is an essential tool for decision makers. A schedule risk analysis can be used to determine a level of confidence in meeting the completion date or whether proper reserves have been incorporated into the schedule. A schedule risk analysis will calculate schedule reserve, which can be set aside for those activities identified as high risk. Without this reserve, the program faces the risk of delays to the scheduled completion date if any delays were to occur on critical path activities. However, if the schedule risk analysis is to be credible, the program must have a quality schedule that reflects reliable logic and clearly identifies the critical path—conditions that the MPA program schedule does not meet.
9. Updating the schedule using logic and durations to determine the dates	Not met	As noted earlier, all activities within the schedule are marked as planned. In other words, even though the schedule's start date is July 2010, 6 months prior to our analysis, no activities have been updated with actual progress. Because no effort has been made to status actual progress, it is impossible to use the schedule to determine what activities have been completed, are in progress, are late, or are planned to start on time. Moreover, program officials stated that they were not expecting monthly updates to the schedule—even though the production contract requires at least monthly updates. Finally, program officials stated that they do not compare the current schedule to a baseline schedule. As a best practice, the schedule should be continually monitored to determine when forecasted completion dates differ from the planned dates, which can be used to determine whether schedule variances will affect downstream work. Maintaining the integrity of the schedule logic is not only necessary to reflect true status, but is also required before conducting a schedule risk analysis.

Source: GAO analysis based on information provided by the Coast Guard.

Table 10: Analysis of the NSC 3 Program Schedule

Best practice	Criterion met	GAO analysis
1. Capturing all activities	Partially met	The program schedule does not reflect all activities as defined in the program's work breakdown structure. For example, the schedule does not include the C4ISR activities as defined in the December 2008 approved acquisition program baseline and the program work breakdown structure. Moreover, the schedule only captures the work for the production of the third cutter (NSC 3), yet the NSC program of record includes a total eight cutters to be delivered by fiscal year 2016. Program officials acknowledged that technical issues in the schedule may be due to conversion errors and as such could negatively affect the integrity of the schedule. For example, during our meeting with the program office, the schedule status date shown in the schedule was inaccurate. Coast Guard officials said they do not have the capability to assess the schedule in its native format, and therefore do not know if issues identified in the schedule are related to the software conversions or some other issue. For this reason, it is ultimately the responsibility of the government program office to develop and maintain the integrated master schedule. However, outside of the contractor schedule there is no other program schedule. In fact, the program office officials stated they considered it a waste of resources developing a government schedule in addition to the schedule maintained by the contractor. Instead, program office officials stated that the fixed price contracting vehicle governing the program is enough incentive for Northrop Grumman to deliver a reliable schedule. Because the integrated master schedule includes all government, contractor, and external party effort, the government program office is ultimately responsible for the development and maintenance of the integrated master schedule. A program integrated master schedule is not simply the prime contractor's schedule; the integrated master schedule is a comprehensive plan of all government, contractor, and subcontractor work that needs to be performed. Without an integrated master schedule that accounts for all planned government and contractor effort, management is not able to reliably estimate planned dates beyond the current schedule's end date of September 2012.

