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Potential Navy Force Structure and Shipbuilding Plans: Background and Issues for Congress

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Ronald O'Rourke
Specialist in National Defense
Foreign Affairs, Defense, and Trade Division

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Summary

Navy and Department of Defense (DOD) officials reportedly are considering reducing at least some parts of Navy force structure from current levels. In addition, the Navy reportedly submitted to the Office of the Secretary of Defense a draft FY2006-FY2011 budget plan that would delay or reduce a number of planned Navy shipbuilding programs. These developments have caused concern among Members of Congress and others about potential DOD plans for the Navy and the effect these plans might have on the shipbuilding industrial base.

The current absence of an officially approved, consensus plan for the size and structure of the Navy may make it difficult, if not impossible, for Congress to conduct effective oversight by reconciling desired Navy capabilities with planned Navy force structure, and planned Navy force structure with supporting Navy programs and budgets. It may also cause business-planning uncertainty for industry.

Statements from Navy officials suggest that the next Navy force structure plan may call for a fleet of roughly 250 to 330 ships. Historical figures for the total number of ships in the Navy are not necessarily a reliable yardstick for assessing the adequacy of today's Navy or a future planned Navy that includes a certain number of ships. Similarly, trends over time in the total number of ships in the Navy are not necessarily a reliable indicator of the direction of change over time in the fleet's ability to perform its stated missions.

Current force-planning issues that Congress may consider in assessing how large a Navy the United States needs include sea-based missile defense; the sea basing concept for conducting expeditionary operations ashore; naval requirements for the global war on terrorism and irregular conflicts; the possible emergence over the next 10 to 25 years of significantly more capable Chinese maritime military forces; new technologies that may affect U.S. Navy ship capabilities; Navy ship homeporting arrangements and deployment methods; DOD's increased emphasis on achieving full jointness in U.S. military operations; and potential tradeoffs between funding Navy requirements and funding competing defense requirements.

Candidate shipyards for building Navy ships in coming years include the six yards that have built the Navy's major warships in recent years and three additional yards that are competing to build Littoral Combat Ships (LCSs). In assessing how many shipyards should be regularly involved in Navy shipbuilding in coming years, Congress may consider a number of factors, including the production capacities of these nine yards, the potential shipbuilding rate for a fleet of 250 to 330 ships, the potential need to surge to a higher rate of production, the potential for creating new shipyards or reopening closed ones, shipyard fixed overhead costs, costs associated with split learning curves and government supervision of Navy shipbuilding work, competition in design and construction of Navy ships, regional labor markets, potential shipyard work other than Navy shipbuilding, the geographic base of support for Navy shipbuilding, and the distribution of the economic benefits of shipbuilding around the country. This report will be updated as events warrant.

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Potential Navy Force Structure and Shipbuilding Plans: Background and Issues for Congress

Introduction and Issue for Congress

Navy and Department of Defense (DOD) officials reportedly are considering reducing at least some parts of Navy force structure from current levels.[1] In addition, the Navy in the summer of 2004 reportedly submitted to the Office of the Secretary of Defense a draft FY2006-FY2011 budget plan that would delay or reduce a number of planned Navy shipbuilding programs.[2] These developments, together with the current absence of an officially approved, consensus plan for the size and structure of the Navy, have caused concern among Members of Congress and others about potential DOD plans for the Navy and the effect these plans might have on the shipbuilding industrial base.[3]

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[1] Navy officials, for example, are reportedly considering reducing the force-level goals for attack submarines and amphibious ships. For discussions, see CRS Report RL32418, *Navy Attack Submarine Force-Level Goal and Procurement Rate: Background and Issues for Congress*, by Ronald O'Rourke, and CRS Report RL32513, *Navy-Marine Corps Amphibious and Maritime Prepositioning Ship Programs: Background and Oversight Issues for Congress*, by Ronald O'Rourke.

[2] Christopher J. Castelli, "Navy Proposes Shipbuilding Cuts, Plans Appeal To Bush For Reforms," *Inside the Navy*, August 9, 2004; Christopher J. Castelli, "Collins Warns Navy Not To 'Squander' Shipbuilding Budget Progress," *Inside the Navy*, August 16, 2004; Renae Merle. "Navy Plans To Buy Fewer Ships," *Washington Post*, September 7, 2004: E1.

[3] See, for example, *Shipbuilding Industrial Base Survey and Report*. Washington, American Shipbuilding Association, 2004. (August 2004) 8 pp.; Christopher J. Castelli, "Warner Concerned About Possible Carrier Delay In Navy Budget," *Inside the Navy*, August 23, 2004; Christopher J. Castelli, "Navy's Latest Proposals To Slash Shipbuilding Seen As Budget Tactics," *Inside the Navy*, August 23, 2004: 1; Kathy Gambrell, "Official: DD(X) Delay A Possible 'Cry For Help,'" *Aerospace Daily & Defense Report*, August 23, 2004: 4-5; Dave Ahearn, "Sen. Warner Concerned Navy May Not Build Enough Ships," *Defense Today*, August 26, 2004: 1; Dave Ahearn, "Fiscal 2006 Navy Shipbuilding Pace Would Yield A 120-Vessel Fleet," *Defense Today*, August 27, 2004: 1; Jason Sherman, "U.S. Navy Plan Could Cut Swing-State Jobs," *Defense News*, August 30, 2004: 4; Christopher J. Castelli, "President Receives Defense Briefings, But Cambone's Not Among Them," *Inside the Navy*, August 30, 2004: 1; Dale Eisman and Allison Connolly, "Shipbuilding Lobby Raises Concerns Over Navy Cuts," *Norfolk Virginian-Pilot*, September 2, 2004; Amy Klamper, "Ships At Sea," *National Journal's CongressDailyAM*, September 8, 2004; Kathy Gambrell, "Potential Navy Cuts 'Foolish,' Lott Says," *Aerospace Daily & Defense Report*, September 17, 2004; Lorenzo Cortes. "Maine Senator Raises Concerns To Navy

(continued...)

The issue for Congress is how to respond to the current uncertainty regarding the planned size and structure of the Navy, the possibility of reductions in Navy ship force structure, and the possibility of reductions or delays in planned Navy shipbuilding programs. Decisions that Congress makes regarding Navy force structure and shipbuilding programs could significantly affect future U.S. military capabilities, Navy funding requirements, and the shipbuilding industrial base.

The next section of the report discusses the following background questions:

- Why is there no current, officially approved, consensus plan for the future size and structure of the Navy?
- What are the potential implications of not having an officially approved, consensus plan for the future size and structure of the Navy?
- Based on press reports, what might the next Navy ship force structure plan look like?
- Based on press reports, what might be the Navy's new plans for individual shipbuilding programs?

The section that follows discusses two potential issues for Congress:

- In terms of numbers of ships, how large a Navy does the United States need, and what current force-planning issues may affect these numbers?
- How many shipyards should be regularly involved in Navy shipbuilding?

The final section of the report presents recent legislative activity on these issues.

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[3] (...continued)
Secretary Regarding FY '06 Budget," *Defense Daily*, September 24, 2004; Dave Ahearn, "Lieberman Sees Fighter Planes Cut, Not Canceled; Seeks More Ships," *Defense Today*, September 24, 2004: 1-2; Sharon Weinberger, "Acquisition Reductions Likely, But No Cancellations, Lieberman Says," *Defense Daily*, September 24, 2004: 1; Christopher J. Castelli, "Lieberman Concerned About Navy's Proposed Shipbuilding Cuts," *Inside the Navy*, September 27, 2004; Kathy Gambrell, "Lawmakers Call On Bush To Aid Navy Shipbuilding," *Aerospace Daily & Defense Report*, September 29, 2004. See also the text of a September 20, 2004 letter from Senator Collins to Secretary of the Navy England, reprinted in *Inside the Navy* (Collins Letter To Navy Secretary On DD(X). *Inside the Navy*, September 27, 2004); the text of a September 27, 2004, letter from seven Senators to President Bush, reprinted in *Inside the Navy* (Senate Letter on Shipbuilding Budget, *Inside the Navy*, October 4, 2004).

Background

No Current, Officially Approved, Force Structure Plan

Why is there no current, officially approved, consensus plan for the future size and structure of the Navy?

310-Ship Plan From 2001 QDR. The last force structure plan for the Navy that was officially approved and published by the Office of the Secretary of Defense (OSD) appeared in the report on the 2001 Quadrennial Defense Review (QDR). This plan, like the one approved in the 1997 QDR, included 12 aircraft carriers, 116 surface combatants, 55 nuclear-powered attack submarines (SSNs),[4] and 36 amphibious ships organized into 12 amphibious ready groups (ARGs) with a combined capability to lift the assault echelons of 2.5 Marine Expeditionary Brigades (MEBs).[5] Although the 2001 QDR report did not mention a total number of ships, this fleet was generally understood to include a total of about 310 battle force ships.[6] The 2001 QDR report also stated that as DOD's "transformation effort matures — and as it produces significantly higher output of military value from each element of the force — DOD will explore additional opportunities to restructure and reorganize the Armed Forces."[7]

Following the publication of the 2001 QDR report, the Navy took steps which had the effect of calling into question the status of the 310-ship plan. In November 2001, the Navy announced a plan for procuring a new kind of small surface combatant, called the Littoral Combat Ship (LCS), that the Navy had not previously planned to procure, and which was not mentioned in the 2001 QDR report.[8] And in

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[4] The plan approved in the 1997 QDR originally included 50 SSNs but was subsequently amended to include 55 SSNs.

[5] U.S. Department of Defense, *Quadrennial Defense Review Report*, Washington, 2001, (September 30, 2001) p. 22.

