



March 2015

COAST GUARD

Timely Actions Needed to Address Risks in Using Rotational Crews

GAO Highlights

Highlights of [GAO-15-195](#), a report to congressional requesters

Why GAO Did This Study

The Coast Guard is in the process of replacing its 12 aging high-endurance cutters with 8 NSCs. The NSCs are to achieve increased operational performance compared to the legacy cutters they are replacing, in part, by using rotating crews.

GAO was asked to assess the Coast Guard's use of the CRC to increase NSC operational performance. This report examines (1) the extent to which the Coast Guard has made progress in testing the CRC and increasing the NSCs' operational performance, (2) the extent to which the Coast Guard has addressed risks affecting the CRC test and implementation, and (3) the extent to which the Coast Guard's performance measure allows it to accurately measure NSC operational performance.

GAO analyzed NSC acquisition and planning documents; DAFHP data from fiscal years 2011 to 2014; and studies on aspects of CRC implementation, such as scheduling, and interviewed Coast Guard officials and senior officers of all three NSCs deployed as of October 2014.

What GAO Recommends

GAO recommends, among other things, that the Coast Guard (1) fulfill its recommended NSC staffing requirements, (2) specify mitigating actions to address risk factors identified in this report, (3) develop interim milestones for the mitigation actions to be taken, and (4) develop a timeframe for implementing alternative operational performance measures prior to CRC testing. The Department of Homeland Security concurred with GAO's recommendations.

View [GAO-15-195](#). For more information, contact Jennifer A. Grover at (202) 512-7141 or groverj@gao.gov.

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What GAO Found

The Coast Guard has delayed the feasibility test for using the crew rotation concept (CRC) to achieve increased operational days at sea with its National Security Cutters (NSC) until 2019. In 2006, the Coast Guard decided to use the CRC for its NSCs and that implementation would begin in 2011. However, the Coast Guard has postponed CRC testing because of delays in NSC deliveries and needed structural enhancements. In fiscal year 2013, the Coast Guard began implementing an interim plan to increase the NSCs' operational performance, not by rotating crews, but by adding crew members to help bear the increased workload. However, the added crew members do not have the skill mix recommended by a 2011 manpower requirements analysis. Without the appropriate crew members with the right skill mix, the NSCs may not be able to complete all mission requirements or required maintenance.

The Coast Guard has not fully addressed a variety of risks that could affect the success of its planned CRC feasibility test and goal to increase NSC operational days away from home port (DAFHP) from 185 to 230 days per year using the CRC. Further, the Coast Guard could not provide us with complete details about whether the CRC plan, to be completed by the end of 2017, will include actions to address and effectively mitigate various risks, to include

- determining the appropriate number and skill mix of NSC crew members and support personnel and whether they will be in place in time for the CRC test;
- incorporating actual NSC maintenance needs when developing NSC maintenance schedules and goals;
- testing the CRC under realistic circumstances, such as addressing the misalignment of the crewing concept to be tested as compared to the NSC homeporting plan;
- addressing the potential impacts of wide variations between alternative deployment schedules using the CRC; and
- implementing a training infrastructure and providing training support for off-cycle rotating crews.

As the Coast Guard continues to develop its CRC plan, establishing interim milestones for carrying out the actions needed to address and effectively mitigate these risks would help ensure that it addresses the risks in a timely manner.

The Coast Guard's current measure does not accurately quantify the operational performance of the NSC fleet. The Coast Guard primarily uses the DAFHP measure across its major cutter fleet; however, this measure includes days when a cutter is undergoing maintenance away from its home port and, as a result, will likely overstate the number of operational days. The Coast Guard has known of the measure's limitation for years and is exploring alternatives. However, since the CRC plan is premised on achieving 230 DAFHP per year—and that other Coast Guard vessels, such as the Offshore Patrol Cutter, also plan to use the DAFHP metric—implementing alternative measures prior to CRC testing will better ensure the test results are benchmarked against a more appropriate goal to quantify the operational performance of its fleet of NSCs and its planned fleet of Offshore Patrol Cutters.

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Abbreviations

CRC	Crew Rotation Concept
DAFHP	Days Away from Home Port
DHS	Department of Homeland Security
GPRA	Government Performance and Results Act
ITMP	in-theater maintenance period
NSC	National Security Cutter
OPC	Offshore Patrol Cutter
WMSL	Coast Guard maritime security cutter, large

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March 6, 2015

The Honorable Bill Shuster
Chairman
Committee on Transportation and Infrastructure
House of Representatives

The Honorable Duncan Hunter
Chairman
Subcommittee on Coast Guard and Maritime Transportation
Committee on Transportation and Infrastructure
House of Representatives

The U.S. Coast Guard is in the process of replacing its 12 aging high-endurance cutters with 8 National Security Cutters (NSC) that are more capable of extended on-scene presence, extended transits, and enhanced communication and surveillance systems compared with the high-endurance cutters they are replacing. Since 2004, the Coast Guard's goal has been that fewer NSCs would be needed to replace its fleet of high-endurance cutters because of increased NSC operational performance, in part measured by the number of days away from home port (DAFHP) the new NSCs were to achieve.¹ Specifically, in 2006, the Coast Guard determined that its NSCs were to achieve 230 DAFHP each year by using a crew rotation concept (CRC). Rather than the traditional one-cutter-one-crew concept, under the CRC, additional crews are created to rotate among the NSCs to increase the DAFHP from 185 to 230 while maintaining the crew members' time spent aboard the cutters at the Coast Guard's limit of 185 DAFHP a year. Thus, by achieving 230 DAFHP, the NSC fleet, with its planned improvements in operational capabilities and performance is intended to exceed the operational capabilities and performance of the legacy high-endurance cutter fleet.

You asked us to assess the progress the Coast Guard has made in achieving an increase in the operational performance of its NSC fleet. In response, this report addresses

¹For purposes of this report, we refer to DAFHP or operational days at sea as an operational performance measure.

-
- the extent to which the Coast Guard has made progress in developing and testing the CRC and taken other actions to achieve increased DAFHP,
 - the extent to which the Coast Guard has addressed risks that could affect testing and implementation of the CRC, and
 - the extent to which the Coast Guard's current performance measure allows it to accurately measure the operational performance of the NSC fleet.

To address all of these objectives, we analyzed Coast Guard documents related to the NSC fleet, including acquisition documents, plans to increase operational days at sea using rotational crewing, and concepts of operations. We also analyzed Coast Guard decision memos, manuals, and instructions related to NSC operations and crews. Further, we analyzed the data used by the Coast Guard to measure NSC operational performance, including the number of DAFHP from fiscal years 2011 through 2014 compiled by Coast Guard officials based on the NSCs' deployment schedules. To assess the reliability of these data, we spoke with knowledgeable officials and reviewed Coast Guard guidance on DAFHP and other relevant documentation. Where possible, we corroborated these data with the NSCs' deployment schedules and after-action reports and found the DAFHP data sufficiently reliable for the purposes of this report. For background and context in addressing these objectives, we also reviewed prior GAO reports on the Coast Guard's acquisition strategy and management challenges related to the delayed deployment and increased acquisition costs of the NSC fleet,² and on the

²See for example, GAO, *Coast Guard: Progress Being Made on Deepwater Project, but Risks Remain*, [GAO-01-564](#) (Washington, D.C.: May 2, 2001); *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: 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: Portfolio Management Approach Needed to Improve Major Acquisition Outcomes*, [GAO-12-918](#) (Washington, D.C.: Sept. 20, 2012); and *Coast Guard Acquisitions: Better Information on Performance and Funding Needed to Address Shortfalls*, [GAO-14-450](#) (Washington, D.C.: June 5, 2014).

U.S. Navy's use of rotational crewing.³ In addition, we reviewed studies on the U.S. Navy's experience with rotational crewing and interviewed officials from the U.S. Navy's Fleet Forces Command in Norfolk, Virginia, as well as senior officers in command of Navy vessels using rotational crewing during the time of our review—including a mine countermeasures ship and a littoral combat ship in San Diego, California—to compare and contrast the Navy's experience using rotational crews with the Coast Guard's plans. Further, we interviewed Coast Guard headquarters, Pacific Area Command, and a Surface Fleet Logistics Center official, as well as the commanding officers, executive officers, and engineering officers assigned to the 3 NSCs deployed during the time of our review—the *Bertholf*, *Waesche*, and *Stratton*—to obtain their views on the Coast Guard's actions to increase NSC operational days at sea and the impact of the increased days at sea. Finally, we interviewed a Congressional Budget Office researcher on his report and findings regarding the U.S. Navy's use of rotational crewing to determine possible benefits and challenges to the Coast Guard's rotational crewing plans, and officials representing the Director of Operational Test and Evaluation within the Department of Homeland Security's (DHS) Science and Technology Directorate on the NSC operational test plan and test results.

In addition to the audit steps mentioned above, for the first objective, we analyzed, among other things, the Coast Guard's plan for determining the home ports for each of the NSCs (homeporting plan), the NSC manpower requirements analysis, the interim plan to increase NSC operational days at sea, and the Coast Guard staffing standards to compare NSC staffing requirements with staffing of the actual crews assigned to the 3 deployed NSCs at the time of our review.

For the second objective, we also reviewed Coast Guard–commissioned studies on various aspects of implementing the CRC, including risks related to (1) vessel mission deployment scheduling, (2) training, (3) alternative rotational crewing approaches, and (4) implementation cost

³GAO, *Force Structure: Ship Rotational Crewing Initiatives Would Benefit from Top-Level Leadership, Navy-wide Guidance, Comprehensive Analysis, and Improved Lessons-Learned Sharing*, [GAO-08-418](#) (Washington, D.C.: May 29, 2008); *Littoral Combat Ship: Actions Needed to Improve Operating Cost Estimates and Mitigate Risks in Implementing New Concepts*, [GAO-10-257](#) (Washington, D.C.: Feb. 2, 2010); and *Littoral Combat Ship: Deployment of USS Freedom Revealed Risks in Implementing Operational Concepts and Uncertain Costs*, [GAO-14-447](#) (Washington, D.C.: July 8, 2014).

estimates.⁴ We reviewed the methodologies of these studies and found them reasonable for the purposes of this report. Further, we compared DHS and Coast Guard acquisition and test and evaluation guidance with the Coast Guard's plan for testing the CRC. We compared the various risks to CRC implementation—identified, in part, by Coast Guard–commissioned studies and interviews with Coast Guard officials—with risk assessment standards from *Standards for Internal Control in the Federal Government* and leading practices for program management.⁵ Further, we analyzed Coast Guard documents related to personnel, maintenance, and training, including NSC staffing standards, engineering reports, and a cutter training and qualification manual. We also analyzed training completion data for assigned NSC crews for fiscal years 2013 and 2014, covering the years that the first 3 NSCs have been operational. In particular, we interviewed knowledgeable officials and reviewed documentation regarding reasons for not completing the training and determined these data to be sufficiently reliable for this report. Last, we interviewed senior NSC officers from each of the 3 deployed NSCs to gain their perspectives regarding the CRC's potential impact on crew morale, crew fatigue, and maintenance requirements.

For the third objective, we also reviewed prior GAO reports on performance measures related to the Government Performance and Results Act (GPR) and analyzed the Coast Guard's *Capability Management* guidance to determine performance measurement

⁴For example, see U.S. Coast Guard, *U.S. Coast Guard National Security Cutter Crew Rotation Concept Alternatives Schedule Analysis*, a report prepared for the U.S. Coast Guard by the Survivability/Vulnerability Information Analysis Center, which is operated by Booz Allen Hamilton (Wright-Patterson Air Force Base, Ohio: March 21, 2012) and U.S. Coast Guard National Security Cutter Crew Rotation Concept Training System Strategic Needs Assessment, a report prepared for the U.S. Coast Guard by the Survivability/Vulnerability Information Analysis Center, which is operated by Booz Allen Hamilton (Wright-Patterson Air Force Base, Ohio: October 31, 2012).

⁵See GAO, *Standards for Internal Control in the Federal Government*, [GAO/AIMD-00-21.3.1](#) (Washington, D.C.: Nov. 1, 1999); Department of Homeland Security Acquisition Management Directive No. 102.01, January 20, 2010; and the Project Management Institute, *The Standard for Program Management*, third edition (Newton Square, PA.: 2013). *Standards for Internal Control* states that risk assessment is the identification and analysis of relevant risks associated with achieving the objectives, such as those defined in strategic and annual performance plans developed under the Government Performance and Results Act, and forming a basis for determining how risks should be managed.

standards.⁶ Further, we compared the Coast Guard's performance measures for the NSC fleet with GPRA and the Coast Guard's criteria to determine whether these measures could be effectively used as an accurate gauge of operational performance, or serve as a target against which to track actual operational performance.

We conducted this performance audit from January 2014 to March 2015 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.

Background

A Brief History of the Deepwater Program

In the late 1990s, the Coast Guard began the Deepwater Program, a 25-year, \$24.2 billion recapitalization effort to, among other things, rebuild or replace vessels and aircraft that were reaching the end of their expected service lives and were in deteriorating condition. Deepwater documents from 1996 identified the Coast Guard's mission need for a large maritime security cutter, which later became known as the NSC. The Coast Guard awarded a contract in June 2002 to a prime contractor (or systems integrator) for the Deepwater Program. The Coast Guard generally provided the contractor with broad, overall performance specifications—such as the ability to interdict illicit drugs—and the contractor determined the assets needed and their specifications and was responsible for designing, constructing, deploying, supporting, and integrating the various assets to meet projected operational requirements. Also in 2002, the Coast Guard conducted an analysis that determined the vessel fleet, as designed by the contractor, would have significant capability gaps in meeting mission requirements related to homeland security that emerged

⁶See, for example, GAO, *Results-Oriented Government: GPRA Has Established a Solid Foundation for Achieving Greater Results*, [GAO-04-38](#) (Washington, D.C.: Mar. 10, 2004); *Managing for Results: Enhancing Agency Use of Performance Information for Management Decision Making*, [GAO-05-927](#) (Washington, D.C.: Sept. 9, 2005); and U.S. Coast Guard, *Capability Management*, Coast Guard Publication 7-0 (Washington, D.C.: May 24, 2013).

after the September 11, 2001, (9/11) terrorist attacks. The Coast Guard decided, because of fiscal constraints, not to make significant changes to the contractor's planned fleet, but did approve changes to several assets' capabilities, including those of the NSC, and submitted a revised cost, schedule, and performance baseline for the overall Deepwater Program to DHS in November 2006.⁷

As we have previously reported, DHS approved the newly developed baseline at \$24.2 billion in May 2007, shortly after the Coast Guard—acknowledging that it had relied too heavily on contractors and that the government and industry had failed to control costs—announced its intention to take over the role of systems integrator.⁸ The Coast Guard took over responsibility for Deepwater systems integration and program management from the contractor in April 2007. Further, as of the fiscal year 2012 budget, DHS and the Coast Guard no longer use the term “Deepwater”; rather it is called the recapitalization program and includes many of the assets, such as the NSC, that made up the former Deepwater Program.

