

PROGRAMS VS. RESOURCES

Some Options for the Navy

Ronald O'Rourke

The Navy, like other U.S. military services, faces a challenge in funding various program goals within a budget that is expected to experience little or no real growth. This challenge will be compounded if the change in the nation's projected budget and debt situation that has developed since the 2008 financial crisis leads to a real decline in the Department of Defense (DoD) budget.

The total number of ships in the Navy is to be bolstered over the next decade by the entry into service of substantial numbers of relatively inexpensive Littoral Combat Ships (LCSs) and Joint High Speed Vessels (JHSV). In addition, the unit capability of Navy ships, aircraft, and other systems will increase in coming years as a result of the introduction of new platforms and technologies. If, however, the Navy's budget does not increase in real terms, the Navy faces a longer-term prospect of a decline in ship and aircraft numbers that would offset at least some of the gains realized in unit capability. The resulting fleet could have a rich collection of capabilities for performing various missions but lack the capacity (i.e., numbers) for performing those missions simultaneously in all desired geographic areas.

If Navy budget pressures are compounded by a real decline in the DoD budget, policy makers could face difficult choices to fund programs for some kinds of Navy capabilities but not others. If so, the resulting fleet could have gaps in capability as well as capacity. These developments could occur at a time when the United States faces various international security challenges, including a potentially significant challenge from a modernized Chinese military capable of acting as a maritime antiaccess force and otherwise influencing events in the western Pacific.

Although the Navy forms only a part of the U.S. military, which in turn forms only a part of the nation's overall tool kit for defending its interests and pursuing its policy goals, a Navy with insufficient ability to maintain desired levels of forward-deployed presence and engagement, to respond to contingencies and contain crises, or to conduct combat operations of certain kinds could contribute to a situation in which American policy makers might need to prioritize key U.S. interests and goals and reconsider the national strategy for defending those interests and pursuing those goals.

THE NAVY'S PROGRAMS-VS.-RESOURCES SITUATION

Shipbuilding accounts for only 35 percent or so of Department of the Navy (DON) procurement funding and only 10 percent or so of DON's entire baseline budget.¹ Even so, examining funding pressures in the Navy's shipbuilding account can be a useful means of gaining an understanding of the service's overall programs-vs.-resources situation, for two reasons. First, the Navy balances funding demands for shipbuilding against those for other programs, so funding pressures in the shipbuilding account are likely to be mirrored by similar pressures in other accounts. Second, ships are central to the Navy: it is difficult to have a navy without them; many of the Navy's manned aircraft, unmanned vehicles, and weapons are based on them; and much of the Navy's other spending funds their basing, crewing, operation, maintenance, and modernization.

The Navy's five-year (fiscal year [FY] 2011–FY 2015) shipbuilding plan includes a total of fifty ships, or an average of ten per year. Such a rate represents an increase over the single-digit numbers of ships that have been procured for the last eighteen years (FY 1993–FY 2010) and is a little above the steady-state replacement rate for a fleet with 313 ships (the Navy's force-level goal), which is about 8.9 ships per year, assuming a weighted average ship life of thirty-five years.

The Navy's ability to assemble a five-year plan for fifty ships within available resources does not, however, necessarily mean that the service has solved its long-term challenge of shipbuilding affordability. The Navy was able to fund this fifty-ship plan in part because twenty-five of those ships—half the total—are relatively inexpensive LCSs and JHSVs. Since LCSs and JHSVs are to account eventually for about 25 percent of the Navy's planned 313-ship fleet, they are temporarily overrepresented in the Navy's shipbuilding plan.² Beyond FY 2015, as the LCS and JHSV programs run their courses and are procured in smaller annual quantities, and particularly as the Navy enters the period for procuring twelve replacement ballistic-missile submarines, or SSBN(X)s, the amount of funding needed for an average of ten ships per year will increase

substantially. The Navy preliminarily estimates the unit procurement cost of the SSBN(X) at six to seven billion dollars in constant fiscal-year 2011 dollars—a figure equivalent to roughly half the Navy’s annual budget for new ship construction. The thirty-year shipbuilding plan acknowledges the pressure the SSBN(X) program will place on the shipbuilding budget and shows reduced rates of shipbuilding during the fifteen years (FY 2019–FY 2033) when the twelve boats are to be procured.