[6] Since the beginning of the Reagan Administration, the total number of ships in the Navy has been calculated using the battle force method of counting ships. Battle force ships are ships that are readily deployable and which contribute directly or indirectly to the deployed combat capability of the Navy. Battle force ships include active-duty Navy ships, Naval Reserve Force ships, and ships operated by the Military Sealift Command that meet this standard. The total number of battle force ships includes not only combat ships but also auxiliary and support ships — such as oilers, ammunition ships, and general stores ships — that transport supplies to deployed Navy ships operating at sea. The total number of battle force ships does not include ships in reduced readiness status that are not readily deployable, ships and craft that are not generally intended for making distant deployments, oceanographic ships operated by the National Oceanic and Atmospheric Administration (NOAA), and DoD sealift and prepositioning ships that transport equipment and supplies (usually for the benefit of the Army or Air Force) from one land mass to another.

[7] *Quadrennial Defense Review Report*, op cit., p. 23.

[8] For more on the LCS program, see CRS Report RS21305, *Navy Littoral Combat Ship (LCS): Background and Issues for Congress*, by Ronald O'Rourke; and CRS Report

(continued...)

February 2003, in submitting its proposed FY2004-FY2009 Future Years Defense Plan (FYDP) to Congress, DOD announced that it had initiated studies on undersea warfare requirements and forcible entry options for the U.S. military. These studies could affect, among the other things, the required numbers of SSNs and amphibious ships. The 310-ship plan is now rarely mentioned by Navy and DOD officials.

Navy 375-Ship Proposal. Navy leaders in 2002 began to mention an alternative proposal for a 375-ship Navy that includes several dozen LCSs not included in the 310-ship plan. The 375-ship proposal includes 12 aircraft carriers, 55 SSNs, 4 converted Trident cruise-missile-carrying submarines (SSGNs), 160 surface combatants (including 104 cruisers, destroyers, frigates, and 56 LCSs), 37 amphibious ships, and additional mine warfare and support ships.

Although Navy leaders in 2002 and 2003 routinely referred to the 375-ship proposal, Secretary of Defense Donald Rumsfeld, at a February 5, 2003 hearing before the House Armed Services Committee, explicitly declined to endorse it as an official DOD goal, leaving it a Navy proposal only. In recent months, moreover, Navy leaders have backed away from the 375-ship proposal, stating that 375 is an approximate figure, that the ships making up the total of 375 are subject to change, and perhaps most important, that the 375-ship figure reflected traditional concepts for deploying Navy ships, rather than new concepts (such as the Sea Swap concept for long deployments with crew rotation) that could significantly reduce future requirements for Navy ships.[9] Navy officials now mention the 375-ship goal less frequently.

In summary, neither the 310-ship plan from the 2001 QDR or the Navy's 375-ship proposal appear to qualify as a current, officially approved, consensus plan for the size and structure of the Navy. Navy and DOD officials, moreover, have given only limited indication of when they might issue such a plan as an official replacement for the 310-ship plan from the 2001 QDR.[10]

Reasons For Planning Uncertainty. One potential reason why Navy and DOD officials have not announced a new force structure plan is that they are

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[8] (...continued)
RL32109, *Navy DD(X) and LCS Ship Acquisition Programs: Oversight Issues and Options for Congress*, by Ronald O'Rourke.

[9] For more on Sea Swap and other new approaches for deploying Navy ships, see CRS Report RS21338, *Navy Ship Deployments: New Approaches — Background and Issues for Congress*, by Ronald O'Rourke.

[10] An August 2004 article stated:

> Asked when he will reach a decision on a new fleet size figure, [Chief of Naval Operations Vernon] Clark said, "It will evolve over the course of the next year, because this is embedded in the campaign analysis" from two wars in the past three years and a major naval exercise.

(Dave Ahearn, "Clark Says Fleet Size Decision May Take Another Year," *Defense Today*, August 6, 2004: 1, 4.)

currently working to define more precisely certain new capabilities they want the Navy to have. Examples of such capabilities include sea-based ballistic missile defense and the new sea basing concept for conducting expeditionary operations ashore. The current vision for missile defense includes a role for Navy forces, but the exact nature of that role is not yet well defined.[11] Similarly, Navy and DOD officials are supportive of the new sea basing concept for conducting expeditionary operations ashore, but are still working to define the concept in greater detail.[12]

A second potential reason why Navy and DOD officials have not announced a new force structure plan is that, once a desired collection of Navy capabilities is defined, the metrics for translating those capabilities into numbers of ships and aircraft are shifting due to new concepts such as network-centric warfare (NCW) and Sea Swap. NCW refers to using computer networking technology to link individual military units into a series of local- and wide-area networks for rapidly transmitting critical data. Although implementing NCW is expected to improve, perhaps dramatically, the warfighting ability of U.S. forces, the implications of NCW for the design and capability of individual U.S. military platforms (such as ships) are not yet fully understood.[13] Sea Swap refers to the Navy's new plan for sending ships on long-duration deployments during which the ships are operated by multiple crews that are sent out to the ships on a rotational basis. Although Sea Swap is understood to have the potential for reducing the total number of ships of a given kind that are needed to keep a certain number of that kind forward deployed in an overseas operating area, the kinds of Navy ships for which Sea Swap might be suitable, and the exact extent of the resulting reduction in required numbers of ships, is not yet clear.[14]

A third potential reason why Navy and DOD officials have not announced a new force structure plan is that Navy and DOD officials may find it convenient for their own purposes to not announce such a plan. In the absence of a current, officially approved, consensus plan for the size and structure of the Navy, Navy and DOD officials are free to speak broadly about individual Navy acquisition programs without offering many quantitative details about them — details which they might

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[11] For more discussion, see CRS Report RL31111, *Missile Defense: The Current Debate*, Coordinated by Steven A. Hildreth.

[12] For more on the sea basing concept, see CRS Report RS20851, *Naval Transformation: Background and Issues for Congress*, by Ronald O'Rourke, and CRS Report RL32513, *Navy-Marine Corps Amphibious and Maritime Prepositioning Ship Programs: Background and Oversight Issues for Congress*, by Ronald O'Rourke.

[13] For more on NCW in general, see CRS Report RL32411, *Network Centric Warfare: Background and Issues for Congress*, by Clay Wilson, CRS Report RL32238, *Background and Oversight Issues for Congress*, by Ronald O'Rourke. For more on naval programs involved in NCW, see CRS Report RS20557, *Navy Network-Centric Warfare Concept: Key Programs and Issues for Congress*, by Ronald O'Rourke.

[14] For more on Sea Swap, see CRS Report RS21338, *Navy Ship Deployments: New Approaches — Background and Issues for Congress*, by Ronald O'Rourke. For an article discussing Sea Swap and other issues the Navy is examining to work toward a new force-structure plan, see Dave Ahearn, "Clark Says Fleet Size Decision May Take Another Year," *Defense Today*, August 6, 2004: 1, 4.

be held accountable to later, or which, if revealed now, might disappoint Members of Congress or industry officials. If this is a reason why Navy and DOD officials have not announced a new force structure plan for the Navy, then such a plan might not be issued until Congress directs DOD to do so.

Capabilities-Based Planning. DOD in recent years has altered the basis of its force planning, shifting from threat-based planning to capabilities-based planning. Under threat-based planning, DOD planned its forces based on what would be needed for conflict scenarios that were defined fairly specifically. During the Cold War, for example, DOD planned forces that would be sufficient, in conjunction with allied NATO forces, for fighting a multi-theater conflict with the Soviet Union and its Warsaw Pact allies. Similarly, in the first few years of the post-Cold War era, DOD planned forces that would be sufficient for, among other things, fighting two nearly simultaneous regional conflicts, one in the Persian Gulf region, the other on the Korean peninsula.

Under capabilities-based planning, DOD is now planning for U.S. military forces to have a variety of abilities, so that they will be better able to respond to a wide array of possible conflict scenarios. DOD officials have explained that the shift to capabilities-based planning responds to the difficulty of predicting, in today's security environment, specific future threats and warfighting scenarios.

When asked in recent months about required numbers of Navy ships and aircraft, Navy and DoD officials have sometimes argued that under capabilities-based planning, numbers of ships and aircraft per se are not as important as the total amount of capability represented in the fleet. That may be correct insofar as the policy objective is to have a Navy with a certain desired set of capabilities, and not simply one that happens to include a certain number of ships and aircraft. But that is not the same as saying that a Navy with a desired set of capabilities cannot in turn be described as one having certain numbers of ships and aircraft of certain types.

Although the force-planning implications of issues such as sea-based missile defense, the sea basing concept, network-centric warfare, and Sea Swap are not currently understood in all their details, with further study of these issues, it arguably should become possible at some point to define a set of desired Navy capabilities with some clarity, and to translate those desired capabilities into desired numbers of ships and aircraft. Those numbers might be expressed as ranges rather than specific figures, and they may change over time as missions and technologies change. But to argue indefinitely that desired naval capabilities cannot be translated into desired numbers of ships and aircraft would be to suggest that the Navy cannot measure and understand the capabilities of its own ships and aircraft. In this sense, the shift to capability-based planning does not in itself constitute a rationale for permanently setting aside the question of the planned size and structure of the fleet.

Implications of Not Having A Current Plan

What are the potential implications of not having an officially approved, consensus plan for the future size and structure of the Navy?

The absence of a current, officially approved, consensus plan for the future size and structure of the Navy has potential implications for both Congress and industry.

