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The U.S. Coast Guard's Deepwater Force Modernization Plan

*Can It Be Accelerated?
Will It Meet Changing Security Needs?*

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Prepared for the United States Coast Guard

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Summary

The United States Coast Guard's (USCG's) slow, but steady effort to replace and modernize many of its cutters, patrol boats, and air vehicles—conceived and put in motion before the September 11, 2001, terrorist attacks and officially known as the Integrated Deepwater System program¹—will not provide the USCG with adequate assets and capabilities to fulfill demands² for traditional missions and emerging responsibilities.³ To satisfy these demands, the USCG will need the capabilities of twice the number of cutters and 50 percent more air vehicles than it has been planning to acquire over the next two decades. It cannot gain these capabilities merely by buying the assets in the current program over 10 or 15 years instead of over 20 years. Rather, it can gain these capabilities only by acquiring significantly more cutters, unmanned air vehicles (UAVs), and helicopters than are in the current acquisition program, or by mixing into the

¹ Throughout this document, we refer to the Integrated Deepwater System program as Deepwater or the Deepwater program.

² One RAND objective in conducting the analyses was to avoid overstating asset demand. Because much of the evaluation of performance is subjective and, hence, hard to quantify, we used *asset presence* as a proxy for *performance*—crediting assets with 100-percent effectiveness. Assets are clearly not 100-percent effective, which indeed systematically constrained us from overstating asset demand.

³ According to an article in *Defense Daily* (Biesecker, 2004),

While the new systems being acquired under Deepwater would be substantially more capable than the legacy systems being retired, the original objective [of the Deepwater program] was to maintain the status quo in terms of overall capability, so fewer new assets would be needed

program other platforms and technologies that provide the same or additional capabilities.

So concludes this study, performed between November 2002 and summer 2003, of options open to the USCG as it pursues its Deepwater program, a multiyear effort to replace or modernize nearly 100 aging cutters and more than 200 aircraft. The study recommends that the USCG meet its mission demands by starting to accelerate and expand the asset acquisitions in the current Deepwater program and, at the same time, identifying and exploring new platform options, emerging technologies, and operational concepts that could leverage those assets. Such a two-pronged strategy may satisfy demand more quickly and at less cost than just expanding the original Deepwater plan.

The Problem

The existing Deepwater acquisition schedule, which calls for the USCG to acquire all of its new assets by the year 2022, was crafted in the late 1990s, long before the terrorist attacks of September 11, 2001. In the period since those attacks, the USCG has taken on expanded responsibilities in homeland defense and homeland security and has changed its institutional home to the newly created Department of Homeland Security.⁴ Whether the original 20-year Deepwater acquisition schedule is still appropriate is an open question. However, the planned Deepwater force structure cannot do the job, and many members of Congress and other policymakers have suggested that the USCG rethink that acquisition timetable and the mix of assets it is planning to acquire. RAND's analysis—done at the request of the Program Executive Officer, Integrated Deepwater System—explored whether the USCG's original replacement and

⁴ *Homeland security* encompasses missions that the USCG performs for DHS. *Homeland defense* encompasses missions the USCG performs for the Department of Defense (DoD). When the USCG engages in homeland defense, it can do so as either a supported or supporting commander for DoD.

modernization plan will allow it to adequately shoulder its traditional missions and emerging responsibilities⁵ and identified ways it could, if necessary, adjust that plan.

The policy question RAND addressed was straightforward: Will the original Deepwater plan—drafted and initiated prior to the tragic events of September 11—provide the USCG with the right types and number of assets? On the one hand, the USCG has been asked to pursue its traditional missions more robustly,⁶ with enhanced capabilities leading to improved operations utilizing fewer assets (USCG, 1996). On the other hand, it is being asked to perform, concurrently with its traditional missions, expanded homeland defense and homeland security responsibilities and to anticipate other, yet-to-be-identified, maritime responsibilities as the United States and its allies pursue the war against terrorism. The security environment since the events of September 11, 2001, has given new urgency to accelerating the acquisition of new assets.