The Navy’s thirty-year (FY 2011–FY 2040) shipbuilding plan does not include enough ships to support fully all elements of the Navy’s planned 313-ship fleet over the long run. The Navy projects that if all 276 ships in the plan are bought, the total number of ships in fleet will increase from 284 in FY 2011 to

320 in FY 2024, in part due to the entry into service of substantial numbers of LCSs and JHSVs; then fall below 313 in 2027, reaching a minimum of 288 in 2032 and 2033; and then increase to 301 by the end of the thirty-year period.

If limits on resources lead not only to reduced ship and aircraft numbers but also to smaller investments in capabilities, the Navy’s margin of superiority in certain high-end combat scenarios could be reduced.

The Navy projects that the fleet would have significant shortfalls during the latter years of the plan in two types of combat ships—attack submarines and cruisers/destroyers:

- The attack submarine shortfall, which in previous thirty-year plans was “bathtub-shaped” (i.e., the total number of attack submarines was projected to fall below the force-level goal of forty-eight boats in the 2020s and then get back up to forty-eight by the early 2030s), is now projected to be more open-ended. That is, under the new thirty-year plan the attack submarine force is not projected to get back up to forty-eight boats by the end of the thirty-year period.
- The previous (FY 2009–FY 2038) thirty-year shipbuilding plan did not show a shortfall in cruisers and destroyers. The new (FY 2011–FY 2040) plan shows the cruiser-destroyer fleet falling below the eighty-eight-ship force-level goal for these ships to a low of sixty-seven in 2034 before increasing to the middle seventies by the end of the thirty-year period. The eighty-eight-ship goal, like other elements of the 313-ship plan, dates to 2006. Some observers believe it should be increased to some higher number to reflect increased demands for cruisers and destroyers resulting from the administration’s plan, announced in September 2009, for using ballistic missile defense (BMD)–capable Aegis cruisers and destroyers for European BMD.

It is not clear whether the Navy will be able to procure all 276 ships shown in the thirty-year plan, for three reasons.

- Several Navy shipbuilding programs have experienced significant cost growth in recent years. If some of the ships in the plan turn out to be more expensive than estimated, the projected funding profile in the plan will likely be insufficient to build all the ships intended. Programs that might be considered risks for cost growth include the *Gerald R. Ford* (CVN 78) class of aircraft carriers (first ship procured in FY 2008); the Flight III *Arleigh Burke* (DDG 51)–class Aegis destroyer (first ship to be procured FY 2016); the LSD(X) amphibious ship (first ship to be procured FY 2017); and the SSBN(X) (first ship to be procured FY 2019). The Congressional Budget Office (CBO) estimates for all these ships are higher than the Navy estimates.³
- The shipbuilding funding profile shown in the plan presumes the availability of an additional two billion dollars or so per year in constant dollars in the middle years of the plan—when the Navy plans to procure the twelve SSBN(X)s. There is little in the Navy’s report on the plan, however, to explain how this “hump” in shipbuilding funding will be realized, particularly in the context of a budget that experiences little or no real growth. If this hump in funding were not realized, the Navy might not be able to fund numerous ships now shown in the plan. A draft version of the thirty-year plan that was reported by the defense trade press in December 2009 showed a scenario in which the shipbuilding budget was not increased to pay for the twelve planned SSBN(X)s. In that scenario the total number of ships built over the thirty-year plan dropped to 222 and the total number of ships in the Navy to declined to 237 by the end of the thirty-year period.⁴
- As a result of the financial crisis of 2008 and subsequent developments, the nation is facing significant projected budget deficits and significant projected growth in the debt-to-GDP (gross domestic product) ratio. CBO’s March 2010 estimate of the administration’s FY 2011 budget submission shows annual deficits averaging 5.2 percent of GDP from FY 2011 through 2020 and debt as a percentage of GDP increasing from 63.2 percent in FY 2010 to 90 percent in 2020.⁵ Given that the DoD budget accounts for roughly half of discretionary federal spending, if policy makers decide to take steps to reduce substantially projected deficits and growth in the debt-to-GDP ratio, the DoD budget could be reduced in real terms. This could cause a reduction in the Navy’s budget, which could lead to shipbuilding budgets that are smaller than what would remain in the thirty-year plan without the above-discussed two-billion-dollar-per-year hump.