For Congress. The absence of such a plan may make it difficult, if not impossible, for Congress to conduct effective oversight by reconciling desired Navy capabilities with planned Navy force structure, and planned Navy force structure with supporting Navy programs and budgets. With the middle element of this oversight chain missing, Congress may find it difficult to understand whether proposed programs and budgets will produce a Navy with DOD's desired capabilities. The defense oversight committees in recent years have criticized the Navy for presenting a confused and changing picture of Navy ship requirements and procurement plans.[15]

For Industry. In the absence of a current, officially approved, consensus force structure plan, industry officials might be tempted to pour into broad remarks from DOD or the Navy their own hopes and dreams for individual programs. This could lead to excessive industry optimism about those programs. Uncertainty in Navy planning can also cause business-planning uncertainty in areas such as production

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[15] For example, the conference report (H.Rept. 107-772 of November 12, 2002) on the FY2003 defense authorization act (P.L. 107-314/H.R. 4546) stated

> In many instances, the overall Department of Defense ship acquisition message is confused.... The conferees also believe that the DON shares blame for this confusion because it has been inconsistent in its description of force structure requirements. This situation makes it appear as if the Navy has not fully evaluated the long-term implications of its annual budget requests....
>
> The conferees perceive that DOD lacks a commitment to buy the number and type of ships required to carry out the full range of Navy missions without redundancy. The DON has proposed to buy more ships than the stated requirement in some classes, while not requesting sufficient new hulls in other classes that fall short of the stated requirement. Additionally, the conferees believe that the cost of ships will not be reduced by continually changing the number of ships in acquisition programs or by frequently changing the configuration and capability of those ships, all frequent attributes of recent DON shipbuilding plans. (Pages 449 and 450)

The House Appropriations Committee, in its report (H.Rept. 108-553 of June 18, 2004) on the FY2005 DOD appropriations bill (H.R. 4613), stated:

> The Committee remains deeply troubled by the lack of stability in the Navy's shipbuilding program. Often both the current year and out year ship construction profile is dramatically altered with the submission of the next budget request. Programs justified to Congress in terms of mission requirements in one year's budget are removed from the next. This continued shifting of the shipbuilding program promotes confusion and frustration throughout both the public and private sectors. Moreover, the Committee is concerned that this continual shifting of priorities within the Navy's shipbuilding account indicates uncertainty with respect to the validity of requirements and budget requests in support of shipbuilding proposals. (Page 164)

planning, workforce management, facilities investment, and potential mergers and acquisitions.[16]

Potential Features of Next Navy Force Structure Plan

Based on press reports, what might the next Navy ship force structure plan look like?

According to press reports, Navy and DOD officials are considering reducing the attack submarine force level goal from 55 down to something in the low to mid-40s, or perhaps as low as 37, and the planned number of expeditionary strike groups (ESGs) from 12 down to 10, 9, or 8 Since each ESG currently includes three amphibious ships, this suggests that the total number of amphibius ships might be reduced from 36 down to 30, 27, or 24. In conjunction with its plans for amphibious ships, the Navy reportedly is leaning toward building two Maritime Prepositioning Force (Future), or MPF(F), squadrons, each with perhaps 5 to 8 ships, for a total of 10 to 16 MPF(F) ships.[17] It has also been reported that the number of aircraft carriers may be reduced, at least temporarily, from 12 to 11.[18]

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[16] A July 2004 press article, for example, states that

> Philip Dur, chief executive officer of Northrop Grumman's Shipbuilding Systems, argued that the Navy's concept of "capabilities versus numbers" not only would hurt the service's operations, but decimate the industry.
>
> If the Navy decides it cannot afford 300 ships, it should come up with a smaller number and set new ship construction plans based on that number, Dur said.
>
> It also would be helpful, he added, if both the Navy and the Coast Guard jointly planned their long-term shipbuilding buys. "I do not know that either service takes the other service's capabilities into account," he said. If both services set their shipbuilding goals collectively, "then the shipbuilders can lay out an investment plan, a hiring plan [and] a training plan that was predicated on the assumption that we would competing for an X-number of platforms per year on a going-forward basis," Dur said....
>
> If the Department of Defense can frame a requirement for ships and defend it, the industry would make the necessary adjustments to either scale down or ramp up, Dur told reporters during a recent tour of the company's shipyards in Louisiana and Mississippi.

(Roxana Tiron, "Lack of Specificity in Navy Shipbuilding Plans Irks the Industry," *National Defense*, July 2004.)

[17] For discussions, see CRS Report RL32418, *Navy Attack Submarine Force-Level Goal and Procurement Rate: Background and Issues for Congress*, by Ronald O'Rourke, and CRS Report RL32513, *Navy-Marine Corps Amphibious and Maritime Prepositioning Ship Programs: Background and Oversight Issues for Congress*, by Ronald O'Rourke.

[18] Jason Sherman, "Memorandum Outlines Services' Funding Plans," *Air Force Times*, August 23, 2004: 12; Dave Ahearn, "Sen. Warner Concerned Navy May Not Build Enough (continued...)

There has been less reporting on possible Navy plans for surface combatants, but there are at least two indications that Navy and DOD officials may be considering reducing planned force levels for these ships as well. First, although the precise effect of the Sea Swap concept on reducing force-level requirements has yet to be determined, the Navy began experimenting with Sea Swap on surface combatants and appears to view these ships as among those most suitable for the concept. Second, the long-term Navy shipbuilding plan that the Navy submitted to Congress in 2003 showed a production rate of about two DD(X) destroyers or CG(X) cruisers per year extending through FY2030, the final year covered in the plan. Assuming an average 35-year life for destroyers and cruisers, a two-per-year procurement rate, if maintained over the long run, would eventually result in a force of about 70 larger surface combatants, which is less than the 116 surface combatants in the 310-ship plan from the 2001 QDR, the 104 larger surface combatants included in the Navy's 375-ship proposal, and 103 surface combatants in service at the end of FY2004.

Since submarines, aircraft carriers, surface combatants, and amphibious ships are the four major categories of combat ships that traditionally have helped to define the size and structure of the Navy, potential reductions in force levels among these ships can be used to prepare notional estimates of what the next Navy force structure plan might look like. As shown in **Table 1** below, for total fleet size, those estimates range from about 250 ships to about 330 ships. The figure of about 250 ships results from using lower potential numbers for various force structure elements, while the figure of about 330 ships results from using higher potential numbers for various elements.

Table 1 on the next page compares notional fleets of about 250 and 330 ships to the 310-ship plan from the 2001 QDR and the Navy's 375-ship proposal. It should be emphasized that the two notional plans are meant to be illustrative. The next officially approved Navy force structure plan will likely differ from the 250- and 330-ship plans shown here. In addition, these notional plans are not an estimate of the size of the fleet that the Navy might be able to afford in coming years, but of what the Navy and DOD might state is required to produce a fleet with desired capabilities.

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[18] (...continued)
Ships," *Defense Today*, August 26, 2004: 1. See also "Rumsfeld Says Navy Can Operate With Fewer Carrier Groups," *Defense Today*, September 24, 2004: 1.

Table 1. Notional Possibilities for the Next Navy Force Structure Plan

(compared to 310-ship plan and 375-ship proposal)

Ship type	310-ship plan from 2001 QDR	Navy 375-ship proposal	Notional future plans	
			About 250 ships	About 330 ships
Ballistic missile submarines (SSBNs)	14	14	14	14
Cruise missile submarines (SSGNs)	2 or 4[a]	4	4	4
Attack submarines (SSNs)	55	55	37	50
Aircraft carriers	12	12	11	12
Cruisers, destroyers, frigates	116	104	70[b]	84[c]
Littoral Combat Ships (LCSs)	0	56	30[d]	45[e]
Amphibious ships	36	37	24	36
Maritime prepositioning ships	0[f]	0[f]	10[f]	16[f]
Combat logistics ships	34	42	30	34
Command and support ships	25	25	20	25
Dedicated mine warfare ships	16	26[g]	0[h]	8[h]
TOTAL battle force ships	**310 or 312**	**375**	**250**	**328**

Source: Press reports, except as otherwise noted in footnotes below.

a The report on the 2001 QDR did not mention a specific figure for SSGNs. The Administration's proposed FY2001 DOD budget requested funding to support the conversion of two available Trident SSBNs into SSGNs, and the retirement of two other Trident SSBNs. Congress, in marking up this request, supported a plan to convert all four available SSBNs into SSGNs.

b The two-per-year procurement rate for DD(X) destroyers and CG(X) cruisers shown in the Navy long-range shipbuilding plan delivered to Congress in 2003 would, if maintained over the long run, eventually result in a force of 70 larger surface combatants.

c Replacing the 62 DDG-51 class Aegis destroyers procured through FY2005 and the final 22 CG-47 class Aegis cruisers on a one-for-one basis (while retiring the first 5 Aegis cruisers, as planned by the Navy) would maintain a force of 84 larger combatants.

d This is the lower end of the range of about 30 to 60 ships that Navy officials have sometimes mentioned as the potential total procurement quantity for the LCS program.

e This is half-way between the lower and higher ends of the range of about 30 to 60 ships that Navy officials have sometimes mentioned as the potential total procurement quantity for the LCS program. The higher end was associated with the Navy's 375-ship proposal.

f Today's 16 Maritime Prepositioning Force (MPF) ships are intended primarily to support Marine Corps operations ashore, rather than Navy combat operations, and thus are not counted as Navy battle force ships. The Navy's planned MPF(Future) ships, however, may be capable of contributing to Navy combat capabilities (for example, by supporting Navy aircraft operations). For this reason, the 10 to 16 MPF(F) ships that may be built in coming years are counted here as battle force ships.

g The figure of 26 dedicated mine warfare ships appears to include 10 ships maintained in a reduced mobilization status called Mobilization Category B. Ships in this status are not readily deployable and thus do not count as battle force ships. The 375-ship proposal thus implied transferring these 10 ships to a higher readiness status.

h The figure of 0 dedicated mine warfare ships assumes that mine warfare duties are completely taken over by the 30 LCSs (for whom mine warfare is one of three primary stated missions) and by other ships (such as six DDG-51 destroyers) equipped with so-called organic (i.e., built-in) mine warfare systems. The figure of 8 mine warfare ships (which is half-way between 0 and the 16 in the 310-ship plan) assumes that, even with 45 LCSs and some other ships equipped with organic mine warfare capability, a few dedicated mine warfare ships are determined to be needed.

Potential Navy Plans for Shipbuilding Programs

Based on press reports, what might be the Navy's new plans for individual shipbuilding programs?