What RAND Was Asked to Do About the Problem

The Deepwater Program Office asked the RAND Corporation to undertake two investigations:

- *Explore issues connected with speeding up, compressing, or otherwise accelerating the pace at which the USCG can acquire surface and air assets that it will operate in the deepwater environment.* As part of this examination, the RAND team was asked to look at the implications for force structure, performance, cost, and the in-

⁵ As defined in *U.S. Coast Guard: America's Maritime Guardian* (U.S. Coast Guard [USCG], 2002c, pp. 62–63), *roles* are “the enduring purposes for which the USCG is established and organized.” *Missions* are “the mandated services the Coast Guard performs in pursuit of its fundamental roles” and “tasks or operations assigned to an individual or unit.” Note that the five USCG roles are also the USCG’s five strategic performance goals (see Appendix A).

⁶ The 1996 *Mission Need Statement for the Deepwater Capabilities Project* (USCG, 1996, p. 10) uses *robust* to mean “flexibility to use assets wherever need is greatest and guaranteeing that all assets are employed, even when not in service on primary mission.”

dustrial base of commissioning all replacement assets, decommissioning all outmoded or old-technology (so-called legacy) assets, and completing all modernization tasks earlier than the year 2022.

- *Determine whether the original Deepwater plan would provide the USCG with a robust force structure to meet mission demands.* The RAND team was asked to evaluate the force structure that the original Deepwater acquisition plan would provide and define the boundaries of a force structure that would be large and flexible enough and with the capabilities to fulfill the USCG's traditional and emerging responsibilities.

Our charter was to explore and use information that was available on the capability of assets to meet demands for traditional missions and emerging responsibilities. We drew on information from two Center for Naval Analyses studies (Nordstrom and Partos, 2002; and East et al., 2000) as an order-of-magnitude baseline for our estimates. Those studies evaluated the demands for asset presence for traditional missions and emerging responsibilities. They are, by their own admission, limited because emerging responsibilities are still evolving. Therefore, this report cannot say: "This is exactly the force structure the U.S. Coast Guard will need." Rather, it provides an estimate of the force structure's magnitude.

How RAND Studied the Problem

RAND tackled the above two investigations using several interrelated methodologies.

With respect to issues connected with accelerating the acquisition schedule, RAND researchers

- identified ways that the USCG could accelerate or modify the Deepwater program acquisition plan so that the pace and range

of assets it acquires allow it to more effectively accomplish both traditional missions and emerging responsibilities.⁷

To accomplish this examination, RAND employed an analytic approach that relied on three models: a force transition model, which examined performance⁸ implications of acceleration; an industrial base model, which explored labor, capacity, competition, and other business issues associated with acceleration; and an operating and support cost model, which looked at the budget implications of alternative acquisition paths. RAND researchers populated these models with data—including information about the operational characteristics of USCG surface and air assets, their anticipated service lives, their manning requirements, and the anticipated labor, production, and cost issues associated with their replacements—provided by the USCG; other government agencies; Lockheed Martin and Northrop Grumman, the contractors managing Deepwater; other manufacturers of cutters and air vehicles; and independent research institutions. RAND researchers augmented these data with information obtained from a survey it sent to shipbuilders and aircraft makers seeking additional detailed program data about their workforces, workloads, production capacities, and facilities (provided in Appendix C). To glean further information, RAND researchers also conducted interviews with selected USCG leaders and industry representatives.⁹

The RAND team used all these quantitative and qualitative data to evaluate operational, performance, cost, and industrial base considerations surrounding three alternative timetables that the USCG

⁷ With regard to these responsibilities, a key phrase being used in the USCG community is Underway Dynamic Response Presence, which is what replacement assets should help guarantee.

⁸ We evaluate *performance* in Chapter Three in terms of mission-hour and coverage-area capabilities. *Performance* is distinct from *effectiveness*, which can be thought of in terms of outcomes, such as tons of cocaine seized or arrests made.

⁹ Data are always subject to change. For instance, the designs of many of the assets had not been finalized at the time of the study. However, the data we used were current at the time of the study.

could use to acquire Deepwater surface and air assets: the original 20-year schedule, a 15-year schedule, and a 10-year schedule.