If the Navy is not able to afford all 276 ships in the thirty-year shipbuilding plan, the total number of ships in the fleet would, other things held equal, be less than that shown in the thirty-year plan. A fleet below three hundred ships, perhaps closer to 250 ships, is a possibility. The Navy might also experience shortfalls in some aircraft types, such as strike fighters (where a shortfall is already projected).

POTENTIAL IMPLICATIONS OF A SMALLER FLEET

Although tomorrow's ships will in many cases have more individual capability than today's, a fleet of fewer than three hundred ships, and perhaps closer to 250, could be hard-pressed to meet regional combatant commander requests for forward-deployed Navy ships. If limits on resources lead not only to reduced ship and aircraft numbers but also to smaller investments in capabilities, the Navy's margin of superiority in certain high-end combat scenarios could be reduced, which could increase operational risks in conflict situations.

The implications of a Navy that is substantially below its force-level goals and perhaps lacking certain desired mission capabilities could be particularly significant in the Pacific. U.S. Navy capabilities in that region could affect the likelihood or possible outcome of a potential U.S.-Chinese military conflict in the Pacific over Taiwan or some other issue. Some observers consider such a conflict to be very unlikely, in part because of significant U.S.-Chinese economic linkages and the tremendous damage that such a conflict could cause on both sides. In the absence of such a conflict, the U.S.-Chinese military balance in the Pacific could influence day-to-day choices made by other Pacific countries, including choices on whether to align their policies more closely with China or the United States. In this sense, decisions on U.S. Navy programs for countering improved Chinese maritime military forces could influence the political evolution of the Pacific, which in turn could affect the ability of the United States to pursue goals relating to various policy issues, both in the Pacific and elsewhere.

OPTIONS FOR ADDRESSING THIS SITUATION

Options for dealing with the prospect described above include but are not limited to the following. The options are not mutually exclusive, are in some cases overlapping, and are presented in no particular order. Each option poses either feasibility challenges or potential downsides.

- Increase DoD's budget in real terms.
- Increase the Navy's share of DoD's budget.
- Find more Navy cost-saving efficiencies.

- Exploit joint Navy–Air Force combat effectiveness, particularly in the Pacific, through the Air-Sea Battle concept.
- Reduce the cost of Navy shipbuilding programs.
- Shift to a more highly distributed fleet architecture.
- Extend the service lives of in-service ships and aircraft.
- Increase the use of forward homeporting, multiple crewing, and long-duration deployments with crew rotation.
- Increase the use of unmanned vehicles to augment or substitute for manned ships and aircraft.
- Reduce levels of forward deployments in some regions while maintaining them in others.
- Transfer Navy responsibilities to other U.S. military forces or federal agencies.
- Transfer “low end” Navy missions to allied and partner navies and coast guards, concentrating available Navy resources on programs for “high end” combat capabilities for countering improved Chinese maritime military forces.
- Encourage allies and partners to do more in terms of fielding naval and other forces for countering Chinese forces.

Each of these is discussed very briefly below.

Increase DoD’s Budget in Real Terms. The change in projected budget deficits and the projected debt-to-GDP ratio that has developed since the 2008 financial crisis make this option difficult to implement. To the contrary, as mentioned earlier, given DoD’s share of discretionary federal spending, if policy makers take steps to reduce substantially projected budget deficits and the projected increase in the debt-to-GDP ratio, DoD’s budget might be reduced rather than increased in real terms.