Table 2 below shows the draft FY2006-FY2011 shipbuilding plan that the Navy reportedly submitted to OSD during the summer of 2004.[19] Differences between this draft plan and the Navy's previous (FY2005-FY2009) shipbuilding plan, which the Navy submitted to Congress in February 2004, are indicated by showing figures from the previous plan in parentheses.[20] The FY2005 column is included to show how congressional action on the DD(X) destroyer program in FY2005 changed the nominal profile for that program. The table also includes a line providing the total number of ships other than LCSs. LCSs are scheduled to be built in shipyards other than the six shipyards that have built the Navy's major warships in recent years.

Table 2. Draft Navy Shipbuilding Plan for FY2006-FY2011

(Figures from previous plan shown in parentheses; FY2005 shown for reference)

	FY2005	FY2006	FY2007	FY2008	FY2009	FY2010	FY2011	Total FY2006-FY2011
CVN-21	0	0	(1) 0	(0) 1	0	0	(1) 0	(2) 1
SSN-774	1	1	1	1	2	2	2	9
CG(X)	0	0	0	0	0	0	(0) 1	(0) 1
DDG-51	3	0	0	0	0	0	0	0
DD(X)	(1) 0	0	(2) 1	(2) 1	(3) 2	2	(2) 1	(11) 7
LCS	1	(2) 1	(1) 2	3	(6) 5	5	5	(22) 21
LPD-17	1	1	1	1	(1) 0	(1) 0	(1) 0	(6) 3
LHA(R)	0	0	(0) 1	(1) 0	0	1	0	2
TAKE	2	(2) 1	1	(0) 1	0	0	0	3
TAOE(X)	0	0	0	0	(2) 1	(2) 1	(0) 2	4

[19] Table entitled "Navy's Proposed FY-05 Shipbuilding Plan (Compared to president's FY-05 budget request)," as printed in *Inside the Navy*, August 16, 2004: 5. The table as printed in the magazine also included line items for additional items such as high-speed connectors (or HSCs — a new term for fast transport ships), aircraft carrier refueling complex overhauls (RCOHs), attack submarine (SSN) engineering refueling overhauls (EROs), ballistic missile submarine (SSBN) EROs, a new type of amphibious landing craft called the LCH(X), and a new type of air-cushioned landing craft (LCAC) called the LCAC(X).

[20] Although the FY2005-FY2009 plan did not cover FY2010 and FY2011, the table as printed in *Inside the Navy* includes figures for these years. These figures might reflect previous internal Navy planning for those years.

	FY2005	FY2006	FY2007	FY2008	FY2009	FY2010	FY2011	Total FY2006-FY2011
MPF(F)	0	0	(1) 0	0	(2) 1	(2) 1	2	(7) 4
MPF(A)	0	0	0	0	(1) 0	0	0	(1) 0
TOTAL	(9) 8	(6) 4	(8) 7	(9) 8	(17) 11	(15) 12	13	(68) 55
TOTAL less LCSs	(8) 7	(4) 3	(7) 5	(6) 5	(11) 6	(10) 7	8	(46) 34

Source: Inside the Navy, August 16, 2004: 5.

The following discusses the changes between this reported draft shipbuilding plan and the previous shipbuilding plan.

Overall Ship Procurement Rate. Under the draft Navy plan, for the period FY2006-FY2011, the total number of ships to be procured would be reduced from 68, or an average of about 11.3 ships per year, to 55, or an average of about 9.2 ships per year. Assuming an average Navy ship life of 30 to 35 years, an average procurement rate of about 11.3 ships per year would, over the long run, maintain a fleet of 340 to 397 ships, while an average procurement rate of about 9.2 ships per year would, over the long run, maintain a fleet of 275 to 321 ships.

Excluding LCSs so as to focus on ships that would likely be built by the six yards that have built the Navy's major warships in recent years,[21] the total number of ships to be built would be reduced from 46, or an average of about 7.7 ships per year, to 34 under the draft plan, or an average of about 5.7 ships per year. Assuming an average Navy ship life of 30 to 35 years, an average procurement rate of about 7.7 ships per year other than LCSs would, over the long run, maintain a fleet that included 230 to 268 ships other than LCSs, while an average procurement rate of about 5.7 ships per year other than LCSs would, over the long run, maintain a fleet that included 170 to 198 ships other than LCSs.

Individual Shipbuilding Programs.

CVN-21 Aircraft Carrier Program. The draft Navy plan defers the procurement of the next aircraft carrier, called CVN-21, by a year, to FY2008. This may have been due to need to finance the procurement in FY2007 of the lead DD(X) destroyer and the LHA(R) amphibious assault ship. The draft Navy plan also defers

[21] These six yards include Bath Iron Works (BIW) of Bath, ME, the Electric Boat Division of Groton, CT, and Quonset Point, RI, and National Steel and Shipbuilding Company (NASSCO) of San Diego, CA, all of which are owned by General Dynamics Corporation; and Avondale Shipyards near New Orleans, LA, Ingalls Shipbuilding of Pascagoula, MS, and Newport News Shipbuilding of Newport News, VA, all of which are owned by Northrop Grumman Corporation.

the procurement of the carrier after CVN-21 from FY2011 to some future fiscal year.[22]

SSN-774 Attack Submarine Program. The draft Navy plan does not change the procurement profile for the Virginia (SSN-774) class attack submarine program.[23]

CG(X) Cruiser Program. The draft Navy plan would accelerate the procurement of the first CG(X) cruiser to FY2011. The long-range shipbuilding plan that the Navy submitted to Congress in 2003 showed the first CG(X) cruiser being procured in FY2018.[24]

DDG-51 Destroyer Program. The draft Navy plan does not change the procurement profile for the Arleigh Burke (DDG-51) class Aegis destroyer program. This profile calls for the three DDG-51s procured in FY2005 to be the last ships in the program.

DD(X) Destroyer Program. The table suggests that the draft Navy plan defers the procurement of the lead DD(X) destroyer by two years, to FY2007. The actual effect of the draft Navy plan on the schedule for building this ship, however, may be less dramatic. The Navy's FY2005 budget submission proposed funding the construction of the lead DD(X) in the Navy's research and development account through a stream of annual funding increments stretching out to FY2011 — an approach commonly known as incremental funding. Under this proposed scheme, the Navy had some flexibility to choose which year to record as the nominal year of procurement for the lead DD(X). The Navy chose FY2005, the year of the first scheduled increment, even though the amount of funding requested for the FY2005 increment equated to only about 8% of the ship's total cost, leaving the remaining 92% of the ship's cost to be provided in future years.

Congress, in acting on the Navy's proposed FY2005 budget, approved the Navy's FY2005 funding request for the lead DD(X) but directed that the ship be procured the traditional way, through the Navy's shipbuilding account (known formally as the Shipbuilding and Conversion, Navy, or SCN, account), and that the ship be funded the traditional way, in accordance with the full funding policy, which requires that items acquired through the procurement title of the DOD appropriation act be fully funded in the year they are procured.[25] Consistent with this direction, the

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[22] For more on the CVN-21 program, see CRS Report RS20643, *Navy CVN-21 Aircraft Carrier Program: Background and Issues for Congress*, by Ronald O'Rourke.

[23] For more on the SSN-774 program, see CRS Report RL32418, *Navy Attack Submarine Force-Level Goal and Procurement Rate: Background and Issues for Congress*, by Ronald O'Rourke.

[24] For more on the CG(X) program, see CRS Report RL32109, *Navy DD(X) and LCS Ship Acquisition Programs: Oversight Issues and Options for Congress*, by Ronald O'Rourke.

[25] For more on the full funding policy, see CRS Report RL31404, *Defense Procurement: Full Funding Policy — Background, Issues, and Options for Congress*, by Ronald O'Rourke
(continued...)

FY2005 funding increment was designated as advance procurement (AP) funding for a ship to be procured in some future fiscal year.

Abiding by this direction will require the Navy to alter its funding profile for the lead DD(X) to one that fully funds the ship in a particular year. The draft Navy plan suggests that the Navy, after examining its options, selected FY2007 as the year in which the ship would be fully funded. It is not clear, however, whether the actual schedule for building the lead ship will be significantly affected by this change in funding profile and nominal year of procurement. Consequently, although the nominal year of procurement for the lead DD(X) appears to have been deferred two years, this may overstate the actual amount of change in the schedule for the lead ship.

The draft Navy plan does, however, defer the procurement of the second DD(X) by a year, to FY2008, and reduces to seven the total number of DD(X)s to be procured through FY2011. Under previous plans, the Navy envisioned stopping DD(X) procurement at about the time that it started CG(X) procurement. If the lead CG(X) is procured in FY2011, as shown in the draft Navy plan, and there is a gap year in FY2012 between the procurement of the lead CG(X) and follow-on CG(X)s starting in FY2013, then two final DD(X)s might be procured in FY2012. If so, then the total procurement quantity for the DD(X) program would be nine ships, which could be viewed as consistent with a plan to provide one DD(X) for each of nine ESGs.[26]

Littoral Combat Ship (LCS) Program. The draft Navy plan defers procurement of the third LCS by a year, to FY2007. This is consistent with Congress' direction, in acting on the Navy's FY2005 budget request, to fully fund a lead LCS in FY2005 but require a gap year between the procurement of a lead LCS and any follow-on LCSs built to that same design. The Navy plans to procure two lead LCSs to different designs developed by two competing industry teams. Under the Navy's draft plan, the single ship now planned for FY2006 would presumably be the second lead LCS, and the two LCSs now planned for FY2007 would presumably be follow-on ships built to the same design as the lead LCS procured in FY2005. The draft plan would also reduce the number of LCSs procured in FY2009 from six ships to five. This can be viewed as consistent with the Navy's longer-range projection for the LCS program, which has envisioned a sustaining procurement rate of five ships per year through the end of the program, as shown by the figures for FY2010 and FY2011.[27]

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[25] (...continued)
and Stephen Daggett.