Since assuming responsibility for the Deepwater Program, the Coast Guard has reconsidered the fleet mix required to meet its mission needs through a series of analyses and, as a result, has made some changes to the composition of its asset mix. We found in June 2014, that the Coast Guard, DHS, and Office of Management and Budget officials acknowledged that the Coast Guard could not afford to recapitalize and modernize its assets in accordance with the existing plan at current funding levels.⁹ Further, we also reported that the Coast Guard had repeatedly delayed and reduced the capability of its new assets through the annual budget process and did not know the extent to which its mission needs could be tailored and still achieve the desired results. As a result, we concluded that the Coast Guard's ability to meet future mission needs was uncertain and recommended, among other things, that the

⁷We reported previously on the Coast Guard's progress in achieving these capabilities, such as adding chemical, biological, and decontamination capability. See, for example, [GAO-12-918](#).

⁸See, for example, GAO, *Coast Guard: Legacy Vessels' Declining Conditions Reinforce Need for More Realistic Operational Targets*, [GAO-12-741](#) (Washington, D.C.: July 31, 2012) [reissued on Aug. 30, 2012]; [GAO-09-497](#); and [GAO-12-918](#).

⁹See [GAO-14-450](#).

Coast Guard develop a 20-year fleet modernization plan that identifies all acquisitions needed to maintain the current level of service and the fiscal resources necessary to build the identified assets. The plan was to also include trade-offs if the fiscal resources needed to execute the plan were not consistent with the Coast Guard's annual budgets. We stated that a properly constructed 20-year plan was necessary to determine long-term feasibility, provide a basis for informed decisions to align the Coast Guard's needs and resources, and protect taxpayer investments given the approximately \$1.5 billion annual spending for Coast Guard acquisitions. While DHS concurred with this recommendation, it did not fully address our recommendation or set forth an estimated date for the 20-year plan's completion.

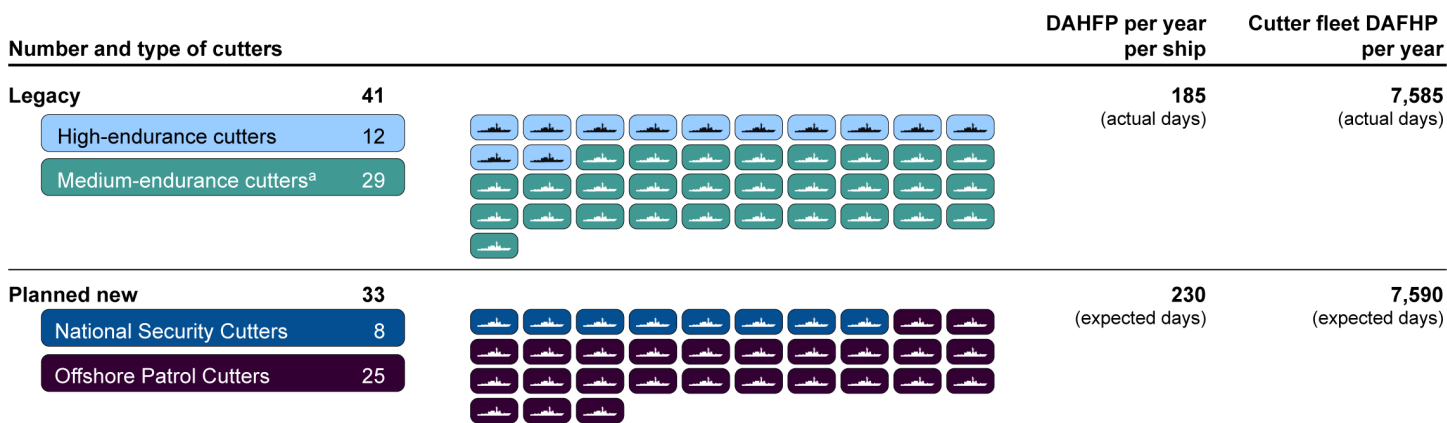
Overview of NSC Acquisitions and Concept of Operations

The Coast Guard, within DHS, is the principal federal agency responsible for maritime safety, security, and environmental stewardship through multimission resources, authorities, and capabilities. To carry out these missions, the fleet of NSCs is to be capable of helping the Coast Guard execute its most challenging maritime security missions and to possess enhanced capabilities over the high-endurance cutters it is replacing. The NSC was the first cutter class delivered to the Coast Guard under the former Deepwater Program and, according to its concept of operations and other acquisition documents, is the largest and most capable multimission cutter in the Coast Guard, with capabilities for maritime homeland security, law enforcement, and defense readiness missions.

As outlined in Deepwater planning documents, the Coast Guard's aging fleet of major cutters—the high- and medium-endurance cutters—were generally to be replaced with the NSC and the Offshore Patrol Cutter (OPC), respectively. The NSCs and OPCs, however, are not intended to be a direct one-for-one replacement of these legacy vessels. Acquisition documents state that fewer new cutters would be needed to conduct the majority of the operational tasking previously assigned to the legacy major cutters by increasing operational days at sea, among other improvements. Specifically, the 41 legacy major cutters operating at that time (12 high-endurance cutters and 29 medium-endurance cutters) were each averaging 185 DAFHP a year and were to be replaced by 33 new cutters (8 NSCs and 25 OPCs) that were each to achieve 230 DAFHP a

year.¹⁰ Coast Guard officials told us that the Coast Guard calculated that it would need the 33 new cutters to achieve 230 DAFHP each year in order to attain roughly the equivalent DAFHP that the 41 legacy major cutters were to achieve with a goal of 185 DAFHP per vessel—about 7,590 for the new cutters and about 7,585 DAFHP per year for the legacy major cutters—as shown in figure 1.¹¹ Further, in September 2014, senior-level Coast Guard officials stated that a key goal for the NSCs to achieve 230 DAFHP using rotational crewing was to save acquisition costs by increasing the operational performance overall while having to acquire fewer new cutters.

Figure 1: Comparison of Legacy Major Cutters' Actual Days Away from Home Port (DAFHP) and Planned New Major Cutters' Expected DAFHP



Source: GAO analysis of data provided by the U.S. Coast Guard. | GAO-15-195

^aThis includes 13 270-foot medium-endurance cutters, 14 210-foot medium-endurance cutters, and 2 mature medium-endurance cutters in the Coast Guard fleet around the time the 2004 Deepwater acquisition documents were being developed.

¹⁰For purposes of this report, we use the term “legacy major cutters” to refer to the 378-foot high-endurance cutters and the 210-foot and 270-foot medium-endurance cutters. It does not include the 213-foot *Acushnet*, the 230-foot *Storis*, or the 282-foot *Alex Haley*.

¹¹According to Coast Guard officials, a decision memorandum documenting the production and deployment of 8 NSCs to replace the 12 high-endurance cutters was not written. Coast Guard officials told us that Deepwater acquisition documents considered factors other than operational time, such as the number of nautical square miles that the NSCs could keep under surveillance with the planned unmanned aerial vehicles and helicopters, a factor that influenced the number of assets the Coast Guard eventually procured.

Our previous work found that the Coast Guard experienced delays in the delivery of the first NSC and estimated acquisition costs of the 8 NSCs had increased by \$2.2 billion, from an estimate of \$3.5 billion in 2007 to about \$5.7 billion in 2014.¹² As discussed later in this report, the first NSC was to be delivered in 2006; however, because of a number of factors, it was delivered in May 2008. As of the end of fiscal year 2014, the first 3 of the planned 8 NSCs have been deployed—all to Alameda, California. The other NSCs are in various stages of production, as shown in table 1.

Table 1: Delivery and Ready for Operation Dates and Planned Home Ports for the National Security Cutters (NSC) as of November 2014

NSC	Delivery ^a	Ready for operation ^b	Home port
<i>Bertholf</i>	May 2008	May 2010	Alameda, CA
<i>Waesche</i>	November 2009	October 2011	Alameda, CA
<i>Stratton</i>	September 2011	March 2013	Alameda, CA
<i>Hamilton</i>	September 2014	September 2015	Charleston, SC
<i>James</i>	June 2015	June 2016	Charleston, SC
<i>Munro</i>	December 2016	December 2017	Alameda, CA
<i>Kimball</i>	February 2018	February 2019	Honolulu, HI
<i>Midgett</i>	December 2018 ^c	December 2019 ^c	Honolulu, HI

Source: U.S. Coast Guard | GAO-15-195.

^aThis represents the date that the Coast Guard takes possession of the asset from the contractor.

^bThis represents the date that the cutter and its associated systems are ready to carry out Coast Guard missions.

^cThis is an estimated date; however, the contract had not been awarded as of November 2014.

As mentioned above, the NSC has key enhancements in capabilities over the legacy high-endurance cutters, as shown in figure 2. One of these enhancements, increased DAFHP, is discussed in greater detail later in this report.

¹²GAO, *Government Operations: Status of Selected Aspects of the Coast Guard's Deepwater Program*, [GAO-08-270R](#) (Washington, D.C.: Mar. 11, 2008); *Coast Guard: Update on Deepwater Program Management, Cost, and Acquisition Workforce*, [GAO-09-620T](#) (Washington, D.C.: Apr. 22, 2009); and [GAO-14-450](#).

Figure 2: Comparison of the Capabilities of the High-Endurance Cutter to the Capabilities of the National Security Cutter



Capability	High-endurance cutter	National Security Cutter
Number in fleet ^a	12 (7 remain in service)	8 planned (3 ready for operation)
Year first-in-class cutter commissioned	1967	2008
Crew size	166 (19 officers, 147 crew)	110 (14 officers, 96 crew)
Length	378 feet	418 feet
Targeted days away from home port	185 days per year	230 days per year
Maximum time at sea without reprovisioning	45 days	60 days
Range	9,600 nautical miles (at an average speed of 15 knots)	12,000 nautical miles (at an average speed of 12 knots)
Maximum speed	29 knots ^b	28 knots
Patrol speed	12 knots	15 knots
Draft ^c	19 feet	22 feet
Small boat capabilities	Carries 2 small boats 2 side-mounted small boat recovery systems	Carries 3 small boats 1 side-mounted small boat recovery system for 1 small boat, 1 stern-mounted small boat recovery system for 2 small boats

Source: GAO analysis of information provided by the U.S. Coast Guard; U.S. Coast Guard (photos). | GAO-15-195

^aThis is as of November 2014. "Ready for operations" is the date that the cutter and its associated systems are ready to carry out Coast Guard missions.

^bAccording to the Coast Guard, the age and condition of the high-endurance cutters, coupled with renovation and modernization modifications made to these vessels over the years, make many of these vessels unable to achieve a maximum speed of 29 knots.

^cDraft is the depth of water needed to float the vessel.

As we have previously reported, the Coast Guard had not completed operational testing on the NSC until after 3 of the 8 vessels were completed.¹³ In January through April 2014, operational tests were conducted on the NSCs to determine their operational effectiveness and suitability. We are conducting additional work examining these tests as part of a separate review and expect to present the results in late 2015.

Development of the Crew Rotation Concept

While the Coast Guard has never implemented rotational crewing for an entire class of vessels, the U.S. Navy has had some experience using rotational crewing.¹⁴ In reviewing these U.S. Navy programs, we noted in a May 2008 report that rotational crewing has been proven to provide greater forward presence for Navy ships by eliminating ship transits and maintaining more on-station time in distant operating areas.¹⁵ For example, rotational crewing has been used by the U.S. Navy on submarines using a “blue-gold,” or two crews-to-one vessel, crewing model since the 1960s to keep the submarines deployed up to 230 days a year. We also noted in the May 2008 report that because of cost growth in new vessel classes and federal fiscal challenges, rotational crewing may be one alternative the Navy could use to meet mission requirements and mitigate the effects of cost growth. The Congressional Budget Office and Center for Naval Analyses have also noted procurement savings that could be achieved as a result of using rotational crewing on ships.¹⁶ Further, as of August 2014, the U.S. Navy was testing the use of rotational crewing on its littoral combat ships, with eight crews assigned to the first four deployed ships. As we have previously reported, the long-term concept for the littoral combat ship is to use a 3:2:1 model whereby three crews rotate between two ships, one of which is to be deployed at

¹³[GAO-14-450](#).

¹⁴The Coast Guard used a multicrewing concept for about 8 years when some medium-endurance cutters were taken out of service on a rotating basis for equipment upgrades to increase the cutters’ reliability and reduce longer-term maintenance costs, called the Mission Effectiveness Project. Coast Guard officials stated that crews were swapped out in a 5-day period in a variety of locations in the Atlantic area.

¹⁵[GAO-08-418](#).

¹⁶Congressional Budget Office, *Crew Rotation in the Navy: The Long-Term Effect on Forward Presence*, Pub. No. 2897 (Washington, D.C.: October 2007), and Center for Naval Analyses, *Cost Implications of Sea Swap*, (Alexandria, VA.: November 2005). The Center for Naval Analyses is a federally funded research and development center for the U.S. Navy and other defense agencies.

sea.¹⁷ While the use of rotational crews can provide more operational time at sea, it represents a transformational cultural change from the traditional one-crew-one vessel concept and requires leadership and accountability for successful implementation.

As noted earlier, the Coast Guard's goal is to increase operational performance of the NSCs and OPCs over that provided by the legacy major cutters they are replacing by achieving 230 DAFHP each year through the use of alternative crewing strategies. Specifically, in September 2008, the Coast Guard issued a concept of operations that estimated that the CRC would reach initial operating capability in 2011, using three crews to rotate among the first 2 NSCs, and then reach full operating capability in 2013 by rotating four crews among the 3 NSCs that were to be deployed by then. Additionally, the Coast Guard and Maritime Transportation Act of 2012 required the Coast Guard to submit a program execution plan before certifying the sixth NSC as ready for operations.¹⁸ In November 2014, Coast Guard officials estimated the sixth NSC will be ready for operations in December 2017.

The Coast Guard Has Delayed CRC Testing, and Its Interim Plan Uses Crews That Lack the Required Skills and Abilities

While the Coast Guard decided in 2006 that its NSCs would operate using a CRC to achieve 230 DAFHP, various factors have contributed to the Coast Guard's decision to delay testing of the feasibility of the CRC from the initially planned date of 2011 until 2019—13 years after the Coast Guard's initial decision to use the CRC. In addition, the Coast Guard has not yet decided what specific crew configurations it will use in testing the CRC and is considering various options. Because of the delays, the Coast Guard developed and is implementing an interim, bridging strategy for the 3 operational NSCs to achieve 210 DAFHP. The interim plan (the 210 DAFHP Implementation Plan, or 210 Plan) uses augmented crew members to achieve the increased DAFHP rather than

¹⁷GAO-14-447.