With respect to issues connected with analyzing the Deepwater force structure, RAND researchers

- *explored asset-presence demands of traditional missions and emerging responsibilities:* the RAND team used as its starting point two recent studies done by the Center for Naval Analyses (CNA) that analyzed whether the USCG will be able to meet future demands for its services.¹⁰ One study (East et al., 2000) looked at traditional demands being placed on the USCG's current assets. The other study (Nordstrom and Partos, 2002) looked at emerging demands that will require forces as the USCG moves into the twenty-first century and adjusts to its post-September 11 responsibilities. After reviewing CNA's calculations and performing an independent evaluation of its assumptions, the RAND team concurred with CNA's approaches and findings.
- *identified assets that the USCG would need to perform missions robustly:* RAND researchers made additional projections and evaluations, drawing from and building on the methodology and tools developed by CNA. In this portion of the analysis, RAND defined a force structure that the USCG would need to meet asset-presence demands for both traditional and emerging Deepwater responsibilities. The force structure needed to meet asset-presence demands takes into account both the number of assets that the USCG needs on-station for a particular responsibility and the number that are tied up in maintenance, modernization, training, and other duties. The RAND team used this concept to identify a force structure that would enable the USCG to provide 100-percent asset presence for traditional missions and emerging responsibilities, what we term a "100-Percent Force Structure."

¹⁰ *Demands* are defined in terms of asset presence—i.e., a cutter or air vehicle on-station performing a mission.

- *assessed the costs and benefits of a force structure that provides 100-percent asset presence:* The RAND team compared its projected acquisition and operation and support costs for the above-identified force with those projected for the force acquired with the 20-year Deepwater plan. The study team also used operational projections to (1) examine performance improvements offered by accelerating or expanding the 20-year Deepwater acquisition program and (2) compare the number of ports that this force structure and the 20-year Deepwater force would be able to protect under highest-alert security conditions.
- *evaluated whether U.S. and allied manufacturers are capable of producing such a force:* Using data that shipbuilders and air vehicle manufacturers provided about their current and expected production capacities, RAND researchers evaluated, asset by asset, whether manufacturers will be able to accommodate this force's demand for surface and air assets.

Our Three Findings

Finding 1: The USCG can accelerate its acquisition of Deepwater assets.

Accelerating the acquisition from the original 20-year schedule to a 15- or 10-year timetable would have a negligible effect on total operating and support costs over a 20-year period, on annual operating and support costs, and on total acquisition costs.

Moreover, the shipbuilding and air vehicle industrial bases could produce the USCG's Deepwater assets on either the 15-year or the 10-year schedule. Manufacturers would require no major facility upgrades to accommodate acceleration. Northrop Grumman Ship Systems, which would build the National Security Cutter and Offshore Patrol Cutter, and the manufacturers of air assets would be able to accommodate faster acquisition timetables. Bollinger Shipyards, which is converting USCG patrol boats from 110-foot vessels to 123-foot vessels, would see its labor hours shrink by up to 4 percent if the

acquisition schedule were compressed to 10 years; however, that reduction would be largely offset in the near term by accelerating the Fast Response Cutter.

By accelerating acquisition, the USCG would benefit from enhanced mission performance at an earlier date. We found that acquiring Deepwater assets over 15- or 10-year schedules would allow the USCG to operate surface and air assets for significantly more mission hours and to increase the detection coverage area for airborne sensors as compared with the capabilities it would acquire using a 20-year acquisition schedule. For instance, the total number of mission hours over a 20-year period would increase by 12 percent with the 15-year schedule and by 15 percent with the 10-year schedule. The total airborne sensor coverage area over a 20-year period would increase by 4 percent with the 15-year schedule and by 7 percent with the 10-year schedule.

Acceleration would have a negligible effect on total acquisition costs; however, it would result in increased annual outlays for acquisition. The average annual outlays (in FY1998 constant-year dollars) would increase from \$400 million to \$500 million under the 15-year plan and to \$700 million under the 10-year plan. The peak annual outlay would increase from \$600 million to \$1 billion under the 15-year plan and to \$1.3 billion under the 10-year plan.

Finding 2: Deepwater does not provide adequate numbers of surface and air assets for the USCG to meet asset-presence demands for traditional missions and emerging responsibilities at the 100-percent level.

The Deepwater program would acquire only half of the surface assets and two-thirds of the air assets required to meet the asset-presence demands of traditional missions and emerging responsibilities at the 100-percent level, a level that might well be the USCG's de facto mission-coverage standard in the post-September 11 environment. The United States today has a new image of its national interest, and policymakers should not assume that the USCG mission-coverage levels that were acceptable in the past will remain the same in the future.