[26] For more on the DD(X) program, see CRS Report RS21059, *Navy DD(X) Destroyer Program: Background and Issues for Congress*, by Ronald O'Rourke; and CRS Report RL32109, *Navy DD(X) and LCS Ship Acquisition Programs: Oversight Issues and Options for Congress*, by Ronald O'Rourke.

[27] For more on the LCS program, see CRS Report RS21305, *Navy Littoral Combat Ship (LCS): Background and Issues for Congress*, by Ronald O'Rourke; and CRS Report RL32109, *Navy DD(X) and LCS Ship Acquisition Programs: Oversight Issues and Options*
(continued...)

LPD-17 Amphibious Ship Program. The draft Navy plan shows the elimination of three San Antonio (LPD-17) class amphibious ships from the period FY2009-FY2011. This is somewhat confusing, since procuring these three ships would result in a total procurement of 13 LPD-17s, whereas previous Navy plans called for procuring a total of 12 LPD-17s, with the final LPD-17 being procured in FY2010. Either way, if the final LPD-17 is procured in FY2008, as shown in the draft plan, a total of 10 LPD-17s would be procured. A figure of 10 LPD-17s could be viewed as consistent with a plan to provide one LPD-17 for each of 10 ESGs.[28] According to a September, 2004 press article, Secretary of the Navy Gordon England expressed a firm commitment to procure nine LPD-17s but was noncommittal about building any additional LPD-17s beyond that.[29]

LHA(R) Amphibious Ship Program. The draft Navy plan would accelerate the procurement of LHA(R), an amphibious assault ship, by one year, to FY2007. Although the Navy's FY2005-FY2009 shipbuilding plan scheduled procurement of LHA(R) for FY2008, its previous (i.e., FY2004-FY2009) shipbuilding plan, which the Navy submitted to Congress in February 2003, showed LHA(R) in FY2007. Accelerating procurement of LHA(R) to FY2007 can thus be viewed as restoring the year of procurement shown in the plan submitted to Congress in 2003.[30]

TAKE Auxiliary Cargo Ship Program. The draft Navy plan effectively defers one of the two Lewis and Clark (TAKE-1) class auxiliary cargo ships previously planned for FY2006 to FY2008.

TAOE(X) Replenishment Ship Program. The draft Navy plan would reduce procurement of new TAOE(X) auxiliary underway replenishment ships to one ship per year in FY2009 and FY2010, deferring the two additional ships previously planned for these years to FY2011.

MPF(F) Maritime Prepositioning Ship (Future) Program. The draft Navy plan would defer procurement of the first Maritime Prepositioning Force (Future) ship by two years, to FY2009, and reduce the total number of MPF(F)s procured through FY2011 from seven (plus one additional MPF(A) ship; see next item below) to four.[31]

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[27] (...continued)
for Congress, by Ronald O'Rourke.

[28] For more on the LPD-17 program, see CRS Report RL32513, *Navy-Marine Corps Amphibious and Maritime Prepositioning Ship Programs: Background and Oversight Issues for Congress*, by Ronald O'Rourke.

[29] Keith Darce, "Navy Commits To Building 9 Warships," *New Orleans Times-Pacayune*, September 11, 2004.

[30] For more on the LHA(R) program, see CRS Report RL32513, *Navy-Marine Corps Amphibious and Maritime Prepositioning Ship Programs: Background and Oversight Issues for Congress*, by Ronald O'Rourke.

[31] For more on the MPF(F) program, see CRS Report RL32513, op cit.

MPF(A) Maritime Prepositioning Ship (Aviation) Program. Previous Navy plans distinguished between the basic MPF(F) ship and an aviation variant called MPF(A). The draft Navy plan either cancels the MPF(A) effort or ends the distinction by folding the MPF(A) back into the MPF(F) program.

Issues for Congress

Number of Ships in the Navy

In terms of numbers of ships, how large a Navy does the United States need, and what current force-planning issues may affect these numbers?

Capabilities-Based Planning and Numbers of Ships. As a result of the shift to capabilities-based planning, Navy and DOD officials are seeking to acquire a Navy with a certain set of desired capabilities, rather than a Navy that happens to have a certain number of ships and aircraft. As discussed in the Background section, however, once the Navy and DOD identify a desired set of capabilities for the Navy, it should become possible at some point to translate those desired capabilities into a force structure plan for a Navy that includes numbers of ships and aircraft, although those numbers might be expressed as ranges rather than discrete figures. In this sense, even under capabilities-based planning, it is legitimate to ask Navy and DOD officials how large a Navy they are planning in terms of numbers of ships. When the Navy and DOD provide a force structure plan with these numbers, Congress will have an opportunity to assess its adequacy.

Historical Fleet Numbers As A Yardstick. Historical figures for the total number of ships in the Navy are not necessarily a reliable yardstick for assessing the adequacy of today's Navy or a future planned Navy that includes a certain number of ships, particularly if the historical figures are more than a few years old, because the missions to be performed by the Navy, the mix of ships that make up the Navy, and the technologies that are available to Navy ships for performing missions all change over time. Due to changes in these variables, the historical number of ships in the fleet is at best a partial guide, and at worst a potentially misleading guide, to whether today's Navy is adequate, or a future Navy that includes a certain number of ships would be adequate, for performing its required missions.

The Navy, for example, reached a late-Cold War peak of 568 battle force ships at the end of FY1987,[32] and as of October 21, 2004 had declined to a total of 289

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[32] Some publications, such as those of the American Shipbuilding Association, state that the Navy reached a peak of 594 ships at the end of FY1987. This figure, however, is the total number of active ships in the fleet, which is not the same as the total number of battle force ships. In recent years, the total number of active ships has been larger than the total number of battle force ships. For example, the Naval Historical Center states that as of November 16, 2001, the Navy included a total of 337 active ships, while the Navy states that as of November 19, 2001, the Navy included a total of 317 battle force ships. Although the total number of battle force ships as of October 6, 2004 was 290, the total number of active ships

(continued...)

battle force ships. The FY1987 fleet, however, was intended to meet a set of mission requirements that focused on countering Soviet naval forces at sea during a potential multi-theater NATO-Warsaw Pact conflict, while the October 2004 fleet is intended to meet a considerably different set of mission requirements centered on influencing events ashore by countering both land- and sea-based military forces of potential regional threats other than Russia, including non-state terrorist organizations. In addition, the Navy of FY1987 differed substantially from the October 2004 fleet in areas such as profusion of precision-guided air-delivered weapons, numbers of Tomahawk-capable ships, and sophistication of C4ISR systems.[33]

Fifteen or so years from now, Navy missions may have shifted again, to include, as a possible example, a greater emphasis on being able to counter Chinese maritime military capabilities. In addition, the capabilities of Navy ships will likely have changed further by that time due to developments such as more comprehensive implementation of networking technology and increased use of ship-based unmanned vehicles.

The 568-ship fleet of FY1987 may or may not have been capable of performing its stated missions; the 289-ship fleet of October 2004 may or nor may not be capable of performing its stated missions; and a fleet 15 or so years from now with a certain number of ships may or may not be capable of performing its stated missions. Given changes over time in mission requirements, ship mixes, and technologies, however, these three issues are to a substantial degree independent of one another.

For similar reasons, trends over time in the total number of ships in the Navy are not necessarily a reliable indicator of the direction of change in the fleet's ability to perform its stated missions. An increasing number of ships in the fleet might not necessarily mean that the fleet's ability to perform its stated missions is increasing, because the fleet's mission requirements might be increasing more rapidly than ship numbers and average ship capability. Similarly, a decreasing number of ships in the fleet might not necessarily mean that the fleet's ability to perform stated missions is decreasing, because the fleet's mission requirements might be declining more rapidly than numbers of ships, or because average ship capability and the percentage of time that ships are in deployed locations might be increasing quickly enough to more than offset reductions in total ship numbers.

Previous Force Structure Plans As A Yardstick. Previous Navy force structure plans might provide some insight into the potential adequacy of a proposed new force-structure plan, but changes over time in mission requirements,

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[32] (...continued)
as of this date was likely more than 300. Comparing the total number of active ships in one year to the total number of battle force ships in another year is thus an apple-to-oranges comparison that in this case overstates the decline since FY1987 in the number of ships in the Navy. As a general rule to avoid potential statistical distortions, comparisons of the number of ships in the Navy over time should use, whenever possible, a single counting method.

[33] C4ISR stands for command and control, communications, computers, intelligence, surveillance, and reconnaissance.

technologies available to ships for performing missions, and other force-planning factors suggest that some caution should be applied in using past force structure plans for this purpose. The Reagan-era plan for a 600-ship Navy was designed for a Cold War set of missions focusing on countering Soviet naval forces at sea, which is not an appropriate basis for planning the Navy today, while more recent Navy force-structure plans, including the Navy's 375-ship proposal, do not appear to reflect potential changes now being discussed by Navy officials, such as additional forward homeporting of ships, widespread application of the Sea Swap concept, and implementation of the new sea basing concept for conducting expeditionary operations ashore.[34]

Current Force-Planning Issues. Current force-planning issues that Congress may consider in assessing how large a Navy the United States needs include the following:

- sea-based missile defense;
- the sea basing concept for conducting expeditionary operations ashore;

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[34] Recent Navy force structure plans include the Reagan-era 600-ship plan of the 1980s, the Base Force fleet of more than 400 ships planned during the final two years of the George H. W. Bush Administration, the 346-ship fleet from the Clinton Administration's 1993 Bottom-Up Review (or BUR, sometimes also called Base Force II), the 310-ship fleets of the Clinton Administration's 1997 QDR and the George W. Bush Administration's 2001 QDR, and the Navy's 375-ship proposal. The table below summarizes some key features of these plans.