¹⁸Pub. L. No. 112-213, § 221(b), 126 Stat. 1540, 1560 (2012). This statute states that the Coast Guard Commandant may not certify a sixth NSC as ready for operations before the Commandant has submitted to the Committee on Commerce, Science, and Transportation of the Senate and the Committee on Transportation and Infrastructure of the House of Representatives program execution plans detailing, among other things, how the first 3 NSCs will achieve the goal of 225 days away from home port in fiscal years following the completion of the structural enhancements (formally called Structural Enhancement Dry-dock Availability) of the first 2 NSCs, as described later in this report.

crew rotations.¹⁹ However, as of the end of fiscal year 2014, the augmented crew members did not possess all the skills and abilities recommended in the Coast Guard's manpower requirements analysis since the goal to achieve 210 DAFHP began in fiscal year 2013.

The Coast Guard Has Delayed Testing of CRC Feasibility to Achieve 230 DAFHP

One of the key operational performance requirements stated in NSC acquisition, planning, and concept of operations documents is to achieve 230 DAFHP through use of a CRC. However, the Coast Guard has postponed testing the CRC from 2011 to 2019 because of, among other things, delays in the delivery of the NSCs and needed structural enhancements to the first 2 NSCs. In particular, our previous work found that the Coast Guard experienced several delays in the delivery of the NSC first-in-class vessel, the *Bertholf*, which led to delays in the production of subsequent NSCs.²⁰ Initially, the *Bertholf* was to be delivered in 2006, but its delivery date later moved to August 2007 because of specification changes made by the Coast Guard to address added post-9/11 homeland security responsibilities. The *Bertholf's* delivery date was then further delayed to May 2008 as a result of substantial damage to the NSC shipyard located in Mississippi, and an exodus of some of the experienced workforce as a result of Hurricane Katrina.

Testing and implementation of the CRC was delayed further when the Coast Guard decided, in December 2012, to complete needed structural enhancements to the hulls of the first 2 NSCs before starting CRC

¹⁹The full name of the plan is the *WMSL 210 DAFHP Implementation Plan*. For the acronym WMSL, *W* means Coast Guard ship, and *MSL* means maritime security cutter, large.

²⁰For example, see GAO, *Coast Guard: Deepwater Program Acquisition Schedule Update Needed*, [GAO-04-695](#) (Washington, D.C.: June 14, 2004); *Coast Guard: Observations on Agency Priorities in Fiscal Year 2006 Budget Request*, [GAO-05-364T](#) (Washington, D.C.: Mar. 17, 2005); *Status of Selected Aspects of the Coast Guard's Deepwater Program*, [GAO-08-270R](#) (Washington, D.C.: Mar. 11, 2008); and *Coast Guard: Change in Course Improves Deepwater Management and Oversight, but Outcome Still Uncertain*, [GAO-08-745](#) (Washington, D.C.: June 24, 2008).

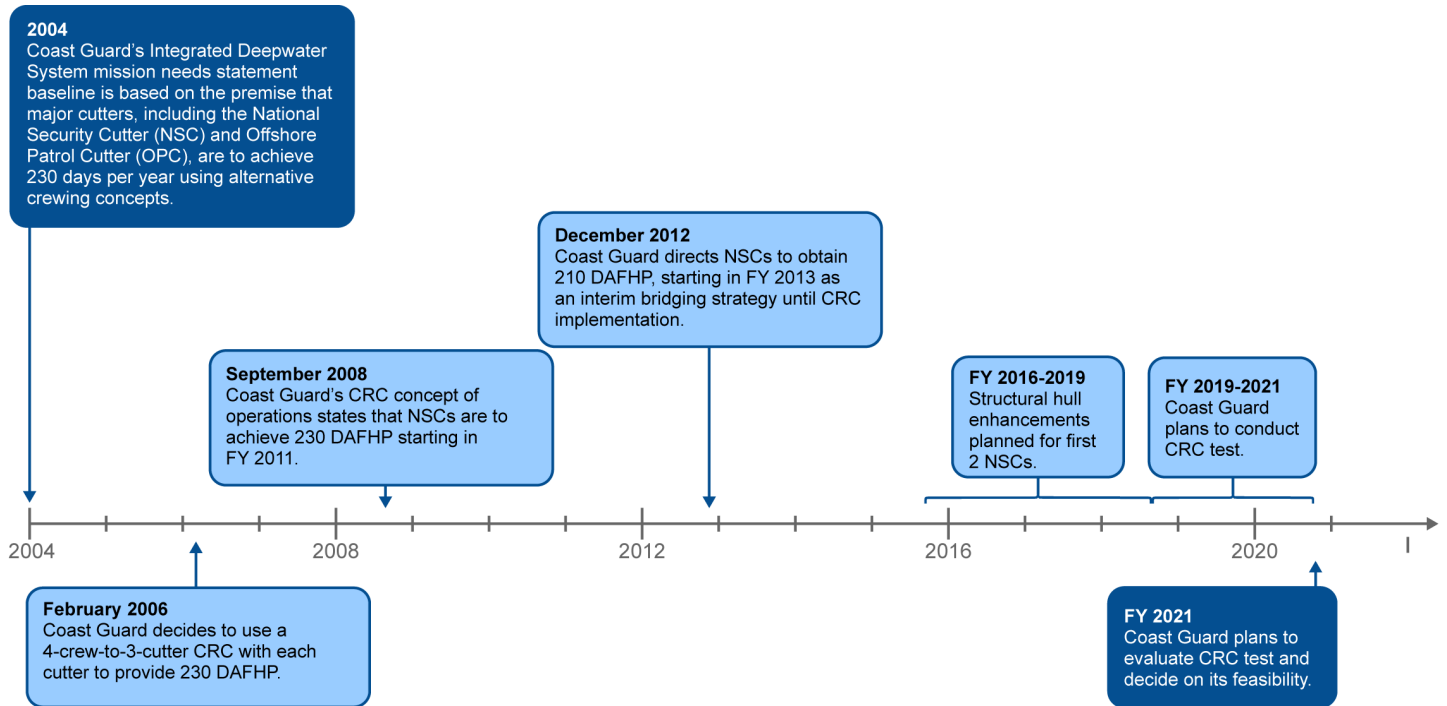
testing.²¹ As of October 2014, according to Coast Guard officials, the Coast Guard estimated that the enhancements to the *Bertholf's* hull would begin in fiscal year 2017 and requested \$20 million in its fiscal year 2015 budget for the enhancements. Coast Guard officials told us its Capital Investment Plan projections for fiscal years 2015 to 2019 include a funding request for structural enhancements for the second vessel, the *Waesche*. According to Coast Guard officials, the structural enhancement work on the 2 NSCs is to be done consecutively and would take each cutter out of operation for about a year.²²

Senior-level Coast Guard officials stated that the Coast Guard is committed to test the CRC, but it would not be able to determine if the concept is feasible for the NSC fleet until it completes the test and analyzes the results. Coast Guard officials estimated in October 2014 that, according to the 3-year estimate for completing the structural enhancements, CRC testing would begin in fiscal year 2019 and would take about 2 years to complete. The Coast Guard officials told us they would evaluate the test results and make a determination regarding the feasibility of CRC, which is expected in fiscal year 2021, some 15 years after first deciding to use the concept. Figure 3 provides further details on the major events since the Coast Guard's 2006 decision to use the CRC to fulfill the 230 DAFHP operational performance requirement established in the NSC mission needs statement.

²¹See GAO, *Coast Guard: Challenges Affecting Deepwater Asset Deployment and Management and Efforts to Address Them*, [GAO-07-874](#) (Washington, D.C.: June 18, 2007), and [GAO-08-745](#). During the design phase, the NSC hull was found, as confirmed by a U.S. Navy study, to be unlikely to meet the 30-year service life expectations because of fatigue. Fatigue is physical weakening because of age, stress, or vibration. At the time the structural deficiencies were confirmed, the Coast Guard could not make the design changes because it held only an advisory role in making technical decisions under the Deepwater Program structure. The Coast Guard ultimately decided to correct the structural deficiencies for the first 2 NSCs at scheduled points after construction was completed to avoid stopping the production lines, and to incorporate structural enhancements into the design and production for future ships.

²²Coast Guard officials estimated that the cutters would need to be dry-docked for about 6 months, followed by dockside work. Further, an additional 3 months would be needed for validation and testing before each cutter would be ready to resume operations.

Figure 3: Timeline of the National Security Cutters' (NSC) Operational Performance Requirement to Achieve 230 Days Away from Home Port (DAFHP) Using a Crew Rotation Concept (CRC), 2004 to 2021



Legend
 FY Fiscal year

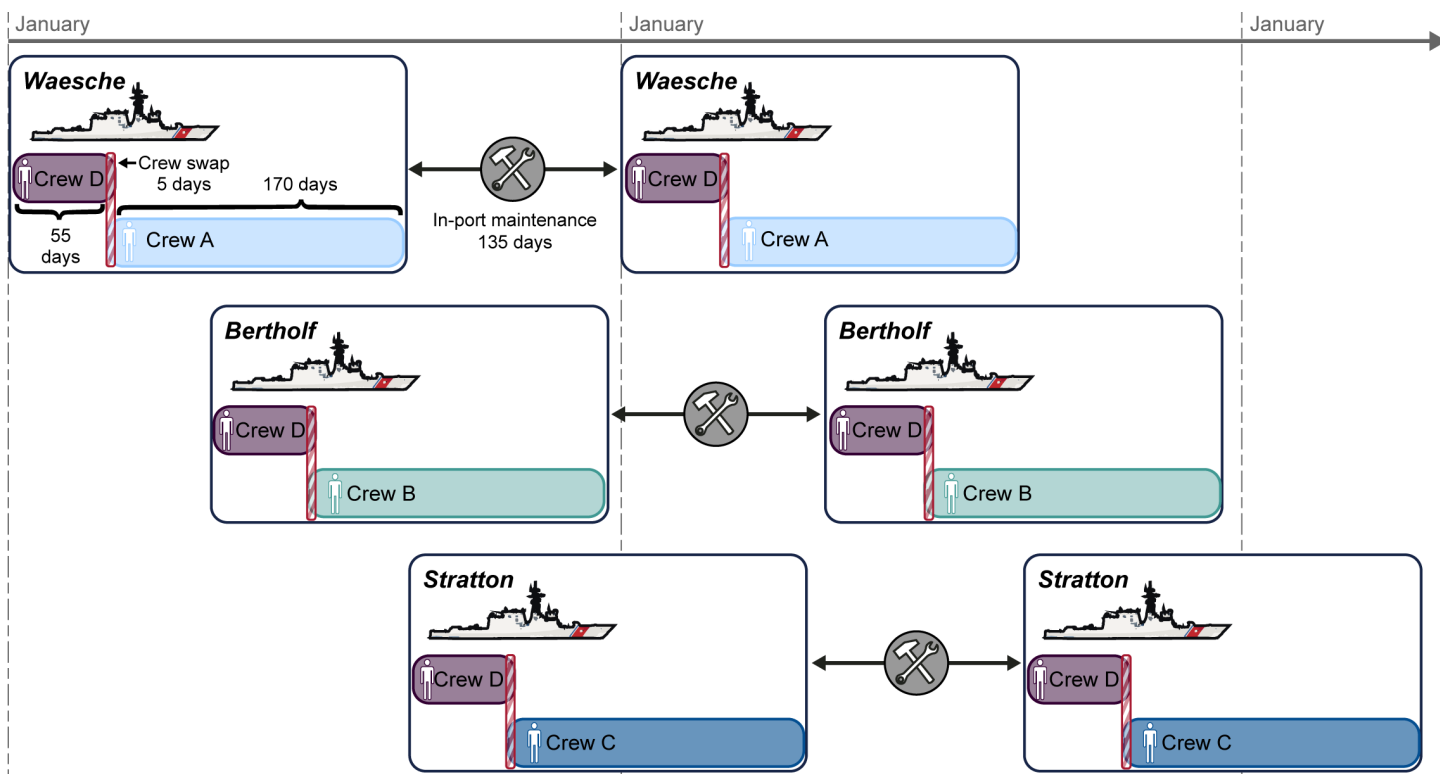
Source: GAO analysis of data provided by the U.S. Coast Guard. | GAO-15-195

The Coast Guard Is Considering Various Options for Testing the CRC

In November 2012, the Coast Guard formed a working group, the Optimizing Cutter Tempo Working Group, to develop the plans to achieve 230 DAFHP using the CRC. As of November 2014, Coast Guard officials told us that they were in the process of considering various rotational crewing options to test. One of the possible rotational crewing options being considered involves the use of one crew assigned to each of the 3 deployed NSCs and a fourth crew, "Crew Delta," (Crew D in figure 4) that would rotate among the 3 NSCs. Notionally, Coast Guard officials stated that Crew Delta would rotate for 60 days at sea on 1 NSC, while the assigned crew rotates off the cutter. After the 60-day deployment, Crew Delta would then return to its home port and be ashore for about 60 days before deploying for another 60-day rotation at sea on a different NSC. Crew Delta would repeat this process one more time, deploying on the third NSC for another 60-day rotation at sea. This notional 2-year rotation schedule would allow for the three assigned NSCs' crews and Crew Delta

to each achieve around 185 DAFHP a year, while the cutters would achieve 230 DAFHP, as shown in figure 4.