Increase the Navy’s Share of DoD’s Budget. Supporters of naval forces could seek to open a debate about the value of sea-based forces relative to land-based forces in defending the nation’s interests in coming years, with the aim of shifting a greater share of DoD’s budget to the former. Supporters of such a shift could argue that American access to overseas land bases in coming years could be limited or uncertain; that those bases are fixed in location and thus highly vulnerable to attack by theater-range ballistic missiles and other forces; and that U.S. forces based on foreign soil could face host-nation limits on how they are

used. Supporters could argue that a large percentage of the world's population and economic activity is located in littoral areas; that sea-based forces can project power into and otherwise influence events in littoral areas while operating in international waters without permission from other countries; that sea-based forces can use the sea as a medium of maneuver to avoid detection, targeting, or attack; and that sea-based forces can easily move closer to shore or back over the horizon, as needed, to achieve desired political effects. They could also argue that China's military modernization effort will make the Pacific a key U.S. military operating area in coming years and that the geography of the Pacific makes it a primarily maritime and aerospace theater.

A fleet below three hundred ships, perhaps closer to 250 ships, is a possibility.

As compelling as these arguments might appear to supporters of naval forces, attempts to shift a greater share of DoD's budget to

naval forces could face strong headwinds. Current U.S. military operations in Iraq and Afghanistan tend to focus attention on the value and needs of the ground forces rather than of the Navy. The Navy's emphasis in recent years on its contributions in Iraq and Afghanistan might actually reinforce this dynamic. While operations in Iraq appear to be winding down, those in Afghanistan may continue for several more years, extending the focus on ground forces for some time. Even when operations in Afghanistan wind down, advocates of land-based forces could argue that weak or instable governments in other countries of interest to the United States make it possible, if not likely, that the United States will engage in similar operations in the future. Navy leaders in recent years have been stressing the fleet's value in engagement, partner capacity building, and humanitarian assistance and disaster response (HADR) operations. Emphasizing these operations helps demonstrate the Navy's day-to-day relevance but does little to make a case for shifting to it a greater share of DoD's budget, because such operations do not appear to require investment in expensive, high-end combat capabilities. A stronger case for such investments might be made by placing more stress on the need to counter improved Chinese military forces in coming years, but the executive branch appears averse to putting China nearer the center of the public discussion of American defense plans and programs.

Last, it can be noted that even gaining a larger share of DoD's budget might not result in a substantial increase in funding for Navy programs if the DoD's budget is at the same time reduced.

Find More Navy Cost-Saving Efficiencies. The Navy in recent years has implemented a number of cost-saving efficiency measures. Among other things, it has closed and realigned bases, reformed its approach to maintenance, implemented

energy-saving initiatives ashore and on ships, and reduced its end strength. The Navy continues to look for additional cost-saving efficiencies and will likely find some, but it is not clear that such initiatives by themselves will be sufficient to resolve the service's programs-vs.-resources situation fully. Future reductions in end strength may be difficult to achieve, given the reductions the Navy has already made, and savings from past end-strength reductions have been offset by increases in per capita personnel costs.

Exploit Joint Navy–Air Force Combat Effectiveness through Air-Sea Battle. DoD's final report on the 2010 Quadrennial Defense Review states, in its section on deterring and defeating aggression in antiaccess environments, that

the Air Force and Navy together are developing a new joint air-sea battle concept for defeating adversaries across the range of military operations, including adversaries equipped with sophisticated antiaccess and area denial capabilities. The concept will address how air and naval forces will integrate capabilities across all operational domains—air, sea, land, space, and cyberspace—to counter growing challenges to U.S. freedom of action. As it matures, the concept will also help guide the development of future capabilities needed for effective power projection operations.⁶

In theory, joint efficiencies created through closer integration of Navy and Air Force operations under the Air-Sea Battle concept could reduce requirements for certain Navy and Air Forces assets. It is not clear, however, how much effect Air-Sea Battle will have in this regard. It can also be noted that development of the concept could conceivably *increase* requirements for certain Navy and Air Force assets by uncovering gaps in joint capabilities.

Reduce Cost of Navy Shipbuilding Programs. The Navy in recent years has reduced the cost of its shipbuilding programs by, among other things, incorporating significant numbers of LCSs and JHSVs in the 313-ship plan, canceling the planned CG(X) cruiser in favor of the Flight-III DDG 51 destroyer, and reducing numbers and capabilities of new maritime-prepositioning ships. The Navy is also seeking to reduce shipbuilding costs through changes in acquisition strategy and ship design.⁷ Some observers might advocate further reducing costs by changing the Navy's planned shipbuilding mix to include a larger number of less expensive (but less capable) ships.⁸

Shift to a More Highly Distributed Fleet Architecture. Some observers in recent years have advocated shifting to a more highly distributed fleet architecture featuring a reduced reliance on carriers and other large ships and an increased reliance on smaller ships, arguing that such an architecture could generate comparable aggregate fleet capability at lower cost and be more effective at confounding Chinese maritime antiaccess capabilities.⁹ Skeptics, including

supporters of the currently planned fleet architecture, question both of these arguments.