Best practice	Criterion met	GAO analysis
2. Sequencing all activities	Partially met	While the number of activities with missing dependencies is extremely low, the schedule contains a significant number of date constraints. 1,948 (50 percent) of the remaining activities are constrained. Of these, 1,944 are “Start No Earlier Than” constraints and 4 are “Finish No Later Than” constraints. “Start No Earlier Than” constraints are considered “soft” constraints in that they allow the activity to slip into the future based on what happens to their predecessor activities. “Finish No Later Than” constraints are also considered “soft” date constraints because they prevent activities from finishing earlier than their constraint date. Coast Guard and Northrop Grumman officials said “Start No Earlier Than” and “Finish No Later Than” events are used to align start and finish dates on the NSC with other shipyard construction programs and assist in managing facility loading. However, “Start No Earlier Than” and “Finish No Earlier Than” constraints prevent managers from accomplishing work as soon as possible and consume flexibility in the project. We found 118 (3 percent) dangling activities in the schedule; 117 are missing a successor from their finish and 1 is missing logic that would determine its start date. Activities with dangling logic have start and finish dates that are not determined by logic. Thus, activities that do not have their start dates determined by logic would have to start earlier in order to finish on time if they ran longer than their planned durations; and activities missing successors off their finish date could continue indefinitely and not affect the start or finish dates of future activities. We also found 702 (18 percent) lags in the schedule: 693 are positive lags and 9 are negative lags. Program officials said as a result of GAO’s initial findings, they worked to reduce the 5,977 lags we found in our initial review of the schedule. While lags represent the passing of time between activities, they are often misused to put activities on a specific date or to insert a buffer for risk. Therefore, lags should be justified because they cannot vary with risk or uncertainty.
3. Assigning resources to all activities	Substantially met	The program schedule is resource-loaded by cost centers, and the schedule currently includes a total of 189 cost centers that show up as planning packages in the integrated master schedule. Northrop Grumman officials also said resource estimates are based on industrial engineering standards; however, program officials did not provide any written evidence of this engineering standard estimation process. Regarding the availability of resources, both Coast Guard and Northrop Grumman officials said the lack of resources is not a concern at this time because the NSC shipbuilding effort is a small fraction of the total work occurring at the shipyard and at present Northrop Grumman has more manpower than can actually be employed on the ship.
4. Establishing the duration of all activities	Partially met	Fifty-six percent of the remaining activities in the schedule meet best practices with durations of 44 days or less. Per Northrop Grumman officials, durations are determined using historical data from the builds of previous NSCs and the construction of NSC-1 and NSC-2 were used to help forecast the master construction schedule of the NSC-3. Of the 44 percent of remaining activities that were greater than 44 days, 206 activities (7 percent) have durations longer than 200 days. More than half of these are for level of effort activities which are supportive in nature and therefore their durations should be determined by the detail activities they support. For those activities with durations greater than 44 days, management should examine closely to see if it is possible to schedule the activities in smaller increments to improve the management of those activities. Care should be taken not to detail an ill-defined far-term effort so soon that it requires constant revision as time progresses. It should also be recognized that long-duration activities can skew Schedule Risk Analysis results.