Figure 4: Notional Crew Rotation Concept Using Crew Delta to Rotate among the First Three National Security Cutters (NSC)



Source: GAO analysis of data provided by the U.S. Coast Guard. | GAO-15-195

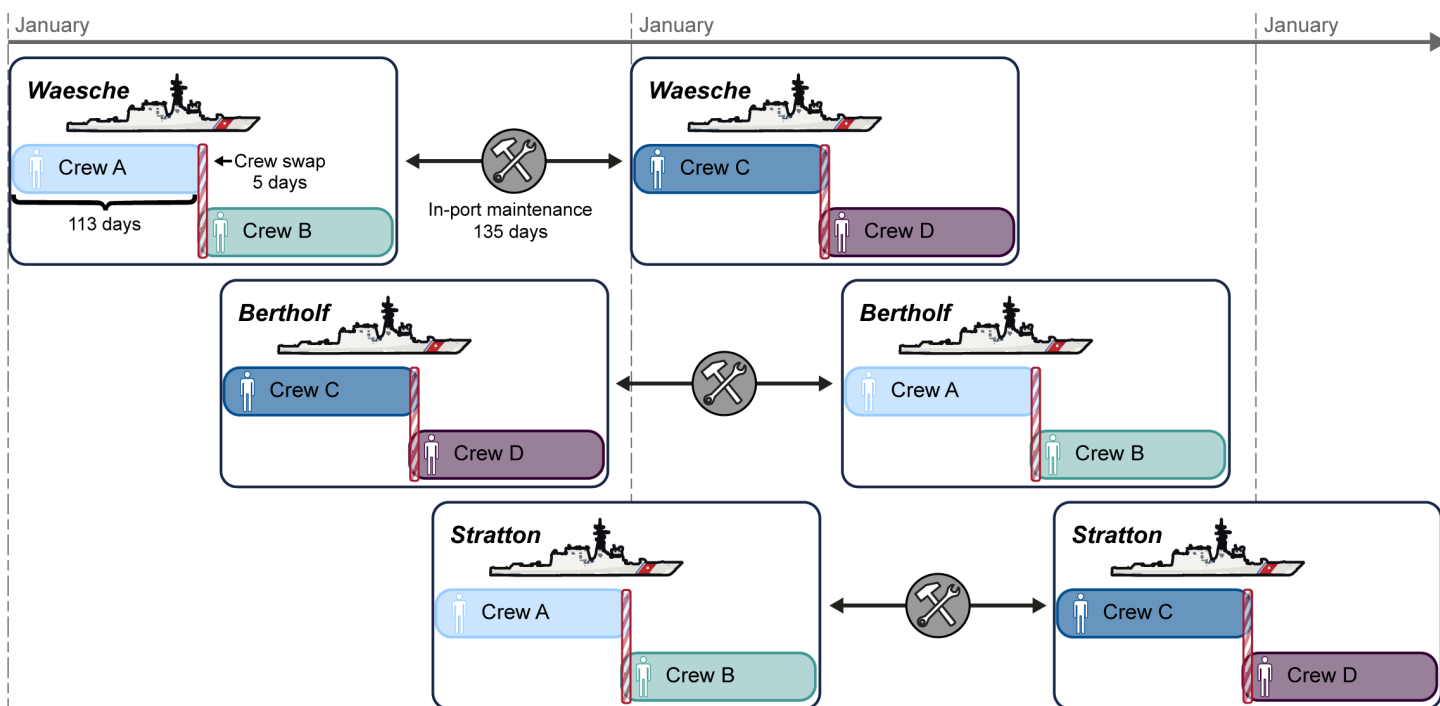
Note: Coast Guard officials told us that the fourth crew, Crew D or “Crew Delta” is to rotate among the 3 NSCs on a schedule that calls for them to be at sea for about 60 days, followed by 60 days back at their home ports. Under this rotation schedule, Crew Delta would complete about 180 days at sea a year on the 3 NSCs.

Coast Guard officials estimated that for each 2-year rotation cycle under this concept, each of the three assigned NSC crews would be rotated off, or swapped out—once at the Alameda, California, home port and once at a forward-deployed port. Given the NSC goal of 230 DAFHP each year, the Coast Guard officials estimate that the remaining days in a 365-day year—135 days—would be set aside for maintenance.

Another rotational crewing concept Coast Guard officials are considering includes using four crews to rotate among the first three NSCs rather than having a single rotating crew as described above. The officials stated that

this rotational crewing concept would provide a consecutive 230 DAFHP operational period for each NSC, followed by a 135-day maintenance period in port, as shown in figure 5. Further, as part of this concept, two crews would complete 118-day DAFHP operational periods on each NSC, with a 5-day overlap period to swap out crews.

Figure 5: Notional Crew Rotation Concept Using All Four Crews to Rotate among the First Three National Security Cutters



Source: GAO analysis of data provided by the U.S. Coast Guard. | GAO-15-195

Coast Guard officials stated that, under this rotational crewing concept, 2 NSCs and two crews would be underway, and one NSC and two crews would be in port at any one time to provide the two off-cycle crews with an NSC in port on which to conduct training and perform maintenance. The Coast Guard officials told us that crew swap outs could take place at the NSCs' home port, or other U.S. or foreign ports, such as those with a large U.S. Department of Defense infrastructure in place.

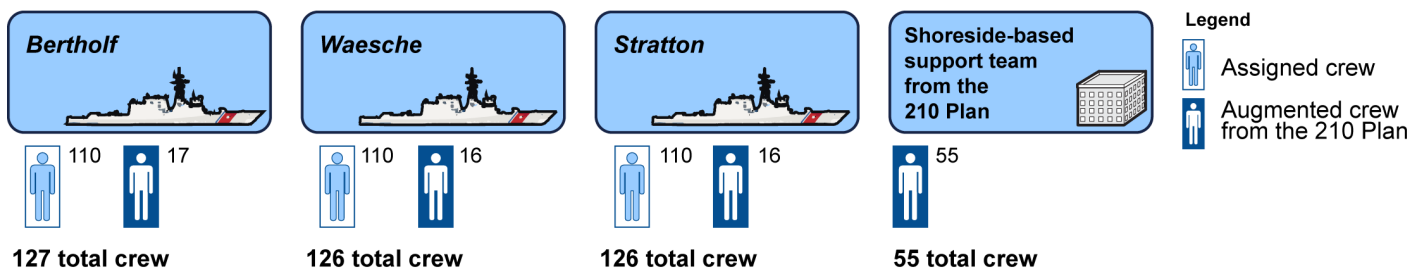
According to Coast Guard officials, these and other notional rotational crewing concepts under consideration would require shoreside-based support staff to coordinate crew movements, maintenance, and training. As of November 2014, the Coast Guard had not yet determined which rotational crewing option to test, but it expects to make that decision and

finalize the CRC plan by December 2017, in accordance with the Coast Guard and Maritime Transportation Act of 2012.

The Coast Guard Has an Interim Plan That Uses Augmented rather than Rotating Crew Members to Increase DAFHP

Given that structural enhancements for the first 2 NSCs are still several years from being completed and the Coast Guard has delayed testing of the CRC to 2019, the Coast Guard has developed and begun to implement an interim, bridging strategy, or 210 Plan, that aims to increase NSC operational performance by 25 days—from 185 to 210 DAFHP per year. The 210 Plan states that adding 25 more days (DAFHP) per NSC would place a significant burden on the crews. On the basis of this concern, the 210 Plan attempts to mitigate the increased burden on the crews by directing additional resources, including assigning an additional 104 staff, to support the increased operational tempo—49 new crew members to the 3 deployed NSCs, including 17 crew members to the *Bertholf* and 16 crew members each to the *Waesche* and *Stratton*—and the addition of a 55-person shoreside-based support team to help stand watch and assist with maintenance and other duties when the NSCs are in home port.²³ Thus, the 210 Plan increases the number of crew members aboard each of the 3 operational NSCs from 110 to 126 or 127, as shown in figure 6.

Figure 6: 210 Days Away from Home Port (DAFHP) Implementation Plan to Augment Existing National Security Cutter (NSC) Crews and Create a Shoreside-Based Support Team



Source: GAO analysis of data provided by the U.S. Coast Guard. | GAO-15-195

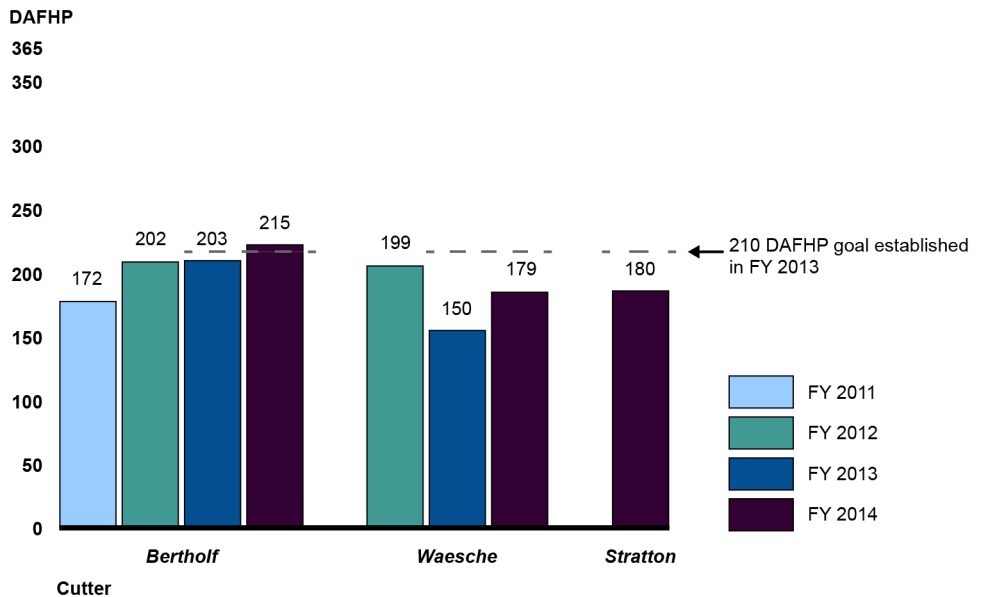
²³Watchstanding is the performance of certain operational tasks that require personnel to be at specific places for specified amounts of times (e.g., communications, security). Personnel standing watch, may, depending on the nature of the watch, also perform collateral tasks.

In fiscal year 2013, the first full year that the goal to achieve 210 DAFHP was in place, the 2 NSCs that were operational during that time period, the *Bertholf* and the *Waesche*, did not achieve the goal of 210 DAFHP. Coast Guard officials told us that the NSCs did not achieve 210 DAFHP because of unanticipated budget cuts because of sequestration and a 100-day system installation on the *Waesche*.²⁴ In fiscal year 2014, the *Bertholf* achieved 215 DAFHP; however, of these 215 DAFHP, the *Bertholf* spent more than 2 months undergoing scheduled maintenance away from the home port, as addressed in more detail later in this report. As shown in figure 7, the other 2 NSCs, the *Waesche* and the *Stratton*, have not yet achieved the desired 210 DAFHP.²⁵

²⁴Coast Guard officials said that reductions in the fiscal year 2013 budget were due, in part, to the automatic across-the-board reductions for federal programs' budgets that took effect in March 2013 as a result of sequestration. Further, the officials told us that as a result of these reductions, the Coast Guard scaled back planned air and surface operations. During fiscal year 2013, the *Waesche* installed a command and control system that took 100 days to set up.

²⁵Coast Guard officials stated that unanticipated reductions in the first quarter of fiscal year 2014 budget caused a reduction in NSC operational performance and thus the 210 DAFHP goal could not be achieved. According to the officials, the Coast Guard contracted for scheduled maintenance on NSCs to take place early in fiscal year 2014 to ensure competitive pricing and maintenance facility space availability. When the budget was enacted about 3 months after the fiscal year began, NSC operations had to be scaled back because the cancellation or renegotiation of these maintenance contracts was not possible because of cost impacts.

Figure 7: Days Away from Home Port (DAFHP), by National Security Cutter (NSC), Fiscal Years (FY) 2011 through 2014



Source: GAO analysis of data provided by the U.S. Coast Guard. | GAO-15-195

Note: Represents data for full fiscal years after the NSCs were determined to be ready for operations, or at a point at which the NSC platform and its associated systems were deemed ready to carry out Coast Guard missions. The ready for operation date for the *Bertholf* was May 2010, the *Waesche* was October 2011, and the *Stratton* was March 2013. DAFHP data were compiled by Coast Guard officials based on the actual calendar days that the cutters were away from Alameda, CA, the home port for *Bertholf*, *Waesche*, and *Stratton* and not compiled from a database. For fiscal years 2011 and 2012, Coast Guard officials estimated the number of maintenance days based on past cutter schedules. The DAFHP data include days the cutters were in transit, underway (i.e., in the targeted operational area [in theater], dedicated maintenance, and dedicated training) and not underway (i.e., in theater, in port dedicated maintenance away from home port).

While Coast Guard headquarters officials told us that they are committed to test the CRC with the goal of achieving 230 DAFHP, other officials raised questions about the benefits of the CRC as compared to the 210 Plan. For example, a Pacific Area Command official told us that a schedule to achieve 230 DAFHP using the CRC may not result in significantly more operational days at sea than the 210 Plan because of the time needed by rotating crew members to meet their training and qualification requirements for the CRC. Further, each time crews rotate, the turnover period is estimated to take 5 days. Under the CRC, the crew swap outs for each of the 3 NSCs involved are to take place twice in a 2-year period, totaling about 10 days.

As described earlier, under the 210 Plan, increasing the NSC's DAFHP also increases the number of days crew members are away from home port. Since the goal to achieve 210 DAFHP has been in effect, the *Bertholf's* crew members were away from home port for 203 days in fiscal year 2013 and for 215 days in fiscal year 2014.²⁶ Six of the nine senior officers assigned to the NSCs that we interviewed and a headquarters NSC program official said that exceeding 185 DAFHP can increase crew fatigue and lower morale.²⁷ Further, Coast Guard officials added that if crew members continue to experience more than 185 DAFHP a year for an extended period of time, this high personnel tempo could lead to difficulty in retaining and recruiting crew members for the NSCs in the future. A November 2009 Coast Guard–commissioned study supports this position. In particular, the study suggested that reenlistment and retention may decrease if personnel tempo increases and becomes the normal mode of operation rather than an exceptional event for an important mission.²⁸ Further, the 2009 study cited incentives, such as increased sea pay, that has been used in isolated circumstances by the U.S. Navy to offset the effects of a high personnel tempo. Under the 210 Plan, Coast Guard officials we met with acknowledge these issues but state that the Coast Guard has mitigated them by augmenting the crews on the 3 operational NSCs and creating a shoreside-based support team to assist the crews during this interim period.

Augmented Crew Members Do Not Have the Required Skills and Abilities

As stated earlier, to help mitigate the burden on the crew of the planned increase in DAFHP, under the 210 Plan, the Coast Guard has added personnel to augment the crews aboard the 3 NSCs. Under the 210 Plan, these augmented crew members' occupations and pay grades are to be aligned as closely as possible to the 126-member crew structure recommended in a September 2011 NSC manpower requirements

²⁶The extent to which individual crew members experienced more than 185 DAFHP in a year is not known because the Coast Guard does not collect data on individuals' DAFHP.

²⁷A Coast Guard Commandant Instruction states that crews aboard NSCs have an employment limit of 185 DAFHP per year, averaged over a 2-year period.