Extend Service Lives of In-Service Ships and Aircraft. One option for mitigating the force-structure effects of reduced ship and aircraft procurement rates would be to extend the lives of in-service ships and aircraft. Potential candidates would include cruisers, destroyers, and attack submarines. The thirty-year plan contemplates operating the twenty-two *Ticonderoga* (CG 47)–class Aegis cruisers and twenty-eight Flight I/II *Arleigh Burke*–class Aegis destroyers to age thirty-five and the growing number of Flight-IIA DDG 51s to age forty. A potential goal for a service-life-extension program for these ships would be to increase all their operating lives to forty-five years. The thirty-year plan contemplates operating the final twenty-three submarines of the *Los Angeles* (SSN 688) class (i.e., the Improved *Los Angeles*–class boats) and the three *Seawolf* (SSN 21)–class boats to age thirty-three. A potential service-life-extension goal for these ships would be to increase that figure by ten or more years, which would require nuclear refuelings.

The feasibility and costs of such service-life extensions would need to be examined. Feasibility could be a particular issue for the attack submarines, given limits on pressure-hull life. The limited growth margins of the existing cruisers and destroyers could also pose challenges. Ships identified for service-life extension would likely need enhanced maintenance in coming years to ensure that they are in good enough condition at the end of their normal service lives to have them extended, which would increase maintenance costs.

Increase Use of Forward Homeporting, Multiple Crewing, and “Sea Swap.” Another option for mitigating the effects of reduced ship force structure would be to make greater use of forward homeporting, multiple crewing, and long-duration deployments with crew rotation (an initiative known as “Sea Swap”). More forward homeporting could involve shifting additional attack submarines to Hawaii and Guam; forward-homeporting BMD-capable Aegis ships in Europe (to reduce the number of such ships needed for sustaining BMD operations in that region); moving additional surface ships to such existing homeporting locations as Hawaii, Guam, Japan, and Bahrain; and perhaps establishing new forward-homeporting locations in such places as Singapore, Australia, or India. Surface ships would be candidates for both multiple crewing and Sea Swap, attack submarines for multiple crewing.

Additional forward homeporting, multiple crewing, and Sea Swap could help a fleet with fewer ships maintain desired levels of day-to-day forward deployments but might do little to mitigate shortfalls in required numbers of ships for

wartime operations. Forward homeporting in foreign countries carries a possibility of host-nation limits on how the ships are used and a risk of sudden eviction following shifts in host-nation policy, particularly those that might result from changes in government. Multiple crewing and Sea Swap would likely increase ship operation and support costs and more quickly consume ship service lives, which could eventually make it more difficult to maintain force levels.

Increase Use of Unmanned Vehicles. The Navy is currently developing and deploying a variety of air, surface, and underwater unmanned vehicles (UVs). In theory, UVs might reduce required numbers of ships and manned aircraft by substituting for those platforms in certain missions or by extending their capabilities. UVs, however, are more suitable for some missions than others; have their own development, procurement, operation, and support costs (including for remote human operators); and pose their own development risks, particularly in the case of UVs intended for autonomous operations.

Reduce Levels of Forward Deployments in Some Regions. Another option would be to reduce levels of naval forward deployments in some regions while maintaining desired levels in others. One approach would be to maintain naval deployments in the Pacific, so as to counter improved Chinese maritime military forces, while reducing forward deployments elsewhere. The administration's new plan for European BMD operations would make it more difficult at the margin to implement that particular possibility, since it will require increasing the number of Aegis ships deployed to European waters. More generally, reducing naval forward deployments to some regions could reduce the deterrence of potential aggressors and the reassurance of allies, Navy engagement and partner capacity-building operations, and ability to respond quickly to contingencies in those regions. It could also encourage perceptions, both in those regions and elsewhere, of the United States as a declining power, which could make it more difficult to achieve U.S. policy goals of various kinds.¹⁰