Features of Recent Navy Force Structure Plans

Plan	600-ship	Base Force	1993 BUR	1997 QDR	2001 QDR	375-ship proposal
TOTAL ships	~600	~450/416[a]	346	~305/310[b]	~310	375
Attack submarines	100	80/~55[c]	45-55	50/55[d]	55[e]	55[e]
Aircraft carriers	15[f]	12	11+1[g]	11+1[g]	12	12
Surface combatants	242/228[h]	~150	~124	116	116	160[i]
Amphibious ships	~75[j]	51[k]	36[k]	36[k]	36[k]	37

Source: Prepared by CRS based on DOD and U.S. Navy data.

a Commonly referred to as 450-ship plan, but called for decreasing to 416 ships by end of FY1999.

b Original total of about 305 ships was increased to about 310 due to increase in number of attack submarines to 55 from 50.

c Plan originally included 80 attack submarines, but this was later reduced to about 55.

d Plan originally included 50 attack submarines but this was later increased to 55.

e Plus 2 or 4 additional converted Trident cruise missile submarines (SSGNs) for the 2001 QDR plan and 4 additional SSGNs for the 375-ship proposal.

f Plus one additional aircraft carrier in the service life extension program (SLEP).

g 11 active carriers plus 1 operational reserve carrier.

h Plan originally included 242 surface combatants but this was later reduced to 228.

i Figure includes 56 LCSs. Other plans shown include no LCSs.

j Number needed to lift assault echelons of 1 Marine Expeditionary Force (MEF) plus 1 Marine Expeditionary Brigade (MEB).

k Number needed to lift assault echelons of 2.5 MEBs. Note how number needed to meet this goal changed from Base Force plan to the BUR plan — a result of new, larger amphibious ship designs.

- naval requirements for the global war on terrorism and for irregular conflicts such as insurgencies;
- naval requirements to address the possible emergence over the next 10 to 25 years of significantly more capable Chinese maritime military forces;
- new technologies that may affect U.S. Navy ship capabilities;
- additional forward homeporting and the Sea Swap concept;
- DOD's increased emphasis on achieving full jointness in U.S. military plans and operations; and
- potential tradeoffs between funding Navy requirements and funding competing defense requirements.

Sea-based Missile Defense. The Navy would likely play a role in any future U.S. missile defense system, but the nature of that role is not yet well defined, because the Missile Defense Agency (MDA) is only in the early stages of defining its preferred eventual overall missile-defense architecture.

Navy ships could contribute to a U.S. missile defense system by acting as platforms for both radars and interceptor missiles. Sea-based radars could be placed on surface combatants or on non-combatant platforms such as auxiliary ships or floating structures resembling offshore oil platforms. Several U.S. Navy surface combatants have recently been designated to operate on a rotational basis in the Sea of Japan as forward radar platforms for detecting potential ballistic missile launches from North Korea. Sea-based interceptor missiles could be based on either submarines, surface combatants, or noncombatant platforms. Submarines might be particularly suitable as boost-phase interceptor platforms, while noncombatant platforms might be particularly suitable as midcourse radar or interceptor platforms. Surface combatants might be suitable as either.

Eventual decisions on the overall missile defense architecture consequently could affect Navy requirements for submarines, surface combatants, and auxiliary ships. A new Navy force structure plan that errs badly in anticipating the Navy's eventual role in the overall missile defense architecture could leave the country with a surplus or shortfall of ships in one or more of these categories. A shortfall could create a tension between performing sea-based missile defense and performing other Navy missions, while a surplus would suggest that the funds used to build some ships might have been better used for other purposes. If MDA can take steps to better define the Navy's role in the overall missile-defense architecture, this could reduce the potential for the next Navy force structure plan to result in such a surplus or shortfall.

Sea Basing Concept. Implementing the sea basing concept would affect requirements for numbers and types of amphibious ships and MPF(F) ships. It might also affect requirements for surface combatants such as the DD(X) and the LCS. Exactly how implementing sea basing would affect these requirements, however, is not yet clear because the number of sea basing squadrons, and their composition, is still being examined.

Global War on Terrorism and Irregular Warfare. The potential effects of the global war on terrorism and irregular conflicts such as insurgencies on

requirements for U.S. ground forces have received much attention in recent months. The potential effects of these factors on requirements for U.S. naval forces, in contrast, has received less attention. Possible effects on requirements for U.S. naval forces include an increased emphasis on one or more of the following:

- ships (such as attack submarines, surface combatants, or aircraft carriers) that can conduct offshore surveillance of suspected terrorists and irregular military forces using either built-in sensors or embarked unmanned vehicles;

- ships (such as surface combatants, and perhaps particularly smaller and less heavily armed combatants like the LCS) for conducting coastal patrol and intercept operations, including countering small boats and craft and countering pirate-like operations;[35]

- ships (such as attack submarines) for covertly inserting and recovering Navy special operations forces, known as SEALs;[36]

- ships (such as amphibious ships) for supporting smaller-scale Marine Corps operations ashore; and

- ships (such as aircraft carriers or large-deck amphibious assault ships) that can launch strike-fighters armed with smaller-scale precision guided weapons.

Chinese Maritime Military Forces. Some analysts are concerned that DOD in coming years may structure U.S. forces, including the Navy, too closely around near-term requirements associated with the global war on terrorism, irregular conflicts, and conflicts against countries like Iraq and Afghanistan, and not enough around requirements associated with countering significantly more capable Chinese military forces, including maritime forces, that might emerge over the next 10 to 25 years.

Views among analysts differ concerning the possible scale or composition of China's military modernization efforts. Most, however, appear to agree that a growing Chinese economy would be able to finance a significant military modernization effort, should Chinese leaders decide to embark upon one, and that improved naval forces capable of operating in blue waters (i.e., waters further away from China's coast) could be a significant component of such an effort.[37]

Structuring the U.S. Navy primarily to match the near-term requirements mentioned above could lead to a fleet that is strongly oriented toward operating in

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[35] Coast Guard cutters may also be well suited for such operations.

[36] SEAL stands for SEa, Air, and Land.

[37] For more on China's current and potential future military capabilities, and Chinese strategic thinking, see U.S. Department of Defense, *Annual Report on The Military Power of The People's Republic of China*, Washington, 2004. (FY2004 Report To Congress on PRC Military Power, Pursuant to the FY2000 National Defense Authorization Act) 54 pp.

near-shore areas, attacking land targets, and countering land-based military forces. Preserving an ability to counter significantly more capable Chinese maritime military forces in the future could involve preserving different kinds of capabilities (or the foundations in technology and operational experience for building up such capabilities), particularly open-ocean antisubmarine warfare, air-to-air combat, defense against large-scale antiship cruise missile attacks, defense against sophisticated electronic warfare techniques and cyberwar attacks, and capabilities for attacking larger enemy ships at sea.

New Technologies. New technologies that will likely affect the capabilities of Navy ships in coming years, and consequently the number of ships that may be needed to perform a given set of missions, include improved radars and other sensors (including miniaturized sensors), improved computers and networking systems, unmanned vehicles, reduced-size, precision-guided, air-delivered weapons, rail guns, directed-energy weapons, and integrated electric drive propulsion technology, to name just a few. Although the effect of improving technology historically has often been to increase the capability of individual Navy ships and thereby permit a reduction in the number of Navy ships needed to perform a stated set of missions, some analysts believe that networking technology and reduced-sized sensors may argue in favor of a more distributed force structure that includes a larger number of smaller ships such as the LCS.

Forward Homeporting and Sea Swap. Other things held equal, homeporting additional Navy ships in forward locations such as Guam and Hawaii, and applying the Sea Swap concept to a significant portion of the fleet, could reduce, perhaps substantially, the total number of Navy ships needed to maintain a certain number of Navy ships in overseas operating areas on a day-to-day basis.

Navy officials, for example, have stated that in terms of resulting operating days in the Pacific, a Guam-homeported attack submarine is the equivalent of an average of about 2.3 attack submarines homeported in the Third Fleet (i.e., in San Diego or Pearl Harbor).[38] The Congressional Budget Office, in a March 2002 report on the attack submarine force, stated that the ratio might be higher, with a Guam-homeported attack submarine equivalent in operating days to about three

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[38] In a "memorandum for interested members of Congress" on the homeporting of attack submarines in Guam dated January 22, 2001, the Navy stated: "Three attack submarines homeported in Guam will provide a total of 300 days (on average) of operations and engagement per year. Those submarines would provide 130 days of operations and engagement per year if they were homeported in [the] Third Fleet [i.e., Eastern Atlantic] and deployed to [the] Seventh Fleet [i.e., Western Pacific] in accordance with current guidelines," 300 divided by 130 is about 2.3. The text of the memo was reprinted in the February 12, 2001 issue of Inside the Navy under the headline, "Text: Navy Memo on Subs in Guam," For the accompanying news story, see Christian Bohmfalk, "Basing Attack Subs On Guam Expected To Increase Fleet's Presence," *Inside the Navy*, Feb. 12, 2001. For additional discussion, see CRS Report RL32418, *Navy Attack Submarine Force-Level Goal and Procurement Rate: Background and Issues for Congress*, by Ronald O'Rourke. pp. 30-33.

attack submarines homeported elsewhere.[39] Recent experiments with the Sea Swap concept on surface combatants sent on long deployments to the Indian Ocean/Persian Gulf region suggest that the concept, if widely applied, might reduce the total number of surface combatants needed to maintain a certain number in forward-deployed locations by 20% or more.[40] The Navy reportedly is considering increasing the number of attack submarines homeported at Guam and transferring one of its continental-U.S.-homeported aircraft carriers to either Hawaii or Guam.

A key planning consideration is the potential difference between the number of Navy ships required for maintaining day-to-day forward deployments and the number required for fighting conflicts. Forward homeporting and Sea Swap affect primarily the former rather than the latter. As a consequence, for some types of ships, additional forward homeporting and use of Sea Swap might reduce the number needed for maintaining day-to-day forward deployments below the number needed for fighting conflicts. In such cases, fully implementing the force-level economies suggested by forward homeporting and Sea Swap could leave the Navy with inadequate forces for fighting conflicts.