²⁸M. A. Legg and K. B. Nordstrom, *What's the Best Way to Crew USCG Major Cutters? Strengths and Weaknesses of Alternative Crewing Schemes* (Alexandria, VA.: Center for Naval Analyses, November 2009).

analysis.²⁹ Specifically, in September 2011, the Coast Guard completed a manpower requirements analysis that reviewed the NSC staffing standard and recommended, among other things, a net increase of 16 crew members per NSC—from 110 to 126—as the balanced and optimal mix of manpower required to maintain safety and sustain the missions of the NSCs, including the associated number and type of crew members needed by occupation and pay grade.³⁰ As of the end of fiscal year 2014, Coast Guard officials told us that the Coast Guard had not authorized resources for the NSC crew structure recommended by the manpower requirements analysis, but rather had augmented the NSC crews as part of the 210 Plan. However, as implemented, the augmented crew members do not reflect the specific mix of skills and abilities that the manpower analysis states are necessary to maintain safety and to sustain the NSC mission performance. For example, the Coast Guard added a total of 5 electronics technicians to the 3 NSCs rather than the additional 15 electronics technicians the manpower requirements analysis stated were needed—5 for each NSC when at sea.³¹ Conversely, the manpower requirements analysis recommended a decrease of a total of 6 boatswain’s mates for the 3 NSCs based on its analysis of workload,

²⁹U.S. Coast Guard, Commandant (CG-1B3) Office of Human Systems Integration for Acquisitions CG Liaison to Navy Manpower Analysis Center, *Legend Class (WMSL 750) Interim Manpower Requirements Analysis CGOPS Construct (Condition IV)* (Washington, D.C.: September 30, 2011).

³⁰The manpower analysis was the culmination of a 3-year effort that measured functional workload demands required to operate and maintain the NSCs in the most demanding environments. The analysis used a methodology developed by the U.S. Navy Manpower Analysis Center and adapted for the Coast Guard’s use. The crew structure of 126 was for the most demanding readiness posture, General Defense Operations, which Coast Guard officials stated was the posture they were in the majority of the time. For the less demanding posture under normal conditions, the crew structure was 123. The following seven occupations were recommended to be increased: junior officer, operations specialist, electronics technician, information systems technician, seaman, fireman, and storekeeper. The two occupations that were recommended to be decreased were boatswain’s mate and machinery technician.

³¹Electronics technicians are responsible for installing, maintaining, and operating the command and control, communications, computer, intelligence, and sensor systems used to support all Coast Guard missions. The manpower requirements analysis recommended that the number of electronics technicians on each NSC be increased by 5 (from 6 to 11) because their workload exceeded workload capacity levels. According to the manpower analysis, the optimal distribution of workload is between 90 and 100 percent of the available time that is allocated to each functional workload.

while under the 210 Plan, the Coast Guard added a total of 3 boatswain's mates to these NSCs.³²

Coast Guard officials acknowledged the discrepancy in the current crew structure under the 210 Plan and told us that it was not always possible to immediately align the available personnel with the specific mix of technical expertise recommended by the manpower requirements analysis given its workforce capacity limits and fiscal constraints. Further, senior officers from the 3 NSCs stated that, under the 210 Plan, they requested and received additional crew members in technical positions, specifically electronics technicians and machinists. However, even with these additional crew members, the NSCs did not achieve the crew structure in terms of the mix of skills and abilities recommended by the manpower requirements analysis. Without the appropriate NSC crew members with the right mix of skills and abilities, as stated in the Coast Guard's manpower requirements analysis, the NSCs, as currently operating, may not be able to complete all mission requirements or perform all required maintenance in the most demanding environments, which, ultimately, could reduce the NSCs' life spans.

The Coast Guard Has Not Fully Addressed Risk Factors That Could Affect CRC Testing and Implementation

The Coast Guard is taking actions in advance of implementing the CRC, such as conducting extended missions and performing some scheduled maintenance in forward-deployed areas like Alaska; however, it has not yet fully addressed a variety of risk factors—to include staffing, maintenance requirements, homeporting plans, crew schedules, and training. As of December 2014, Coast Guard officials could not provide us with complete details regarding how the Coast Guard's CRC plan, scheduled to be finalized by December 2017, will include efforts to achieve its goal of 230 DAFHP using rotational crews and whether it will contain analyses and actions to address and effectively mitigate the risks identified in this report. If these risk factors are not addressed and mitigated in a timely manner, these factors could affect the success and effectiveness of the Coast Guard's planned CRC feasibility tests in 2019, as well as the overall feasibility of its goal to achieve 230 DAFHP using the CRC.

³²Boatswain's mates are responsible for deck and boat seamanship.

Risks Related to Not Determining the Appropriate Number of Crew Members and Shoreside-Based Support Staff with the Needed Skill Mix

As of the end of fiscal year 2014, the Coast Guard had not determined whether the NSC crew structure recommended by its manpower requirements analysis would be in place under the CRC, and had not determined the number of shoreside-based support personnel with the appropriate mix of skills needed to support the CRC. Further, the Coast Guard has not established interim time frames or milestones regarding when these personnel resource determinations are to be completed. As a result, the Coast Guard faces risks in its ability to demonstrate progress in this area and identify and assign the appropriate personnel when the CRC feasibility test is to begin in fiscal year 2019.

As stated earlier, the Coast Guard's 2011 manpower requirements analysis recommended a NSC crew structure that included a net increase of 16 crew members—from 110 to 126 per NSC—as the optimal mix of manpower required to maintain safety and sustain the missions of the NSCs and that, as of the end of fiscal year 2014, the Coast Guard had not authorized resources for this recommended crew structure. Coast Guard officials told us that a determination had not been made regarding whether the crew structure recommended by the manpower requirements analysis would be in place under the CRC. Without making a determination on the NSC crew structure under the CRC, NSCs would be operating with 110 crew members, fewer than the recommended optimal staffing structure of 126 crew members.

In addition to not determining the needed number of crew members and the required mix of skills the NSC crew members should possess for the CRC test, as of the end of fiscal year 2014, the Coast Guard had also not yet completed a manpower requirements analysis to determine the appropriate mix of skills needed for the shoreside-based support personnel in order to test the CRC. As of November 2014, Coast Guard officials stated that they had not completed the shoreside-based support personnel manpower requirements analysis because they were analyzing the resource needs of the rotational crewing concepts under consideration. Coast Guard officials told us that it would be important to determine the total number of resources required to implement the CRC—including both the recommended NSC crew structure and shoreside-based support personnel—since it may take a total of 3 to 4 years to put the appropriate number and type of crew members in place before the CRC test begins. For example, the Coast Guard would need to identify an additional 64 crew members—16 additional crew members for each of the four crews—largely through transfers from other assignments that would require funding requests at least 1 year in advance of hiring. Further, Coast Guard officials stated that training times for the needed

occupations identified in the manpower requirements analysis may take up to 10 months to complete prior to reporting to an NSC for duty.³³ The identification of these additional crew members to implement CRC is also complicated by the ongoing need to identify and train crew members for the fourth, fifth, and sixth NSCs that are to be delivered and deployed during fiscal years 2015 through 2017. An October 2012 Coast Guard–commissioned study on CRC training needs states that implementation of a successful crew rotation model requires, among other things, a personnel assignment and selection system that prepares crews with the training to operate and maintain the high operational tempo of the NSCs.

In addition, a timely and comprehensive manpower requirements analysis of needed shoreside-based support personnel is important because a 2009 Center for Naval Analyses study stated that U.S. Navy ships needed extra maintenance support during crew rotations and that crew rotations worked best when a staff infrastructure was dedicated to planning and support.³⁴ The 2009 study also reported that the Coast Guard determined at that time it would need a squadron staff of 38 to manage each group of cutters, above and beyond the shoreside-based administrative staff that currently support the cutters. The squadron would be needed to, among other things, oversee the uniformity of maintenance and training across the rotating crews. While there are differences between U.S. Navy and Coast Guard vessels, this study helps to emphasize why it is important for the Coast Guard to complete its manpower requirements analysis. Coast Guard officials told us that similar shoreside manpower requirements for the CRC are not yet known because the number and type of crew members and CRC plan have not yet been finalized and all NSC maintenance requirements are not fully known.

Although the Coast Guard has not completed its manpower requirements analysis for shoreside-based crew, a March 2013 Coast Guard–commissioned study on CRC costs estimated that an additional 154 shoreside-based personnel would be needed for the CRC as compared with a one-crew-one-cutter model—378 personnel versus 224—to support the increased maintenance, training, logistics, and other

³³Coast Guard officials stated that the amount of training can be reduced if the new NSC crew members have already completed the required training.

³⁴Legg and Nordstrom, *What's the Best Way to Crew USCG Major Cutters?*

functions. In addition, the September 2011 manpower requirements analysis recommended an increase in shoreside support of over 44,000 annual hours of workload in a variety of categories for each NSC when in port. The manpower requirements analysis stated that this work could be accomplished by others, such as additional shoreside-based support personnel or contractors.

In November 2014, Coast Guard officials stated that one of the manpower requirements analyses needed for the CRC—determining the appropriate number and mix of skills needed for the additional shoreside-based personnel to conduct NSC maintenance requirements—is being developed, but that a time frame for its completion had not been established.³⁵ Further, the officials told us that they planned to conduct additional manpower requirements analyses for shoreside-based personnel needed under the CRC to provide training and other support functions at a later, undetermined date. As a leading practice to better enable management oversight for monitoring the implementation of a specific program and its related projects, *The Standard for Program Management* calls for the development of detailed program management information that should include, among other things, estimated completion dates, interim time frames and milestones, and estimates of resource requirements to accomplish the program's intended ends.³⁶ Without timely determination of the appropriate number and types of NSC crew members and shoreside-based support personnel needed under the CRC or a time frame for making these determinations, the Coast Guard faces risks in its ability to demonstrate progress in this area and identify and assign qualified and trained personnel and have them in place before the CRC test is to begin in fiscal year 2019. As a result, the CRC test may have limited usefulness for informing the Coast Guard about the effectiveness or feasibility of the CRC concept.

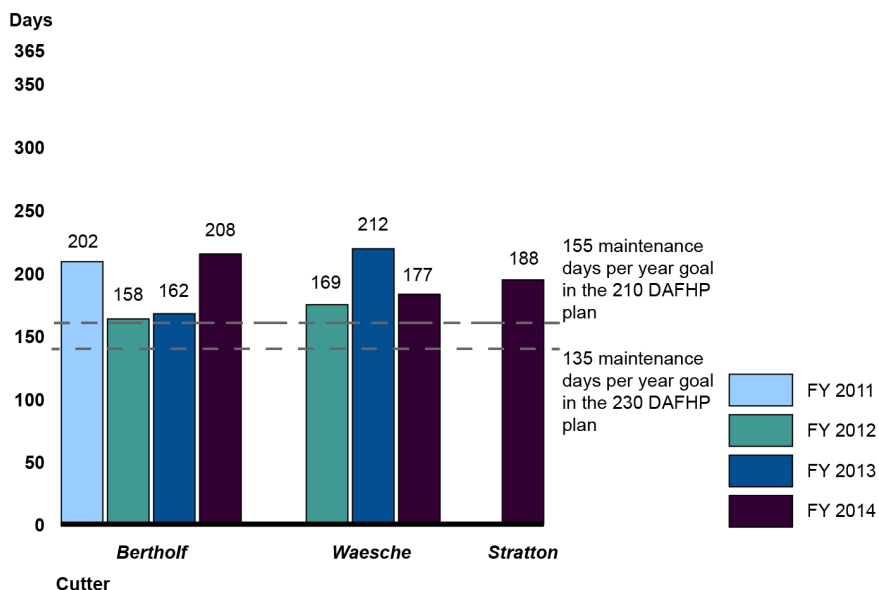
³⁵The manpower requirements analysis for shoreside-based maintenance support includes operational-level maintenance that the crew cannot complete and depot-level maintenance.

³⁶Project Management Institute, *The Standard for Program Management*, third edition.

Risks Related to Planned Maintenance Days under the CRC That May Not Be Realistic

As described earlier, the Coast Guard has a goal for each NSC to achieve 230 DAFHP each year through the CRC and the remaining 135 days is the maximum number of days a NSC can be in maintenance and still achieve 230 DAFHP. According to senior Coast Guard officials, the 135 maintenance days was determined by subtracting 230 DAFHP from 365 days in a calendar year, and was not based on an analysis of actual maintenance days needed. According to Coast Guard data, as of the end of fiscal year 2014, the 3 operational NSCs' number of days in maintenance each year has consistently exceeded 135 days. As a result, the Coast Guard faces risks in meeting the 230 DAFHP goal. Specifically, as shown in figure 8, during fiscal years 2011 through 2014, NSC maintenance days for the individual NSCs ranged from a low of 158 days in fiscal year 2012 to a high of 212 days in fiscal year 2013.

Figure 8: Days in Maintenance, by National Security Cutter (NSC), Fiscal Years (FY) 2011 through 2014



Source: GAO analysis of data provided by the U.S. Coast Guard. | GAO-15-195

Note: This represents data for full fiscal years after the NSCs were determined to be ready for operations, or at a point at which the NSC platform and its associated systems were deemed ready to carry out Coast Guard missions. The ready for operation date for the *Bertholf* it was May 2010, for the *Waesche* it was October 2011, and for the *Stratton* it was March 2013. The Coast Guard classifies maintenance days as dedicated maintenance (underway, in port, and home port) and home port no assigned mission.

Coast Guard officials told us that the Coast Guard faces significant challenges in compressing maintenance into shorter periods of time as

the NSCs increase operational days at sea. The officials added that the Coast Guard is taking steps to refine NSC maintenance requirements and is beginning to conduct some scheduled maintenance away from the NSCs' home ports during missions. For example, in 2013, the Coast Guard conducted NSC maintenance at two distant port locations—called in-theater maintenance periods (ITMP)—at about the halfway point of extended at-sea missions. These ITMPs are planned to take from 5 to 10 days each and are in addition to the NSCs' 135 planned maintenance days, according to a Coast Guard maintenance official. Coast Guard officials stated they hope to build on the lessons learned from the ITMPs and continue to use ITMPs as a means to address NSC maintenance needs.

Coast Guard officials told us they have not yet validated estimates for what maintenance tasks should be done on a calendar basis—such as daily, weekly, or monthly—or done on a condition basis—such as an observable evidence of need.³⁷ Further, the Coast Guard was working with a contractor who was in the process of determining what maintenance tasks could be done by NSC crew members and what tasks could be done by shoreside-based support personnel or contractors. In October 2014, Coast Guard headquarters officials told us that while the contractor's analysis was ongoing, they believed that, on the basis of a preliminary analysis of a planned key maintenance project, they could complete NSC maintenance requirements in a consecutive 135-day time frame and therefore successfully implement the CRC.³⁸ However, these

³⁷Coast Guard officials stated they are using a process similar to the U.S. Navy's Backfit Reliability Centered Maintenance process, which validates existing maintenance requirements by using basic maintenance concepts and by applying operational experience. This methodology first looks to see if the system experiences age degradation, and if so, the current maintenance tasks are analyzed for applicability and effectiveness. The first-in-class *Bertholf* completed its first scheduled 5-year maintenance cycle in February 2014, and the Coast Guard is analyzing data trends and capturing lessons learned that are to be used to adjust NSC maintenance requirements.