Finding 3: To provide 100-percent asset presence for traditional missions and emerging responsibilities, the USCG will need the capabilities of twice the number of cutters and 50 percent more air vehicles than the original Deepwater plan provides.

The RAND team identified a force structure—dubbed the 100-Percent Force Structure—whose assets would enable the USCG to cover 100 percent of traditional and emerging mission demands for asset presence. Compared with the force structure that the USCG would acquire under the original 20-year acquisition schedule, this force structure would enable the USCG to operate its cutters for more mission hours and to have its air vehicles monitor more square miles. These benefits would begin to accrue as early as 2005 and exceed the original force structure’s maximum performance by 2015. If it can couple this force structure with revised operational concepts that take greater advantage of unmanned air vehicles and flight deck–equipped cutters from which helicopters can be operated, the USCG would be able to protect more ports under highest-alert conditions.¹¹

This force structure could be completely in place by 2027. It would cost roughly twice as much as the 20-year Deepwater acquisition plan to acquire and a third more to operate and support. Its total acquisition costs just for air and surface assets would come to \$16.2 billion (in FY1998 dollars), not including costs associated with Integrated Logistics Support, USCG facilities upgrades, recruiting, or training. Its operating and support costs could hit \$1.66 billion a year by 2027, more than double the \$808 million that the 20-year Deepwater acquisition plan assets would require that year.

¹¹ The highest Maritime Security Level alert condition is MARSEC III, which could last up to 15 days and is in response to specific intelligence that an incident/attack is imminent.

Policy Implications That Can Be Derived from Our Findings

We recommend that the USCG pursue a two-pronged strategy. The USCG should meet its mission demands and start replacing its aging assets by (1) accelerating and expanding the asset acquisitions in the current Deepwater program and, at the same time, (2) identifying and exploring new platform options, emerging technologies, and operational concepts that could leverage those assets. Such a two-pronged strategy may satisfy demand more quickly and at less cost than expanding the original Deepwater plan.

While we recommend that the USCG accelerate Deepwater and buy more assets than in the current plan, we also recommend that USCG leaders bear in mind that buying more of today's assets may not provide an optimal solution over the long term. To handle some of the responsibilities currently handled by traditional assets, the USCG could, for example, employ offshore rigs and airships, or realize emerging UAV concepts. Placing rigs near sea-lanes may enable the USCG to base and sustain surface and air assets in deepwater environments while lessening its traditional reliance on cutters.¹² Employing airships or relying more heavily on UAVs, particularly those able to stay aloft for long periods and to cover significant territory, may allow the USCG to enhance its surveillance, reconnaissance, and search and rescue capabilities. Such alternatives may involve less-costly assets than platforms the USCG currently uses to handle its responsibilities.

We provide a preliminary analysis of cost and performance for a 100-Percent Force Structure. Our analysis is sufficient for order-of-magnitude comparisons; however, more work would be required to produce budget-level cost estimates and analysis of operational effectiveness. Policymakers should use the order-of-magnitude estimates of the 100-Percent Force Structure as an upper bound against which

¹² These are, of course, possible concepts of operation. Complete concepts of operations would have to be defined and the cost and feasibility of realizing those concepts examined before reliance on current assets is altered.

they can explore and evaluate alternative concepts and assets that provide the same or improved capabilities at less cost, rather than as a road map to pinpoint specific acquisition decisions.

With respect to accelerating Deepwater acquisitions, it should be noted that both of the acceleration schedules we examined—the 10-year and the 15-year—are feasible. However, to assess the ability of the USCG to integrate assets it would acquire using either of those schedules was beyond the scope of this study.¹³ Without that assessment, we are reluctant to make a recommendation on whether to go with a 15-year or a 10-year acquisition schedule.

How and with what assets the USCG accomplishes traditional missions and emerging responsibilities is an open question. We have identified the force-structure capabilities that we believe the USCG will need in the future, but it is clear that the 100-Percent Force Structure we spell out is by no means the only way to reach those capabilities. However, relying on acquisitions spelled out in the Deepwater program, either in its original 20-year incarnation or in the 15-year and 10-year accelerations, will not provide the number and array of capabilities the USCG will need in the future.

¹³ By *integrate*, we mean providing the facilities, training, manpower, and other implications that such a force structure might require.