Jointness. DOD's increased emphasis on achieving increased jointness (i.e., coordination and integration of the military services) in U.S. military plans and operations could lead to reassessments of requirements for Navy capabilities that were originally determined in a less-joint setting. Areas where U.S. Navy capabilities overlap with the those of the Air Force or Army, and where total U.S. capabilities across the services exceed DOD requirements, might be viewed as candidates for such reassessments, while capabilities that are unique to the Navy might be viewed as less suitable for such reassessments. An example of a broad area shared by the Navy, Air Force, and Army is tactical aviation, while an example of an area that is usually regarded as unique to the Navy is antisubmarine warfare.

Competing Defense Priorities. A final issue to consider are the funding needs of other defense programs. In a situation of finite defense resources, funding certain Navy requirements may require not funding certain other defense priorities. If so, then the issue could become how to allocate finite resources so as to limit operational risk over the various missions involving both Navy and non-Navy mission requirements.

Potential Oversight Questions. Potential oversight questions for Congress regarding the planned size of the Navy and its relationship to ship procurement plans and budgets include the following:

- **Desired Navy capabilities.** Have DOD and the Navy defined the set of capabilities the Navy should have? If not, when do DOD and the Navy anticipate completing this task? Should Congress establish a deadline for completing it? If DOD and the Navy have completed

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[39] U.S. Congressional Budget Office, *Increasing the Mission Capability of the Attack Submarine Force*, March 2002, p. 11.

[40] For additional discussion, see CRS Report RS21338, *Navy Ship Deployments: New Approaches — Background and Issues for Congress*, by Ronald O'Rourke. pp. 4-5.

the task, have they defined this set of capabilities accurately, taking into account factors like those discussed in the previous section?

- **Translating desired capabilities into planned force structure.** Have DOD and the Navy translated desired Navy capabilities into new Navy force-structure goals? If not, when do DOD and the Navy anticipate completing this task? Should Congress establish a deadline for DOD and the Navy to complete this task and issue a new Navy force structure plan? To the extent that DOD and the Navy have translated desired Navy capabilities into Navy force structure goals, have they done so accurately, taking into account factors like those discussed in the previous section?

- **Procurement plan.** If DOD and the Navy have accurately translated desired capabilities into force-structure goals, would implementing the associated Navy procurement plan achieve a fleet with such a force structure in a timely manner?

- **Budget plan.** If the procurement plan would achieve the desired force structure in a timely manner, have DOD and the Navy programmed the correct amount of funding to implement this procurement plan? If the Navy's procurement plan is fully funded, what other defense priorities might not be fully funded, and what are the resulting potential operational risks?

Number of Yards Involved in Navy Shipbuilding

How many shipyards should be regularly involved in Navy shipbuilding?

Questions about the Navy shipbuilding industrial base, including the number of yards that should be regularly involved in Navy shipbuilding, have been debated in Congress for many years, and particularly since the early 1990s, when the rate of Navy ship procurement dropped to a relatively low level as a consequence of the end of the Cold War and the dissolution of the Soviet Union. This section reviews the question of the number of yards that might be regularly involved in Navy shipbuilding in light of the possibility that the next Navy force structure plan might call for a fleet of roughly 250 to 330 ships, including 30 to 45 LCSs, as shown in **Table 1**.

Candidate Yards. Candidate shipyards for building Navy ships in coming years include the six yards that have built the Navy's major warships in recent years and three additional yards that are competing to build LCSs. The six yards that have built the Navy's major warships in recent years are:

- General Dynamics(GD)/Bath Iron Works (BIW) of Bath, ME;
- GD/Electric Boat (EB) of Groton, CT, and Quonset Point, RI;
- GD/National Steel and Shipbuilding Company (NASSCO) of San Diego, CA;

- Northrop Grumman (NOC)/Avondale Shipyards, located near New Orleans, LA;
- NOC/Ingalls Shipbuilding of Pascagoula, MS;[41] and
- NOC/Newport News Shipbuilding (NGNN) or Newport News, VA.

The three yards competing to build LCSs are:

- Austal USA of Mobile, AL, which is the production shipyard on the LCS industry team led by General Dynamics;[42]
- Bollinger Shipyards of Louisiana and Texas, which is one of two production shipyards on the LCS industry team led by Lockheed Martin;[43] and
- Marinette Marine of Marinette, WI, which is the other production shipyard on the Lockheed-led LCS industry team.

Factors to Consider. In assessing how many shipyards should be regularly involved in Navy shipbuilding in coming years, Congress may consider a number of factors, including factors relating to shipyard capacity, factors relating to cost and acquisition strategy, and factors relating to other issues.

Capacity-Related Factors.

Yard Capacities. **Table 3** on the next page, taken from a 1996 CRS report,[44] shows the maximum annual production capacities of the first group of six yards, measured in the principal kinds of ships that they were building for the Navy in 1996, which are broadly similar to the kinds of ships they are building for the Navy today. As can be seen in the table, most of the yards in 1996 could build 3 to 5 ships per year of the kinds they were producing at that time, while Ingalls could build more.[45] The maximum capacities of the yards today would be roughly similar, and in some

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[41] The Avondale and Ingalls yards, together with a fabrication facility at Gulfport, MS, form Northrop Grumman Ship Systems (NGSS) division.

[42] Austal USA was created in 1999 as a joint venture between Austal Limited of Henderson, Western Australia and Bender Shipbuilding & Repair Company of Mobile, AL. The Lockheed LCS team also includes GD/BIW as prime contractor, to provide program management and planning, to provide technical management, and to serve as "LCS system production lead,"

[43] Bollinger operates about 15 shipyards and ship-related facilities in Louisiana and Texas, of which three, located in Lockport, LA, Gretna, LA, and Amelia, LA, are for building new ships.

[44] CRS Report 96-785 F, *Navy Major Shipbuilding Programs and Shipbuilders: Issues and Options for Congress*, by Ronald O'Rourke. (1996, archived; available from the author at 202-707-7610.) Table 2 on page 28; see also text on page 27.

[45] As noted in the 1996 CRS report, caution should be exercised in using the figures in this table to judge the comparative capacities of the yards, because these figures do not adjust for the differing sizes and levels of complexity of the various types of ships listed. A shipyard that is listed as being able to build a given number of large, complex ships may have more capacity than a yard that is listed as being able to build a larger number of smaller or less complex ships.

cases perhaps a bit higher due to yard modernization efforts since 1996 that have increased throughput capacities.

Table 3. Annual Shipyard Production Capacities

Yard	Maximum capacity: Number of ships completed per year
GD/BIW	3.5 Arleigh Burke (DDG-51) class destroyers
GD/EB	3 nuclear-powered attack submarines (SSNs)[a]
GD/NASSCO	4 or 5 Supply (AOE-6) class underway replenishment ships or 5 or 6 Watson (TAKR-310) class sealift ships[b]
NOC/Avondale	4 Harpers Ferry (LSD-49) class amphibious ships
NOC/Ingalls	11 DDG-51 class destroyers *or* 8 DDG-51 class destroyers + 1 Wasp (LHD-1) class amphibious ship
NOC/NGNN	4 SSNs[c] + 1 nuclear-powered aircraft carrier (CVN)

Source: CRS Report 96-785 F, *Navy Major Shipbuilding Programs and Shipbuilders: Issues and Options for Congress*, op cit. Table 2 on page 28.
a Capacity of EB's Land-Level Submarine Construction Facility (LLSCF). Additional submarines could be built in EB's older inclined building ways.
b These ships are also known as Large, Medium-Speed Ro/Ro (Roll-on/Roll-off) ships (LMSRs).
c Capacity of NGNN's Modular Outfitting Facility (MOF). Additional submarines could be built in NGNN's graving docks.

The annual rates in this table add up to roughly 30 ships per year. Adding in the capacities of one or more of the three yards now competing to build LCSs would increase this figure. As noted in the 1996 CRS report, achieving and sustaining the rates shown in **Table 3** could require at least some of the yards to curtail or eliminate other forms of work, such as overhaul and repair of Navy and commercial ships and construction of commercial ships. It could also result in levels of employment at the yards that could strain the managerial and supervisory capacities of the yards.[46]

Potential Shipbuilding Rate for Fleet of 250 to 330 Ships. If the next Navy force structure plan calls for a fleet of about 250 to about 330 ships, including 30 to 45 LCSs, then as shown in **Table 4** on the next page, the steady-state procurement rate for Navy ships — the average annual procurement rate that, if maintained over the long run, would support a fleet of that size over the long run — could be roughly 7 to 10 ships per year, including LCSs, and roughly 6 to 8 ships per year other than LCSs.[47]

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[46] These maximum rates also do not take into account possible capacity limitations in critical supporting supplier industries that could prevent these high rates from being achieved. Limits on supporting supplier industries, however, may be independent of the number of shipyards involved in the building effort. If supplier industries, for example, could only support a combined production rate of 10 ships per year, that limit might apply regardless of whether those 10 ships were being built by 6 yards or some other number of yards.

[47] The steady state replacement rate for an item is equal to the force-level goal divided by
(continued...)

Table 4. Steady-State Ship Procurement Rate for Fleet of 250 to 330 Ships

(average annual procurement rates)

Ship type	Expected service life (years)	Notional fleets			
		~250 ships		~330 ships	
		Number	Steady-state rate	Number	Steady-state rate
SSBNs	42	14	0.33	14	0.33
SSGNs	42	4	0.10	4	0.10
SSNs	33	37	1.12	50	1.52
Aircraft carriers	50	11	0.22	12	0.24
Crus/Des/Frig[a]	35	70	2.0	84	2.4
LCSs	25	30	1.2	45	1.8
Amphibious	35	24	0.69	36	1.03
MPF(F)s	35	10	0.29	16	0.46
CLF[b]	35	30	0.86	34	0.97
Cmd/support[c]	35	20	0.57	25	0.71
Dedicated MIW[d]	25	0	0	8	0.32
TOTAL		250	7.37	328	9.88
TOTAL other than LCSs		220	6.17	283	8.08

Source: Prepared by CRS based on U.S. Navy data for ship expected service lives.
a Cruisers, destroyers, and frigates.
b Combat Logistics Force ships (i.e., ships that resupply Navy combat ships).
c Command and support ships.
d Dedicated mine warfare ships.