³⁸In November 2014, Coast Guard officials told us they are working on a project to decrease the number of maintenance days needed to conduct an overhaul of the NSC diesel engines, which is one of the most time-consuming maintenance tasks. In particular, the Coast Guard is studying an option to completely remove the main diesel engine and replace it with a new or overhauled one. This project is estimated to take from 123 to 147 consecutive days, depending on whether the crews work 6 or 5 days per week, respectively. The engine removed would then be overhauled for use in another NSC. According to the Coast Guard officials, a preliminary report stated that replacing a main diesel engine would take less time than overhauling an engine in place.

officials estimated that this maintenance project was expected to start in 2020, 1 year after the CRC test is to begin. Thus, the Coast Guard faces risks because it has not yet demonstrated, in practice, whether all NSC maintenance requirements can be completed within the 135 days allotted under the CRC. Further, a March 2013 Coast Guard–commissioned study on CRC alternatives stated that because of a compressed maintenance schedule from an increase in operational days, there is a risk associated with completing all required maintenance in such a compressed schedule.³⁹

We recognize that the NSC fleet is fairly new and that its maintenance requirements are not yet validated; however, given that the Coast Guard’s plan for implementing the CRC is premised on the goal of achieving 230 DAFHP each year and that a key maintenance project for helping to determine NSC maintenance requirements will not be in place when the CRC test is to begin, it is important that the Coast Guard ensure that maintenance requirements can be completed within the compressed 135-day time frame in order to feasibly achieve 230 DAFHP.⁴⁰ As stated earlier, *The Standard for Program Management* calls for the development of detailed program management information to include, among other things, interim time frames and milestones and estimates of resource requirements to accomplish the program’s intended results.⁴¹ Setting interim time frames for conducting an analysis to determine when and how the Coast Guard could complete the NSCs’ yearly maintenance needs within 135 days, as allocated under the CRC, would help mitigate risks by better positioning the Coast Guard to demonstrate progress in this area and determine whether the CRC’s current goals are realistic and sustainable. Further, using the NSCs’ actual maintenance needs, to date, to inform the Coast Guard’s final maintenance plans would help mitigate risks and ensure that the CRC feasibility test will include goals and schedules that are more realistic and sustainable.

³⁹Matthew Langevin, Nicolas Nahas, Jeffrey Wang, Scott Brown, and Kelly Sullivan, *National Security Cutter Crew Rotation Concept Alternatives Business Case Analysis (BCA)*. Report prepared for the U.S. Coast Guard by the Survivability/Vulnerability Information Analysis Center, which is operated by Booz Allen Hamilton (Wright-Patterson Air Force Base, Ohio: March 25, 2013).

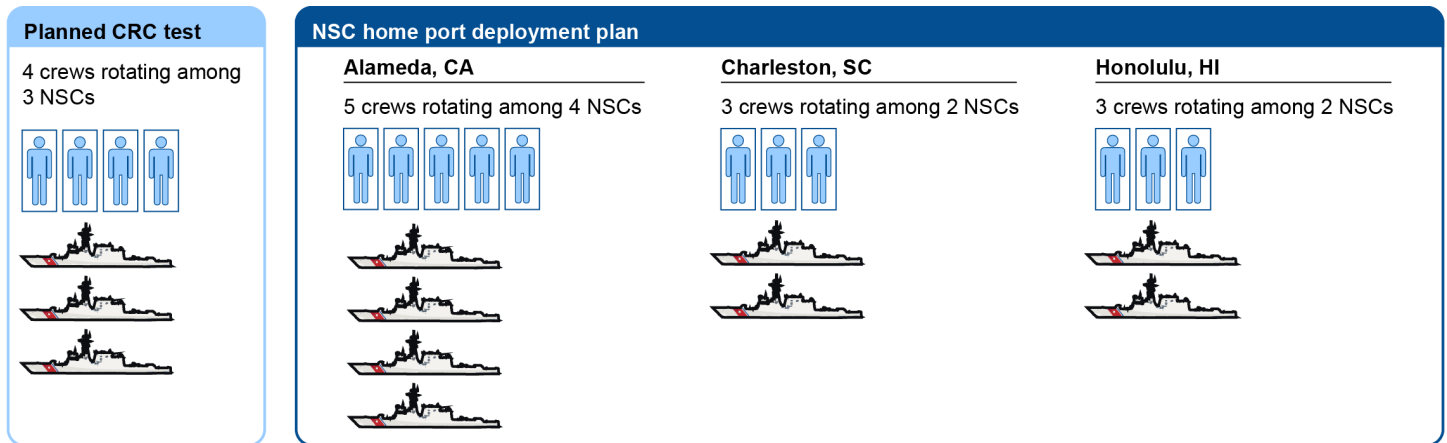
⁴⁰This calculation results from subtracting 230 DAFHP from 365 days in a year, leaving a remainder of 135 days in the year for maintenance.

⁴¹Project Management Institute, *The Standard for Program Management*, third edition.

Risks Related to the Planned CRC Testing That Does Not Align with the NSC Homeporting Plan

The Coast Guard faces risks in implementing its plan for testing the CRC, as described to us in October 2014, because its plan does not align with the NSC home port plan and may therefore be limited in its usefulness for accurately assessing the feasibility of the CRC. Coast Guard officials told us that the planned CRC test is to include four crews rotating among the first 3 NSCs based in Alameda, California, although, as mentioned above, the Coast Guard has not yet determined the specific rotational concept to be tested or established interim time frames and milestones for making this determination. However, the NSC homeporting plan when all 8 NSCs are eventually deployed is to involve five crews rotating among the 4 NSCs based in Alameda, California; and three crews rotating among the 2 NSCs based in both Charleston, South Carolina, and Honolulu, Hawaii, as shown in figure 9.

Figure 9: Comparison of Planned Crew Rotation Concept (CRC) Testing and National Security Cutter (NSC) Deployment Plan, as of September 2014



Source: GAO analysis of data provided by the U.S. Coast Guard. | GAO-15-195

Note: As of October 2014, 3 NSCs were deployed to Alameda, California and the remaining 5 NSCs were in various phases of production.

Because different crewing concepts can yield varying results in terms of benefits and challenges, it is important to test the crewing concept that best aligns with how the Coast Guard intends to deploy and homeport the NSCs. A November 2009 Coast Guard–commissioned study to examine the strengths and weaknesses of different crewing options presented trade-offs that each option offered in terms of capability, cost, and

operational risk.⁴² For example, depending on the crewing option and the proximity of the home ports to the patrol areas, there will be variations in the amount of transit time and the time that NSCs would be operational in their designated patrol areas. Based on its given assumptions, the 2009 study stated that a five-crew-to-four-cutter option deployment schedule could result in crew members exceeding cutter employment standard limits for crew members of 185 DAFHP averaged over a 3-year period. Further, the Coast Guard decided, in December 2012, to implement a plan to operationally test the first three NSCs to 230 DAFHP.

DHS acquisition guidance states, among other things, that operational tests should be completed in an operationally realistic environment.⁴³ Coast Guard officials stated that they believed they are required to use the first 3 NSCs to increase the NSCs' DAFHP based on a 2012 statute that was enacted prior to the NSC homeporting plan being finalized.⁴⁴ The officials further stated that, while the CRC test does not align with the planned home port plan, it will be an operationally realistic environment in that it is to be performed with NSCs and crews from the same home port rotating responsibility for executing missions. We agree that the Coast Guard may be able to test aspects of the CRC, such as crew swap outs and the training of off-cycle crews using the four crews and 3 NSCs based in Alameda, California. However, for example, a more realistic test of the CRC feasibility may be to construct a deployment schedule that aligns with the Coast Guard's NSC homeporting plan—such as using a three-crew-to-two-cutter concept that matches the Coast Guard's

⁴²Legg and Nordstrom, *What's the Best Way to Crew USCG Major Cutters?*

⁴³Department of Homeland Security Acquisition Management Directive No. 102.01, January 20, 2010, and Directive No. 026-06, Test and Evaluation, May 22, 2009. While the DHS acquisition directives do not apply to testing NSC crewing concepts, DHS acquisition policy reflects many key management practices that could help mitigate program risks and help leaders make informed investment decisions. See GAO, *Homeland Security: DHS Requires More Disciplined Investment Management to Help Meet Mission Needs*, [GAO-12-833](#) (Washington, D.C.: Sept. 18, 2012).

⁴⁴As noted above, the Coast Guard and Maritime Transportation Act of 2012 states that the Coast Guard Commandant may not certify a sixth NSC as ready for operations before the Commandant has submitted to the Committee on Commerce, Science, and Transportation of the Senate and the Committee on Transportation and Infrastructure of the House of Representatives program execution plans detailing, among other things, how the first 3 NSCs will achieve the goal of 225 days away from home port in fiscal years following the completion of the Structural Enhancement Dry-dock Availability of the first 2 NSCs. Pub. L. No. 112-213, § 221(b), 126 Stat. at 1560.

homeporting plans for Charleston, South Carolina and Honolulu, Hawaii. Further, testing a cutter configuration that differs from the NSC homeporting plan introduces risks because it may not provide certain information—such as the optimal schedules for rotating crews and performing maintenance—that would help determine if the CRC is a feasible concept for achieving the planned increases in NSC operational days at sea. As stated earlier, to better enable management oversight for implementing a program, *The Standard for Program Management* calls for the development of detailed program management information that should include, among other things, interim time frames and milestones.⁴⁵ Establishing interim time frames for addressing the misalignment of the crewing concept to be used in the planned CRC test, as compared to the NSC homeporting plan, would better position the Coast Guard to demonstrate progress in this area and help to ensure that the CRC test is conducted in an operationally realistic environment and that the test results can be used to determine the optimal schedules for rotating crews and performing maintenance.

Risks Related to CRC Schedules That May Create Wide Variations in Crew Deployments

In addition to the studies the Coast Guard has commissioned on training needs and capabilities, it has also commissioned studies that identified potential risks in implementing the CRC, such as trade-offs in costs; impact on the crews' time away from home port; and effects on readiness, schedule flexibility in absorbing disruptions, and the amount of time spent in the targeted area of responsibility. However, since the Coast Guard has not yet determined which of the various rotational crewing options to test, it does not know how these risks will be addressed. A March 2011 study, for example, concluded that an optimal CRC implementation schedule could not be constructed to achieve 230 DAFHP, a personnel tempo average of 185 DAFHP for crew members, and an annual average of 120 maintenance days per cutter.⁴⁶ Additionally, a November 2009

⁴⁵Project Management Institute, *The Standard for Program Management*, third edition.

⁴⁶U.S. Coast Guard, *Optimizing WMSL CRC: Patrol Schedules to Maximize Availability*, a report prepared by ABSG Consulting and Center for Naval Analyses for the Office of Cutter Forces, March 2011. Personnel tempo averages were calculated over a 3-year period. The 120 maintenance days per year for each cutter was an assumption provided by the Coast Guard to the researchers, which is less than the 135 days estimated for the 230 DAFHP plan. The studies stated that if the assumptions turn out to be incorrect, such as if maintenance takes more or less time than assumed, then it would change the study's results.

Coast Guard–commissioned study could not identify a best choice in crewing options, as each crewing option had benefits and challenges in terms of cost, capability, and risks for both the NSCs and planned OPCs.⁴⁷ The study concluded that the CRC would introduce large variations in personnel tempo from year to year and crew to crew, which could vary by more than 100 days for a single NSC crew from year to year, and by more than 80 days for different NSC crews located at the same home port during a year. The variation in the crews' personnel tempo would occur because NSCs can make extended deployments at sea that can last for 180 days or longer. According to the study, these variations in crew personnel tempo can have impacts on crew morale and readiness.

Similarly, the 2011 study also stated that all CRC alternatives studied had substantial variations in the personnel tempo for crews under different patrol-length scenarios. For example, the study noted that under every CRC alternative studied, crews would regularly spend intervals of 5 to 9 months between deployments and, in rare cases, as long as a year between deployments. These off-cycle periods were longer for crew rotation options having longer patrol lengths and in two-cutter configurations, such as that planned for Charleston, South Carolina, and Honolulu, Hawaii. The study noted that the CRC for the NSCs, as planned, will result in crews spending several months off-cycle, which could negatively affect crew member training and their readiness for deployment on NSCs. Coast Guard officials stated that they are reviewing the results of these studies and are in the process of determining options for crew rotation schedules that best balance achieving the desired DAFHP for the NSCs while minimizing the impact of increased operational days at sea on the crews and maintenance needs. However, the officials could not provide us with details about how they plan to balance the trade-offs among the variations in crew deployments for the rotational crewing options under consideration, nor could they say when a decision would be made regarding which rotational crewing option the CRC plan would use or whether the plan would explicitly include analyses of the feasibility of achieving 230 DAFHP using the CRC. As stated earlier, *The Standard for Program Management* calls for the development of detailed program management information that should include, among

⁴⁷Legg and Nordstrom, *What's the Best Way to Crew USCG Major Cutters?*

other things, interim time frames and milestones.⁴⁸ Without sufficiently addressing the impacts of these potentially wide variations in crew deployment schedules using the CRC in a timely manner, the Coast Guard will face risks that could undermine the success of its plan to increase the NSCs' operational days at sea.

Risks Related to Training Infrastructure That May Not Be in Place Prior to CRC Testing

The Coast Guard has made improvements in providing some training courses for crew members before they arrive for NSC duty, but it faces risks because its capacity for training off-cycle crews—which one Coast Guard–commissioned study estimated could range from 5 to 9 months under a CRC—may not be in place and operational when CRC testing is to begin in fiscal year 2019 and it has not set interim time frames or milestones for improving its training capacity.⁴⁹ An October 2012 Coast Guard–commissioned study analyzing the capacity of the Coast Guard's training system to support rotational crewing found that the system was not ready to support the CRC because (1) the current personnel assignment process did not allow the time necessary for crews to attend training or achieve necessary qualifications prior to reporting to an NSC command, and (2) there is limited availability of high-fidelity simulators that accurately depict an NSC environment to train off-cycle crews. The study stated that under the CRC, NSCs would spend less time in port, and thus training that would normally take place onboard an NSC while in port would instead have to occur in a high-fidelity training environment. Further, the study noted that the Coast Guard risked not meeting operational requirements and creating significant crew burnout if these capability gaps were not addressed.⁵⁰ A senior NSC officer we interviewed stated that having a sufficient number of trained crew members readily available for deployment is key to successfully completing NSC missions. Similarly, an NSC commanding officer emphasized in an after-action report that having new crew members complete training prior to reporting for duty, called prearrival training, is key to ensuring crew members are adequately prepared to conduct required missions.