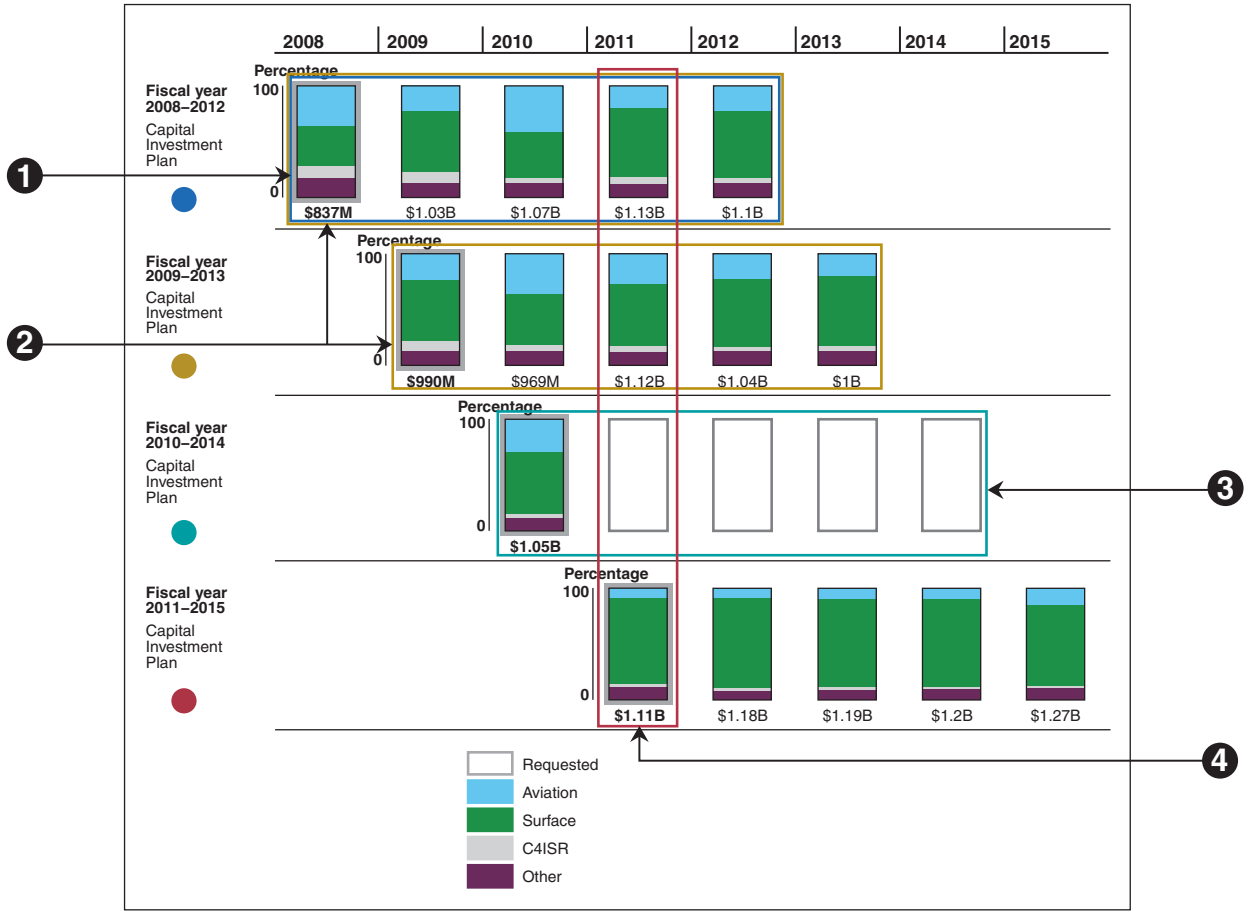
Best practice	Criterion met	GAO analysis
5. Integrating schedule activities horizontally and vertically	Partially met	Vertical integration—that is, the ability to consistently trace work breakdown structure elements between detailed and summary master schedules—is demonstrated because lower level tasks and milestones roll up into higher level summary tasks. But issues with the overuse of lags, and date constraints prevent the program schedule from complying with the requirement of horizontal integration—that is, the overall ability of the schedule to depict relationships between different program elements and product hand-offs. Furthermore, we tested the schedule for horizontal integration by extending a task more than 500 days. We found that while the overall finish date for the schedule did slip, the activity's successor's start and finish dates did not change. Additionally, the program schedule only reflects work for the NSC 3 vessel. Because the schedule only reflects the work for NSC 3 and not the remaining five cutters, the schedule cannot be used to assess the impacts of current task slippages on future planned activities, nor can it be used to support promised program dates beyond September 2012. Unless the schedule is fully horizontally integrated, the effects of slipped tasks on succeeding work cannot be determined. Horizontal integration demonstrates that the overall schedule is rational, planned in a logical sequence, accounts for interdependencies between work and planning packages, and provides a way to evaluate current status. When schedules are not horizontally integrated relationships between different program teams cannot be seen and product handoffs cannot be identified.
6. Establishing the critical path for all activities	Partially met	Our analysis also found that the schedule does not reflect a valid critical path for several reasons. First, the schedule is missing key activities related to the C4ISR capability. Second, the schedule is not logically sequenced in that it contains date constraints, dangling logic, and an overuse of lags. Unless all activities are included and properly linked, it is not possible to generate a true critical path. We traced five critical paths in the schedule. Though the critical path can spread out into a number of different paths, which is the case in this schedule, the path must be continuous from the status date of February 20, 2011, to the project end date of September 10, 2012, which is not the case. Northrop Grumman officials said the critical end milestone they are most concerned about is Preliminary Delivery NSC, which has a planned finish date of September 12, 2011, 12 months before the project finish. Without clear insight into a critical path at the project level, management will not be able to monitor critical or near-critical detail activities that may have a detrimental impact on downstream activities if delayed.
7. Identifying reasonable float	Partially met	We found 1,152 (30 percent) of the remaining activities versus 76 percent in our initial analysis, with negative float values ranging from -5 days to -257 days. We also found 255 (7 percent) of the remaining activities with float values greater than 100 days. The program manager said float values in the schedule were considerably reduced once they removed the two outlier events associated with a typographical error which recorded in the schedule February 2029 finish dates. Float estimates are directly related to the logical sequencing of activities, therefore if the schedule is not properly sequenced float calculations will be miscalculated. Because of the 702 lags in the schedule, float calculations are distorted. Without reliable float estimates management may be unable to allocate resources from noncritical activities to activities that cannot slip without affecting the project finish date. Furthermore, because the critical path is directly related to the logical sequencing of events and float calculations, if the schedule is missing dependencies or if activities are incorrectly linked, float estimates will be miscalculated resulting in an invalid critical path.