Transfer Navy Responsibilities to Other U.S. Forces and Agencies. In theory, there are several possibilities for transferring Navy responsibilities to other U.S. military services or federal agencies.¹¹ Implementing these options might reduce Navy funding requirements but might not necessarily improve the service's programs-vs.-resources challenge if the funding for meeting these responsibilities were shifted out of the Navy's budget along with the responsibilities themselves. Skeptics might argue that these responsibilities currently reside with the Navy because they are most cost-effectively performed by the Navy and that transferring them consequently could increase government costs or result in these tasks being carried out less fully.

Another option that has been mentioned would be to reduce or eliminate the amphibious-assault mission, on the grounds that it is unlikely to be needed in the future. Opponents would argue that it is difficult to predict the kinds of operations the United States might need to conduct in the future, that amphibious ships are valuable for engagement and partner capacity building, and that these ships and associated ship-to-shore transfer capabilities are especially useful for humanitarian assistance and disaster relief operations, which are not only of humanitarian value but also generate significant political benefits for the United States.

Transfer Low-End Navy Missions to Allies and Partners. Another option would be to transfer such missions as engagement, partner capacity building, and maritime security (including antipiracy operations)—to allies and partners, on the grounds that allied and partner navies and coast guards are capable of performing them. Under this option, the Navy would concentrate its resources more heavily on “high end” combat capabilities, such as those required for countering improved Chinese maritime forces. Whether allied or partner navies would be willing to take on new or expanded responsibilities for low-end operations is uncertain. Also, transferring them to other navies and coast guards might free up only a relatively modest amount of Navy funding and would reduce the political and interoperability benefits the United States currently receives from performing low-end missions.

Encourage Allies and Partners to Do More to Counter Improved Chinese Forces. One more option would be to encourage allies and partners to do more in terms of fielding naval and other forces for countering improved Chinese maritime military forces. Countries that might be candidates include Japan, South Korea, Australia, and India. Even without American encouragement, Chinese military modernization might persuade one or more of these countries to modernize or expand their military forces; Australia and India might be viewed as already taking steps in this direction. It is not clear whether American encouragement would result in countries’ taking more steps along these lines than they otherwise might, particularly since these other countries must contend with their own constraints on what they can spend on their military forces. This option could pose risks for the United States, because the interests and policy goals of allies and partners do not always coincide with U.S. interests and goals, and because a change in the government of an ally or partner could lead to a change in its security policy.

NOTES

This article (in slightly different form) was originally prepared for and delivered to a workshop, “Economics and Security: Resourcing National Priorities,” sponsored by the Naval War College’s William B. Ruger Chair of National Security Economics and held at the College on 19–21 May 2010. It appears in essentially the present version, in the proceedings of that conference available at www.usnwc.edu/rugerpapers. The views expressed here are those of the author and do not necessarily reflect the views of the Congressional Research Service, the Library of Congress, or Congress.