⁴⁸Project Management Institute, *The Standard for Program Management*, third edition.

⁴⁹U.S. Coast Guard, *Optimizing WMSL CRC: Patrol Schedules to Maximize Availability*.

⁵⁰U.S. Coast Guard, *U.S. Coast Guard National Security Cutter Crew Rotation Concept Training System Strategic Needs Assessment*.

In response to the October 2012 study and other analyses conducted, Coast Guard officials stated that since fiscal year 2013, the Coast Guard has made NSC training a priority and, according to training data provided by the Coast Guard, the percentage of assigned NSC crew members completing their prearrival training has improved. For example, as of the end of fiscal year 2013, about 69 percent (180 of 262) of assigned NSC crew members had completed the required prearrival training courses, and as of the end of fiscal year 2014, the percentage of assigned NSC crew members who had completed the required prearrival training courses increased to 90 percent (362 of 400) of crew members. The reasons given for not completing the prearrival courses were mainly because of various scheduling conflicts—that is, course schedules, transfer orders, and operational deployment schedules did not align. The Coast Guard attributes the improvement in prearrival training rates to making policy changes that restrict cancellations, giving priority status to NSC crew members, and adding a prearrival training coordinator. It will be important for the Coast Guard to continue to keep NSC training a priority to ensure that additional crew members needed for the CRC testing and the NSCs that are to be deployed in the near future will receive the required training prior to arriving for service at their assigned NSCs.

The Coast Guard has made improvements in ensuring that newly assigned NSC crew members receive required training prior to arrival, but it has not made other improvements needed to support the CRC, such as providing the increased capacity needed for training off-cycle rotating NSC crew members. For example, a March 2013 Coast Guard–commissioned study noted, among other things, that the Coast Guard would need to implement a number of training enhancements to support the CRC—such as establishing training facilities and deploying high-fidelity simulators at each of the three NSC home ports—and that these enhancements would likely not be implemented prior to CRC testing.⁵¹ Similarly, a 2007 Congressional Budget Office report that analyzed rotational crewing on Navy submarines emphasized the importance of training facilities and simulators that mirror the actual submarines trainees would be deployed on for successful rotational crewing implementation.⁵²

⁵¹Langevin, Nahas, Wang, Brown, and Sullivan, *National Security Cutter Crew Rotation Concept Alternatives Business Case Analysis (BCA)*.

⁵²Congressional Budget Office, *Crew Rotation in the Navy: The Long-Term Effect on Forward Presence*.

The Congressional Budget Office report doesn't necessarily correlate to the matter of the Coast Guard's NSC fleet, but helps to illustrate the importance of training in an operationally realistic environment.

In conducting audit work for this report, we interviewed a Congressional Budget Office researcher who has studied and analyzed the rotational crewing used in the U.S. Navy, and he stated that one of the key elements in implementing a successful rotational crewing concept is to develop a robust training infrastructure at shoreside-based facilities for the off-cycle rotating crews. He noted that the Coast Guard would need similar facilities for training its off-cycle rotating NSC crews and support team members. The Coast Guard has a training center in Petaluma, California, that is equipped with a simulator that replicates the NSC's command bridge, as well as an operations center for training crew members assigned to NSCs. Further, the Coast Guard has plans to begin using a new training facility in Yorktown, Virginia, in fiscal year 2015 that has an engine laboratory to provide training on cutter engines. However, a survey of NSC command staff, conducted for the October 2012 Coast Guard–commissioned study on training needed to support the CRC, found that 14 of the 81 NSC duties (17 percent) listed in the survey were considered suitable for training without being onboard an NSC.⁵³ Further, a number of these duties, such as small boat towing, may require training in other types of high-fidelity simulation labs that the Coast Guard officials stated currently do not exist. In October 2014, Coast Guard officials told us that the Coast Guard does not have any plans to build additional training facilities prior to the start of the CRC test in fiscal year 2019, but it does plan to increase the capacity of existing facilities for NSC crew training. However, Coast Guard officials could not provide details or a time frame on the efforts to improve the training infrastructure capacity for off-cycle crews through existing facilities or whether these plans will be implemented in time for use during the CRC testing. As stated earlier, a leading practice to better enable management oversight for the implementation of a program, *The Standard for Program Management* calls for the development of detailed program management information that should include, among other things, interim time frames and milestones.⁵⁴ Without developing interim time frames and milestones for

⁵³U.S. Coast Guard, *U.S. Coast Guard National Security Cutter Crew Rotation Concept Training System Strategic Needs Assessment*.

⁵⁴Project Management Institute, *The Standard for Program Management*, third edition.

expanding existing training facilities and infrastructure prior to the start of the CRC test, the Coast Guard faces risks in demonstrating that it is making progress as intended. Further the Coast Guard could face additional risks because the NSC crew members may not receive all the needed training, a fact that could reduce crew readiness and, in turn, affect the effectiveness of the CRC test, as well as the overall plan to increase NSCs' operational days at sea.

The Coast Guard Has Not Addressed Various Risks That Could Hinder Successful CRC Implementation

As discussed above, the Coast Guard has delayed developing a plan for the NSCs to achieve its goal of 230 DAFHP using the CRC and has a number of risks to overcome to ensure its planned goal is feasible. Coast Guard officials stated the Coast Guard's Optimizing Cutter Tempo Working Group is in the process of developing a plan that is to address CRC testing and implementation. In November 2014, Coast Guard officials told us that they had not yet determined the most effective rotational crewing concept among the various options under consideration for the NSC fleet, but that the CRC plan was to be completed by December 2017. However, the Coast Guard officials could not provide details as to whether the CRC plan would address the risks identified in this report and did not establish interim time frames and milestones for taking actions to effectively mitigate them. Federal internal control standards state that decision makers should comprehensively identify risks associated with achieving program objectives, analyze them to determine their potential effect, and decide how to manage the risks and identify what actions should be taken to address the risks.⁵⁵ Further, these standards state that information should be available on a timely basis to allow for effective monitoring of events and activities, and to allow for prompt resolution. Even if the Coast Guard were to mitigate these risks in its CRC plan, because the plan may not be finalized until December 2017, implementing the various mitigating actions could require more time than the Coast Guard would have before it tests the CRC concept as planned in 2019. For example, as stated earlier, Coast Guard officials told us that once the Coast Guard has determined the appropriate number and type of crew members needed for the CRC, identifying and training the new crew members could take 3 or 4 additional years. This could lead the Coast Guard to proceed with the CRC test without the appropriate crew, or otherwise further postpone the

⁵⁵ [GAO/AIMD-00-21.3.1](#).

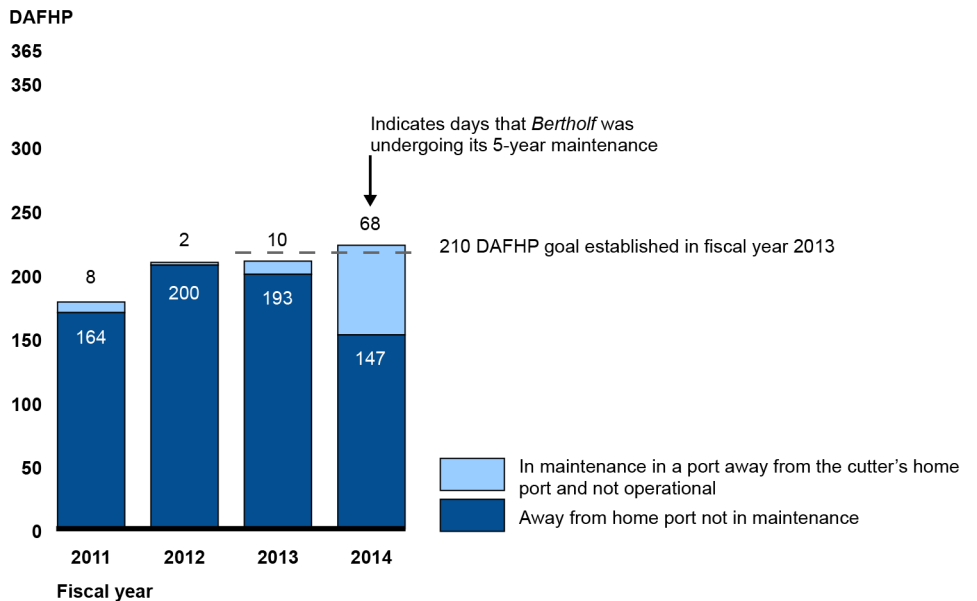
CRC test. As noted earlier, DHS acquisition guidance states, among other things, that tests should be conducted in an operationally realistic environment. Without a plan that addresses the various risk factors described above within a time frame that allows the Coast Guard to design an effective, operationally realistic CRC test, the Coast Guard could jeopardize the usefulness and effectiveness of the CRC feasibility test. In addition, the risk factors described above could also affect the concept of operations for other Coast Guard vessels, such as the OPC, because the Coast Guard also plans to use the CRC to achieve 230 DAFHP for this class of vessels that is currently under development. As the Coast Guard continues to work on its CRC plan, establishing interim time frames and milestones for carrying out various actions necessary to address and effectively mitigate the risks identified in this report would help the Coast Guard better ensure that it addresses the risks in a timely manner.

The Coast Guard's Current Performance Measure Does Not Reflect Actual Operational Performance

A key operational performance measure, DAFHP, which the Coast Guard has traditionally used in acquisition, planning, and concept-of-operations documents for its major cutters—NSCs and OPCs—and for the CRC, does not accurately reflect NSCs' actual operational performance and the Coast Guard has not set a time frame for developing and implementing more accurate measures prior to the CRC test. Specifically, DAFHP is not an accurate measure of cutters' operational performance because it includes days that the cutters are not operational, such as when an NSC is in maintenance away from its home port.⁵⁶ For example, as mentioned earlier in this report, in fiscal year 2014, the *Bertholf* achieved 215 DAFHP, but 68 of those days were not operational days, but rather time that the cutter spent in a planned 5-year dry-dock maintenance period away from its home port of Alameda, California—see figure 10.

⁵⁶In addition to the DAFHP performance measure, the Coast Guard tracks cutter underway hours, which are categorized by mission, such as search and rescue, fisheries enforcement, and counterdrug operations. However, these underway hour data, as collected, cannot be automatically converted to the number of calendar days an NSC is underway because the hours may include various missions conducted concurrently, because of the multimission nature of the Coast Guard's responsibilities.

Figure 10: *Bertholf* Days Away from Home Port (DAFHP), Fiscal Years 2011 through 2014



Source: GAO analysis of data provided by the U.S. Coast Guard. | GAO-15-195

Note: This represents data for full fiscal years after the *Bertholf* was determined to be ready for operations, or at a point at which the NSC platform and its associated systems were deemed ready to carry out Coast Guard missions. The ready-for-operation date for the *Bertholf* was May 2010. DAFHP data were compiled by Coast Guard officials based on the actual calendar days that the cutters were away from Alameda, California, the home port for *Bertholf* and not compiled from a database. For fiscal years 2011 and 2012, Coast Guard officials estimated the number of maintenance days based on past cutter schedules. According to the 210 Plan, maintenance days include underway dedicated maintenance, in-port dedicated maintenance, home port dedicated maintenance, and home port no assigned mission. Coast Guard officials stated that the maintenance could include crew-based maintenance and other maintenance accomplished by the military, civilian, or contractor personnel and that the number of days for the different types of maintenance could not be determined.

As previously reported on the Government Performance and Results Act, we concluded that a key challenge for achieving a government-wide focus on results was that of developing meaningful, outcome-oriented performance goals and the collection of performance data that can be used to assess results.⁵⁷ In addition, we found that to be useful, performance information must meet users' needs for completeness, accuracy, consistency, timeliness, validity, and ease of use.⁵⁸ Further,

⁵⁷ GAO-04-38.

⁵⁸ GAO-05-927.

Coast Guard *Capability Management* guidance states that performance measurement is a means of evaluating efficiency, effectiveness, and results and should include program accomplishments in terms of outputs and outcomes.⁵⁹ A performance target is a designated level of expected performance expressed as a tangible, measurable target against which actual achievement can be compared, including a goal/objective expressed as a quantitative standard, value, or rate. Further, the Coast Guard guidance states that standards should be established based on a systematic assessment of requirements and are to be updated to reflect changing conditions and clearly defined for each performance measure. Since the DAFHP measure includes days that the NSCs may not be in operation, it is not an accurate measure of operational performance, nor can it effectively serve as a target against which to track the NSCs' or other cutters' actual operational performance.

The Coast Guard has been aware of the shortcomings of the DAFHP measure for more than a decade.⁶⁰ Coast Guard officials told us that they have begun to informally collect new performance data by calendar days, such as days underway in theater—the number of days spent in the area of responsibility providing operational coverage—and the number of days in transit. Also, as of October 2014, the officials stated that the Coast Guard was in the process of developing metrics to capture the time spent on the various missions and activities that NSCs perform—sometimes concurrently. These activities may be challenging to capture because the NSCs are available for all missions while underway. For example, when performing training exercises recently, an NSC was diverted from training to interdict a suspected drug smuggler.

Coast Guard officials told us that they will make a determination about what new or additional performance data to collect after gaining experience in gathering these data while operating under the 210 Plan. Further, Coast Guard officials told us that a change in the DAFHP

⁵⁹U.S. Coast Guard, *Capability Management*.

⁶⁰See, for example, Coast Guard, *Cutter Deployment Initiative, FY 97 Determination*, Operations, Office of Cutter Management (Washington, D.C.: July 1997). This report documented a Coast Guard study group's results after a 2-year effort analyzing multicrewing and crew augmentation alternatives to increase high- and medium-endurance cutters' DAFHP. The study group report stated that the true measure of increased performance should be operational days rather than DAFHP, and that adding "DAFHP that are not contributing to the mission gain the organization nothing."

measure is challenging and would take time to formalize and implement given that it would require a redesign of data collection systems and that this change could affect operational performance measures of other cutters using the DAFHP measure. We agree that developing performance measures is challenging; however, the Coast Guard has no specific time frames by which it plans to finalize and implement the revised measures, and Coast Guard officials could not tell us whether the measures and data collection systems would be in place prior to the start of the CRC test. Developing alternatives to the DAFHP measure before implementing the CRC feasibility test would provide better assurance that the Coast Guard could more accurately evaluate the results of the test. Further, the current DAFHP measure will likely overstate the Coast Guard's progress in achieving its operational goals under the CRC plan. Alternative operational performance measures would enable the Coast Guard to more accurately determine whether its test results and its investment of time, staff, and resources for the CRC, as well as other cutters such as the OPC that are using or plan to use the DAFHP measure, are benchmarked against an appropriate goal to measure increases in operational days at sea.