Best practice	Criterion met	GAO analysis
8. Conducting a schedule risk analysis	Not met	Coast Guard program and Northrop Grumman officials said schedule risk analysis was not required as part of the contract and therefore one was not performed. Agency officials and Northrop Grumman said a schedule risk analysis will be performed as part of the NSC 4 schedule. In the December 2010 program management review, only one risk was identified "test or installation phase failure." Given that the schedule as of February 2011 has 3,920 remaining activities, one identified risk seems improbable. For example, Northrop Grumman said the critical end milestone they are most concerned about is ID# 655 "Preliminary Delivery of NSC." For this reason we expected to see this milestone on the risk list, but we didn't. This critical milestone has -5 days of float and 57 converging predecessors. This means the task is already 5 days behind schedule as of the February 20, 2011, status date. Compounding the risk, converging paths decrease the probability of meeting a milestone date. The chance that this milestone will be accomplished on time decreases with every path that is added leading up to the milestone. The more parallel paths in the schedule, the greater the schedule risk. A Monte Carlo schedule risk analysis simulation can help identify the compounded effect of these parallel paths and quantify how much contingency reserve or buffer is needed in the schedule to mitigation this risk. A comprehensive schedule risk analysis is an essential tool for decision makers. A schedule risk analysis can be used to determine a level of confidence in meeting the completion date or whether proper reserves have been incorporated into the schedule. A schedule risk analysis will calculate schedule reserve, which can be set aside for those activities identified as high risk. Without this reserve, the program faces the risk of delays to the scheduled completion date if any delays were to occur on critical path activities.
9. Updating the schedule using logic and durations to determine the dates	Substantially met	We found no tasks in the schedule that should have started in the past that did not have actual start dates and we found no tasks in the schedule with actual start or finish dates in the future. We did find one task with a finish date in the past with no actual finish date. Northrop Grumman said delayed start dates in the schedule occur because predecessor activities have not ended and if an activity has an actual start date, then hours and material are charged to that activity, which indicates that the activity has started. Regarding baseline changes, the program manager said the NSC 3 schedule was rebaselined on May 24, 2010, and an integrated baseline review occurred in September 2010. Per the program manager, the baseline schedule will not be changed until a contract modification is received; the tactical plan can change as activities start and stop, but the baseline schedule cannot change.

Source: GAO analysis based on information provided by the Coast Guard.

Appendix V: Allocation of Deepwater Acquisition, Construction, and Improvement Dollars in the Fiscal Years 2008, 2009, 2010, and 2011 Capital Investment Plans (Then-Year Dollars)

Figure 8: Allocation of Deepwater Acquisition, Construction, and Improvement Dollars in the Fiscal Years 2008, 2009, 2010, and 2011 Capital Investment Plans (Then-Year Dollars)



1 Fiscal year 2008 - 2012
Each year the Coast Guard presents a five-year capital investment plan to Congress as part of the President's Budget request. The first year of the plan represents the budget request for that year and the remaining years represent future budget plans.

2 Fiscal year 2009 - 2013
When the Coast Guard updates its capital investment plan, adjustments are sometimes made for both the total funding level and allocations of funds amongst the portfolios. In both the FY2008 and 2009 capital investment plans, the Coast Guard budgeted approximately $1 billion for Deepwater.

3 Fiscal year 2010 - 2014
As part of the Coast Guard's FY2010 budget request submission, it did not include a plan for expected funding levels from FY2011-2014 which provided no insight into future budgetary plans.

4 Fiscal year 2011 - 2015
The Coast Guard's FY2011 budget request of $1.1 billion allocated approximately 9 percent of the request for the aviation portfolio and 3 percent for C4ISR. Based on previous plans, the Coast Guard had anticipated allocating between 20 – 27 percent in FY2011 to the aviation portfolio and 5 – 6 percent for C4ISR. These allocation changes were a contributing factor to breaches for the HH-60,C-130H, and C4ISR programs.

Source: GAO analysis of Coast Guard data.

Appendix VI: GAO Contacts and Staff Acknowledgments

For further information about this report, please contact John P. Hutton, Director, Acquisition and Sourcing Management, at (202) 512-4841 or huttonj@gao.gov. Other individuals making key contributions to this report include Michele Mackin, Assistant Director; Molly Traci; William Carrigg; Tisha Derricotte; Jennifer Echard; Laurier Fish; Carlos Gomez; Kristine Hassinger; Jason Lee; Karen Richey; and Rebecca Wilson.

Related GAO Products

Coast Guard: Opportunities Exist to Further Improve Acquisition Management Capabilities. GAO-11-480. Washington, D.C.: April 13, 2011.

Coast Guard: Observations on Acquisition Management and Efforts to Reassess the Deepwater Program. GAO-11-535T. Washington, D.C.: April 13, 2011.

Coast Guard: Deepwater Requirements, Quantities, and Cost Require Revalidation to Reflect Knowledge Gained. GAO-10-790. Washington, D.C.: July 27, 2010.