1. DON’s FY 2011 baseline budget request of \$160.6 billion includes \$46.6 billion for procurement, of which \$16.1 billion is for shipbuilding. Rear Admiral Joseph P. Mulloy, Deputy Assistant Secretary of the Navy for Budget, “Department of the Navy FY 2011 President’s Budget,” briefing, 1 February 2010, p. 5.
2. The Navy plans to achieve and maintain a force level of fifty-five LCSs and about twenty-three JHSVs.
3. Congressional Budget Office, *An Analysis of the Navy’s Fiscal Year 2011 Shipbuilding Plan* (Washington, D.C.: May 2010), p. 14, table 3.
4. *Inside the Navy*, 7 December 2009, tables. See also Christopher J. Castelli, “Navy Confronts \$80 Billion Cost of New Ballistic Missile Submarines (Updated),” *Inside the Pentagon*, 3 December 2009.
5. Congressional Budget Office, *An Analysis of the President’s Budgetary Proposal for Fiscal Year 2011* (Washington, D.C.: April 2010), table 1-1 (“Comparison of Projected Revenues, Outlays, and Deficits in CBO’s March 2010 Baseline and CBO’s Estimate of the President’s Budget”), available at www.cbo.gov.
6. U.S. Defense Dept., *Quadrennial Defense Review Report* (Washington, D.C.: February 2010), pp. 32–33.
7. These measures include the following, among other things: exerting more discipline in establishing performance requirements for new ships; resisting subsequent growth in those requirements; working toward more stability in shipbuilding plans; making use of competition where possible in the awarding of contracts for building ships; using fixed-price-type shipbuilding contracts; making greater use of common hulls, systems, and components and seeking greater cross-yard and cross-firm efficiencies in shipbuilding, so as to regain lost economies of scale in shipbuilding; increasing the use of modularity in ship design and construction; increasing the use of open-architecture combat systems; incorporating improved design-for-producibility features and making better use of production engineering in developing new ship designs; developing technologies for reducing the size, weight, and cost of shipboard systems; incorporating technologies for reducing crew size; and developing improved construction processes and methods, such as those developed by the National Shipbuilding Research Program (NSRP). Some observers might advocate additional measures, such as consolidating Navy shipbuilding into a smaller number of shipyards (which would be strongly resisted by supporters of the yards that would lose their Navy shipbuilding business and perhaps face possible downsizing or even closure) or building U.S. Navy ships in foreign shipyards or acquiring foreign-built ships for Navy use (which would require a change in federal law and be strongly resisted by supporters of American shipyards).
8. Possibilities that some observers might advocate could include building conventionally powered aircraft carriers instead of nuclear-powered carriers (which would reduce their mobility and combat sustainability and perhaps achieve only a small savings in total life-cycle costs), building smaller aircraft carriers (which would embark smaller and less capable air wings), and supplementing the Navy’s nuclear-powered attack submarines with conventionally powered boats (whose mobility limitations might make them unsuitable for performing typical U.S. Navy submarine missions).
9. For an example of a study outlining a more highly distributed naval force architecture, see Stuart E. Johnson and Arthur K. Cebrowski, *Alternative Fleet Architecture Design*, Defense & Technology Paper 19 (Washington, D.C.: Center for Technology and

National Security, National Defense Univ., August 2005). See also Wayne P. Hughes, Jr., *The New Navy Fighting Machine: A Study of the Connections between Contemporary Policy, Strategy, Sea Power, Naval Operations, and the Composition of the United States Fleet* (Monterey, Calif.: Naval Postgraduate School, August 2009).

10. For further discussion of options for reducing levels of forward deployments in some regions, see Daniel Whiteneck et al., *The Navy at a Tipping Point: Maritime Dominance at Stake?* (Alexandria, Va.: CNA, March 2010).
11. These might include, among other things, the following: shifting a greater share of the strategic nuclear deterrence mission to Air Force intercontinental ballistic missiles and bombers; transferring Navy tactical aircraft

missions, including strike and airborne electronic warfare, from carrier-based aircraft to the Air Force; transferring intelligence and surveillance responsibilities from attack submarines or other Navy platforms to non-Navy intelligence and surveillance assets; transferring special operations forces (SOF) missions from the Navy SEALs to Army and Air Force SOF; transferring engagement and partner capacity-building responsibilities to the Air Force and Army; transferring Navy homeland-security responsibilities, and potential Navy responsibilities for Arctic surface and air operations, to the Coast Guard; and transferring Navy responsibilities for HADR operations to the Air Force, Army, Coast Guard, and civilian U.S. agencies, such as the Federal Emergency Management Agency or the State Department.



Ronald O'Rourke has been since 1984 a specialist in naval affairs at the Congressional Research Service of the Library of Congress. He is a Phi Beta Kappa graduate of the Johns Hopkins University, from which he received his BA in international studies, and a valedictorian graduate of that university's Paul Nitze School of Advanced International Studies, where he received an MA in the same field. He has written numerous reports for Congress on various issues relating to the Navy. He regularly briefs members of Congress and congressional staffers and has testified before congressional committees on several occasions. Mr. O'Rourke, whose work last appeared in this journal in the Winter 2001 issue, is the author of several articles on naval issues and is a past winner of the U.S. Naval Institute's Arleigh Burke essay contest.