Conclusions

The Coast Guard has delayed testing the feasibility of increasing the operational performance of its NSCs using rotating crews until 2019—13 years after first deciding to use this concept. As a result, the Coast Guard's concept—that 8 NSCs would be able to fulfill or exceed the operational performance of the 12 legacy high-endurance cutters they are replacing—has not been tested or realized. Further, the Coast Guard's interim plan to achieve increased DAFHP does not use rotational crewing and is currently operating with crew members who do not possess the recommended mix of skills and abilities. Thus, the NSCs as currently crewed (prior to implementation of the CRC) may not be able to be operated and maintained in the most demanding environments based on mission and maintenance requirements.

Coast Guard officials stated the Coast Guard is in the process of determining which rotational crewing option to use and is developing a plan—to be completed by December 2017—for testing and implementing the CRC to achieve 230 DAFHP. However, as of December 2014, the Coast Guard could not provide us with details about whether and how it plans to achieve 230 DAFHP using rotational crews, and if the CRC plan will include actions to address and effectively mitigate the various risks we identified in this report.

Given the Coast Guard's delays, to date, in testing the CRC, and given that the Coast Guard's goal to achieve 230 DAFHP a year using the CRC has driven its efforts for a number of years, addressing and mitigating the risk factors identified in this report before beginning the CRC test would help the Coast Guard better ensure the effectiveness and usefulness of the CRC test. Addressing these risks would also help to mitigate concerns that would otherwise call into question the overall feasibility of the Coast Guard's goal for NSCs to achieve 230 DAFHP using the CRC. Further, if the Coast Guard does not address these risk factors prior to the completion of its CRC plan and does not specify actions for effectively mitigating them, the Coast Guard's OPCs could also face similar risks because the Coast Guard plans to use the CRC to achieve 230 DAFHP with the OPCs, which are still under development. Until the Coast Guard develops actions for addressing and effectively mitigating the risk factors identified in this report, uncertainty will exist regarding the ability of the Coast Guard to achieve the planned increase in operational days at sea using the CRC.

Further, the measure used to set the overall goal that crew rotations are to achieve—230 DAFHP—is not an accurate measure of time spent conducting operations because it can include time that a vessel is undergoing maintenance away from its home port. As a result, the DAFHP metric does not meet GPRA or Coast Guard guidance for performance measures, which call for the development and collection of performance metrics that, among other things, can measure efficiency, effectiveness, and results. The Coast Guard has been aware of the weaknesses of this performance measure for more than a decade, but does not have a specific time frame for developing and implementing alternative measures. Developing more accurate operational performance measures than DAFHP prior to CRC testing would ensure that the test results are benchmarked against more appropriate goals to quantify operational performance and provide the Coast Guard more accurate means for determining how best to crew its fleet of NSCs and its planned fleet of OPCs to maximize their operational effectiveness.

Recommendations for Executive Action

We are making the following eight recommendations to the Commandant of the Coast Guard:

To ensure that the NSCs can be operated and maintained in the most demanding environments based on mission and maintenance requirements prior to implementation of the CRC, the Coast Guard should, as expeditiously as possible under its capacity limits and fiscal

constraints, fulfill the staffing requirements recommended in the 2011 manpower requirements analysis, including ensuring that while implementing the interim 210 Plan, the NSCs operate with sufficient numbers of crew members who possess the recommended mix of skills and abilities.

To improve the Coast Guard's ability to make informed decisions about the overall feasibility of its goal to achieve 230 DAFHP using the CRC, and to ensure the effectiveness of the scheduled CRC feasibility test, we recommend that the Coast Guard's CRC plan, scheduled to be completed by December 2017, should specify mitigation actions to effectively address the risk factors identified in this report, including

- determining the appropriate number of NSC crew and shoreside-based support personnel with the right mix of skills and abilities and having them in place when the Coast Guard tests the CRC;
- conducting an analysis of when and how NSC maintenance requirements could be completed within the 135 days allocated under the CRC, including using the NSCs' actual maintenance needs to inform the Coast Guard's final maintenance plans;
- addressing the misalignment of the crewing concept to be used in the planned CRC test, as compared to the NSC homeporting plan, so that the CRC test is conducted in an operationally realistic environment and that the test results can be used to determine the optimal schedules for rotating crews and performing maintenance;
- addressing the potential impacts of wide variations between alternative CRC deployment schedules; and
- expanding the Coast Guard's training infrastructure capacity to provide crew members with the necessary training for off-cycle rotating NSC crew members under the CRC.

To ensure that the Coast Guard is making progress in a timely manner to address and effectively mitigate the risk factors identified above, we recommend that the Coast Guard develop interim milestones for the various actions to be taken on each of the risk factors as the Coast Guard completes the CRC Plan.

Finally, to ensure that the Coast Guard is making progress in developing alternative measures that provide more accurate indicators of operational performance in a timely manner, we recommend that the Coast Guard

establish time frames and interim milestones for developing and implementing these alternative measures for use prior to CRC testing. These measures could then be used for both the NSCs, as well as for other cutters, such as the OPC, that currently use or plan to use the traditional DAFHP performance measure.

Agency Comments and Our Evaluation

We provided a draft of this report to the Department of Defense, DHS, and the Coast Guard for review and comment. The Department of Defense did not provide any comments. DHS and the Coast Guard provided technical comments that have been incorporated into this report as appropriate. DHS also provided written comments, which are reprinted in appendix I. In its comments, DHS concurred with the report's eight recommendations and described actions that the Coast Guard has under way or planned to address the recommendations.

DHS concurred with the first recommendation and stated that the Coast Guard has a working group that is reviewing NSC crew levels and will be providing an update and recommended way forward to senior leadership. The Coast Guard does not yet have an estimated completion date for this review. DHS concurred with the second recommendation and stated that the Coast Guard Assistant Commandant for Human Resources is working to complete an analysis of shoreside-based support staff needed to complete the CRC test and estimated the completion date for this analysis by the end of March 2015. DHS concurred with the third recommendation and stated that the Coast Guard Assistant Commandant for Engineering and Logistics' ongoing analysis show that compression of NSC maintenance into 135 consecutive days is achievable. The analysis is still ongoing, though, and the Coast Guard does not yet have an estimated completion date for this analysis. DHS concurred with the fourth recommendation and stated that the Coast Guard and Maritime Transportation Act of 2012 specifically directs the Coast Guard to submit a plan for how it will achieve increased DAFHP using the first three NSCs that are to be homeported in Alameda, CA. The DHS letter further stated that the lessons learned from the CRC test will be used to inform the crewing models to be used for the NSCs that are to be homeported in Alameda, CA; Charleston, SC; and Honolulu, HI. The Coast Guard does not yet have a completion date for the CRC test. DHS concurred with the fifth recommendation and stated that the Assistant Commandant for Capability continues to evaluate possible crewing plans for achieving increased DAFHP and that any final crewing plans will seek to mitigate differences in deployment schedules. The Coast Guard does not yet have an estimated completion date for finalizing the crewing plans. DHS

concluded with the sixth recommendation and stated that the scope of facilities needed for training the NSC crews will depend on the rotational crewing plan selected and that this process is still underway. The Coast Guard does not yet have an estimated completion date for addressing this recommendation. DHS concurred with the seventh recommendation and stated that the Coast Guard Assistant Commandant for Capability is examining best practices to mitigate the risks involved in moving to a new operation model and will input milestones as appropriate. The Coast Guard does not yet have an estimated completion date for this task. DHS concurred with the eighth recommendation and noted that the DAFHP metric does have some usefulness, but added that the Coast Guard is in the process of evaluating an improved suite of metrics to better reflect the direct performance capabilities of the major cutter fleet. This process is ongoing and the Coast Guard does not yet have an estimated completion date. We will continue to work with the Coast Guard and monitor its progress in addressing each of these recommendations.

As agreed with your offices, unless you publicly announce the contents of this report earlier, we plan no further distribution until 30 days from the report date. At that time, we will send copies to the Secretaries of Defense and Homeland Security, and the Commandant of the Coast Guard. In addition, the report will be available at no charge on the GAO website at <http://www.gao.gov>.

If you or your staff have any questions about this report, please contact me at (202) 512-7141 or groverj@gao.gov. Contact points for our Offices of Congressional Relations and Public Affairs may be found on the last page of this report. GAO staff who made key contributions to this report are listed in appendix II.



Jennifer A. Grover
Director, Homeland Security and Justice

Appendix I: Comments from the Department of Homeland Security



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

**Homeland
Security**

February 24, 2015

Jennifer A. Grover
Director, Homeland Security and Justice Issues
U.S. Government Accountability Office
441 G Street, NW
Washington, DC 20548

Re: Draft Report GAO-15-195, "COAST GUARD: Timely Actions Needed to Address Risks in Using Rotational Crews"

Dear Ms. Grover:

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) work in planning and conducting its review and issuing this report.

The Coast Guard is committed to ensuring that the National Security Cutters (NSC) achieve increased operational performance. To reach this goal, the Coast Guard is reviewing NSC crew levels and is developing and evaluating plans to achieve the 225 Days Away From Homeport (DAFHP) as directed by the 2012 Coast Guard Authorization bill. The NSCs allow the Coast Guard to deliver its unique blend of military capability, law enforcement authority and lifesaving expertise wherever needed to protect American interests, today and for decades to come.

The draft report contained eight recommendations directed to Coast Guard with which the Department concurs. Specifically, GAO recommended that the Commandant of the Coast Guard:

Recommendation 1: Fulfill the staffing requirements recommended in the 2011 manpower requirements analysis, including ensuring that while implementing the interim 210 Plan, the NSCs operate with sufficient numbers of crew members who possess the recommended mix of skills and abilities.

Response: Concur. The Coast Guard Assistant Commandant for Capability (CG-7) has augmented the cutter crews on the first three National Security Cutters (NSCs), utilizing billets from the rotational crew (Crew Delta), in order to bring the personnel levels to

those called for in the Manpower Requirements Determination (MRD). An internal working group is in the process of reviewing NSC crew levels and will be providing an update and recommended way forward to senior leadership. Estimated Completion Date (ECD): To Be Determined (TBD).

Recommendation 2: Determine the appropriate number of NSC crew and shoreside-based support personnel with the right mix of skills and abilities and have them in place when the Coast Guard tests the CRC.

Response: Concur. The Coast Guard Assistant Commandant for Human Resources (CG-1) is already working to complete an analysis of the shore based support needed to complete the CRC test. ECD: March 31, 2015.

Recommendation 3: Conduct an analysis of when and how NSC maintenance requirements could be completed within the 135 days allocated under the CRC, including using NSCs' actual maintenance needs to inform the Coast Guard's final maintenance plans.

Response: Concur. The Coast Guard Assistant Commandant for Engineering and Logistics' (CG-4) ongoing analysis of NSC maintenance shows that compression into 135 consecutive days is achievable. ECD: TBD.

Recommendation 4: Address the misalignment of the crewing concept to be used in the planned CRC test, as compared to the NSC homeporting plan, so that the CRC test is conducted in an operationally realistic environment and that the test results can be used to determine the optimal schedules for rotating crews and performing maintenance.

Response: Concur. The 2012 Coast Guard Authorization bill specifically directs the Coast Guard to submit a plan for how it will achieve 225 Days Away From Homeport on the first 3 NSCs in Alameda following the Structural Enhancement Dry-dock Availability (SEDA). The test will be performed by Coast Guard Pacific Area during normal operations over an extended period (operationally realistic); and the lessons learned will be used to inform future Alameda and Honolulu/Charleston crewing models. ECD: TBD.

Recommendation 5: Address the potential impacts of wide variations between alternative CRC deployment schedules.

Response: Concur. The Coast Guard Assistant Commandant for Capability (CG-7) continues to evaluate possible crewing plans to achieve 225 Days Away From Homeport. Any final crewing plans will seek to mitigate differences in deployment schedules. ECD: TBD.

Recommendation 6: Expand the Coast Guard's training infrastructure capacity to provide crew members with the necessary training for off-cycle rotating NSC crew members under the CRC.

Response: Concur. The scope of facilities necessary will depend on the rotational crewing plan selected which is still being finalized. ECD: TBD.

Recommendation 7: Develop interim milestones for the various actions to be taken on each of the risk factors as the Coast Guard completes the CRC Plan.

Response: Concur. The Coast Guard Assistant Commandant for Capability (CG-7) is examining all best practices to mitigate the risks involved in moving to a new operating model and will input milestones as appropriate. ECD: TBD.

Recommendation 8: Establish timeframes and interim milestones for developing and implementing these alternative measures for use prior to CRC testing. These measures could then be used for both the NSCs, as well as for other cutters, such as the OPC, that currently use or plan to use the traditional DAFHP performance measure.

Response: Concur. Days Away from Homeport remains a useful measure for personnel tempo and holistic fleet management. Further, the Coast Guard does have strategic mission performance indicators for all mission areas where the major cutter fleet contributes performance but it is also in the process of evaluating an improved suite of metrics that can best reflect the direct performance contribution of the major cutter fleet. ECD: TBD.

Again, thank you for the opportunity to review and comment on this draft report. Technical comments were previously provided under separate cover. Please feel free to contact me if you have any questions. We look forward to working with you in the future.

Sincerely,



for
Jim H. Crumacker, CIA, CFE
Director
Departmental GAO-OIG Liaison Office

Appendix II: GAO Contact and Staff Acknowledgments

GAO Contact

Jennifer A. Grover, (202) 512-7141 or groverj@gao.gov

Staff Acknowledgments

In addition to the contact above, Stephen Caldwell, Director; Christopher Conrad, Assistant Director; Nancy Kawahara, Analyst in Charge; Josh Diosomito; Michele Fejfar; Eric Hauswirth; Susan Hsu; Tracey King; and Tom Lombardi all made key contributions to this report.

Related GAO Products

Coast Guard Acquisitions: Better Information on Performance and Funding Needed to Address Shortfalls. [GAO-14-450](#). Washington, D.C.: June 5, 2014.

Coast Guard: Clarifying the Application of Guidance for Common Operational Picture Development Would Strengthen Program. [GAO-13-321](#). Washington, D.C.: April 25, 2013.

Coast Guard: Portfolio Management Approach Needed to Improve Major Acquisition Outcomes. [GAO-12-918](#). Washington, D.C.: September 20, 2012.

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Homeland Security: Observations on the Coast Guard's and the Department of Homeland Security's Fleet Studies. [GAO-12-751R](#). Washington, D.C.: May 31, 2012.

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

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Force Structure: Ship Rotational Crewing Initiatives Would Benefit from Top-Level Leadership, Navy-wide Guidance, Comprehensive Analysis, and Improved Lessons-Learned Sharing. [GAO-08-418](#). Washington, D.C.: May 29, 2008.

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