Department of Homeland Security: Assessments of Selected Complex Acquisitions. GAO-10-588SP. Washington, D.C.: June 30, 2010.

Coast Guard: Observations on the Requested Fiscal Year 2011 Budget, Past Performance, and Current Challenges. GAO-10-411T. Washington, D.C.: February 25, 2010.

Coast Guard: Better Logistics Planning Needed to Aid Operational Decisions Related to the Deployment of the National Security Cutter and Its Support Assets. GAO-09-497. Washington, D.C.: July 17, 2009.

Coast Guard: As Deepwater Systems Integrator, Coast Guard Is Reassessing Costs and Capabilities but Lags in Applying Its Disciplined Acquisition Approach. GAO-09-682. Washington, D.C.: July 14, 2009.

Coast Guard: Observations on Changes to Management and Oversight of the Deepwater Program. GAO-09-462T. Washington, D.C.: March 24, 2009.

Coast Guard: Change in Course Improves Deepwater Management and Oversight, but Outcome Still Uncertain. GAO-08-745. Washington, D.C.: June 24, 2008.

Status of Selected Assets of the Coast Guard's Deepwater Program. GAO-08-270R. Washington, D.C.: March 11, 2008.

Coast Guard: Status of Efforts to Improve Deepwater Program Management and Address Operational Challenges. GAO-07-575T. Washington, D.C.: March 8, 2007.

Coast Guard: Status of Deepwater Fast Response Cutter Design Efforts. GAO-06-764. Washington, D.C.: June 23, 2006.

Coast Guard: Changes to Deepwater Plan Appear Sound, and Program Management Has Improved, but Continued Monitoring Is Warranted. GAO-06-546. Washington, D.C.: April 28, 2006.

Coast Guard: Progress Being Made on Addressing Deepwater Legacy Asset Condition Issues and Program Management, but Acquisition Challenges Remain. GAO-05-757. Washington, D.C.: July 22, 2005.

Coast Guard: Preliminary Observations on the Condition of Deepwater Legacy Assets and Acquisition Management Challenges. GAO-05-651T. Washington, D.C.: June 21, 2005.

Coast Guard: Deepwater Program Acquisition Schedule Update Needed. GAO-04-695. Washington, D.C.: June 14, 2004.

Contract Management: Coast Guard's Deepwater Program Needs Increased Attention to Management and Contractor Oversight. GAO-04-380. Washington, D.C.: March 9, 2004.

Coast Guard: Actions Needed to Mitigate Deepwater Project Risks. GAO-01-659T. Washington, D.C.: May 3, 2001.

GAO's Mission

The Government Accountability Office, the audit, evaluation, and investigative arm of Congress, exists to support Congress in meeting its constitutional responsibilities and to help improve the performance and accountability of the federal government for the American people. GAO examines the use of public funds; evaluates federal programs and policies; and provides analyses, recommendations, and other assistance to help Congress make informed oversight, policy, and funding decisions. GAO's commitment to good government is reflected in its core values of accountability, integrity, and reliability.

Obtaining Copies of GAO Reports and Testimony

The fastest and easiest way to obtain copies of GAO documents at no cost is through GAO's Web site (www.gao.gov). Each weekday afternoon, GAO posts on its Web site newly released reports, testimony, and correspondence. To have GAO e-mail you a list of newly posted products, go to www.gao.gov and select "E-mail Updates."

Order by Phone

The price of each GAO publication reflects GAO's actual cost of production and distribution and depends on the number of pages in the publication and whether the publication is printed in color or black and white. Pricing and ordering information is posted on GAO's Web site, http://www.gao.gov/ordering.htm.

Place orders by calling (202) 512-6000, toll free (866) 801-7077, or TDD (202) 512-2537.

Orders may be paid for using American Express, Discover Card, MasterCard, Visa, check, or money order. Call for additional information.

To Report Fraud, Waste, and Abuse in Federal Programs

Contact:

Web site: www.gao.gov/fraudnet/fraudnet.htm
E-mail: fraudnet@gao.gov
Automated answering system: (800) 424-5454 or (202) 512-7470

Congressional Relations

Ralph Dawn, Managing Director, dawnr@gao.gov, (202) 512-4400
U.S. Government Accountability Office, 441 G Street NW, Room 7125
Washington, DC 20548

Public Affairs

Chuck Young, Managing Director, youngc1@gao.gov, (202) 512-4800
U.S. Government Accountability Office, 441 G Street NW, Room 7149
Washington, DC 20548