The planned ship service lives shown in this table are based on Navy planning data. If actual ship service lives turn out to be shorter than shown in the table, as some observers believe they might be based on historical evidence with previous classes of Navy ships, then the steady-state replacement rate figures would be higher than those shown in the table.

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[47] (...continued)
the service life. For example, a force-level goal of 70 cruisers, destroyer, and frigates divided by a service life of 35 years for such ships equals a steady state procurement rate of 2 such ships per year.

To compensate for the relatively low rate of Navy ship procurement since the early 1990s, maintaining a fleet of about 250 to 330 ships, including 30 to 45 LCSs, will require an average procurement rate in coming years somewhat higher than the steady-state rate. Assuming an average 35-year life for Navy ships, the required rate might be about 8 to 12 ships per year including LCSs, and about 7 to 10 ships per year other than LCSs.[48] If average ship life is assumed to be closer to 30 years, which some observers believe is a more realistic figure, then the required shipbuilding rate might be closer to about 10 to 15 ships per year including LCSs, and about 9 to 12 ships per year other than LCSs.[49]

Even if the production capacities shown in **Table 3** are reduced significantly to avoid a risk of straining the yards' managerial and supervisory abilities and to allow for the yards to do things other than build new Navy ships, it would appear that the nine candidate yards collectively have more than enough capacity to build the ships associated with maintaining a fleet of about 250 to 330 ships, including 30 to 45 LCSs. If, for example, each yard involved in Navy shipbuilding builds an average of two Navy ships per year, then of the total of nine candidate yards, four to six might be sufficient to build 8 to 12 ships per year, including LCSs, while of the first group of six yards, four or five might be sufficient to build a total of 7 to 10 ships per year other than LCSs. An average rate of two ships per year for each yard is between one-third and two-thirds of most of the maximum annual rates shown in **Table 3**, and is similar to rates executed at times in the 1980s, during the final years of the Cold War.

Potential Need to Surge to Higher-Rate Production. Advocates of keeping a larger number of shipyards involved in Navy shipbuilding could argue that in light of the difficulties of predicting future potential threats to U.S. interests, and the possibility that China may choose to build a significant maritime military capability over the next 10 to 25 years, it is possible that the Navy and DOD might decide years from now that the United States needs to build a Navy substantially larger than one of about 250 to 330 ships, in which case there may be a sudden need for building substantially more than 8 to 12 ships per year. Keeping a larger number of yards involved in Navy shipbuilding, they could argue, would make it easier to shift to higher-rate production in a timely manner without straining yard capabilities.

Advocates of keeping a smaller number of yards involved in Navy shipbuilding could argue that in light of the capacity figures shown in **Table 3**, even a smaller

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[48] The decline in the rate of Navy ship procurement to relatively low levels began about FY1993. During the 12-year period FY1993-FY2004, a total of 64 battle force ships (none of them LCSs) were procured, or an average of about 5.3 ships per year. Subtracting these 64 ships from a total fleet of 250 to 330 ships would leave a total of 186 to 266 ships (including all 30 to 45 LCSs) to be procured during the remaining 23 years of a 35-year procurement period for replacing the entire fleet. Procuring these 186 to 266 ships over a 23-year period would require an average procurement rate of about 8.1 to 11.6 ships per year. A total of 156 to 221 ships other than LCSs would need to be procured over these 23 years, or an average of 6.8 to 9.6 ships per year.

[49] Extending the analysis in the previous footnote, a total of 186 to 266 ships of all kinds divided by the 18 remaining years in a 30-year procurement period equates to an average rate of about 10.3 to 14.8 ships per year, while a total of 156 to 221 ships other than LCSs divided by 18 years equates to an average rate of about 8.7 to 12.3 ships per year.

number of yards could still have enough excess capacity to shift to a higher rate of production in a timely manner without straining yard capabilities.

Potential For Creating New Yards or Reopening Closed Yards. Depending on other forms of work available to various shipyards (see discussion below), a decision to keep a smaller number of yards involved in Navy shipbuilding could lead to the end of shipbuilding activities at, or the complete closure of, yards that are not involved in Navy shipbuilding. As a result of this possibility, a potential additional factor to consider is the potential for creating new shipyards or reopening closed ones to respond a need at some point in the future for additional shipbuilding capacity. Factors to consider in assessing this potential include availability of suitable waterfront property, regulatory issues, cost and time for facilities, and cost and time for the workforce:

- **Waterfront property.** If a shipyard is closed but the property is not sold off and developed for other uses (such as conversion into waterside residential units), then it might remain available for eventual reuse as a shipyard. Part of the former government-operated U.S. naval shipyard in Philadelphia, for example, has been converted by the Kvaerner Corporation into a new facility for building commercial ships. If, however, a closed yard's waterfront property is sold off and developed for other uses, it may be difficult to find other suitable waterfront property to establish a new yard, at least in the same immediate area.

- **Regulatory issues.** Since shipyards are major industrial facilities, gaining regulatory approval for establishing a shipyard on a parcel of waterfront property may involve a number of regulatory issues. A special set of regulatory issues would apply in the case of a proposal to establish or reopen a shipyard capable of building nuclear-powered ships. Although the Navy maintains extremely high safety standards in its program for building, operating, and maintaining its nuclear-powered ships, the challenges involved gaining regulatory approval (and local popular support) for establishing a shipyard that would work with radioactive fuel as part of the process for building nuclear-powered ships are viewed as potentially significant, particularly if the area in which the shipyard is to be located has not hosted such a facility previously or for some number of years. The potential challenges associated with creating a new nuclear-capable shipyard, or reopening and recertifying a closed one, are a reason why some observers have argued that particular caution should be applied when considering actions that may have the effect of leading to the closure of either of General Dynamics/Electric Boat or Northrop Grumman/Newport News, which are the only two yards that have built nuclear-powered ships in recent years.[50]

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[50] In theory, nuclear-powered warships could be built at one or more of the country's four (continued...)

- **Cost and time for facilities**. Building the facilities for a new shipyard capable of building larger ships for the Navy could easily involve an investment of several hundred million dollars, or possibly more than a billion dollars, and a number of years of construction time. Reopening a closed shipyard could cost less and require less time, if some portion of the yard's old facilities were left in place and preserved.

- **Cost and time for workforce.** Hiring and training the workforce of a yard capable of building large and complex Navy ships, and putting together a team of capable managers and supervisors for such a facility, could take considerable time and resources if skilled production workers and experienced managers and supervisors were not readily available from other yards. Some observers believe that establishing a skilled workforce can be the most time-consuming component of an effort to create or reopen a shipyard.

Factors Related to Cost and Acquisition Strategy.

Shipyard Fixed Overhead Costs. Other things held equal, keeping a higher number of yards involved in building Navy ships could increase the total cost of Navy ships by increasing the amount of shipyard fixed overhead costs included in that cost.[51] A 1996 CRS report estimated that a smaller shipyard capable of building major Navy ships (i.e., one whose facilities are adjusted to support a total employment of a few thousand people) might have fixed costs ranging from a few to several tens of millions of dollars per year, while a larger shipyard capable of building major Navy ships (i.e., one whose facilities are adjusted to support a total employment ranging from several thousand people to more than 10,000 people) might have fixed costs ranging from several tens of millions of dollars per year to

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[50] (...continued)
government-operated naval shipyards, which are located at Portsmouth, NH/Kittery, ME, Norfolk, VA, Bremerton, WA, and Pearl Harbor, HI. Government-operated naval shipyards, however, have not built new ships for the Navy since the 1970s (they have been used since that time only to overhaul, repair, and modernize Navy ships), so considerable investment would be needed to improve their facilities so as to support new-construction work.

[51] As explained in a 1996 CRS report , a manufacturing facility's fixed overhead costs are those that are relatively insensitive (i.e., do not change very much in response) to changes in the level of production, particularly over the shorter run. Some fixed costs would continue to be incurred even if the level of production at the facility falls to zero. A manufacturing facility's other main type of costs are its variable costs, which are those incurred in proportion to the level of production. Variable costs include expenses for labor and materials. A firm's fixed costs are spread over — that is, charged to and thereby incorporated into the cost of — the various work projects that make up the total workload underway at the facility. (CRS Report 96-785 F, *Navy Major Shipbuilding Programs and Shipbuilders: Issues and Options for Congress*, by Ronald O'Rourke. 1996, archived; available from the author. Pages 83-84.)

more than $100 million per year.[52] Given inflation since 1996, those figures might be somewhat higher today.

On this basis, keeping a higher rather than lower number of yards involved in building Navy ships might increase the fixed overhead costs associated with building these ships by perhaps a few hundred million, or possibly several hundred million, dollars a year. Given current and projected procurement costs for Navy ships, building a total of 8 to 12 ships per year including LCSs could cost an average of more (perhaps much more) than $10 billion per year, in which case a figure of a few or possibly several hundred million dollars in additional fixed overhead costs would increase the collective cost of those ships by a few or possibly several percent. The decision to produce Virginia-class submarines jointly between two yards rather than at a single yard, for example, may have increased the cost of these submarines by somewhere between about $70 million and about $200 million per boat, which equates to about 3% to 9% of the cost of each boat. Some (but not all) of this additional cost is due to the additional fixed overhead costs of maintaining the combined equivalent of more than one complete submarine production line between the two yards.[53]

Advocates of keeping a smaller number of yards involved in Navy shipbuilding could argue that a sum of a few or possibly several hundred million dollars per year in additional shipyard fixed overhead costs is significant in an absolute sense and that being good stewards of taxpayer dollars requires reducing Navy ship construction costs wherever possible, including the area of shipyard fixed overhead costs. Advocates of keeping a larger number of yards involved in Navy shipbuilding could argue that, as a percentage of the total cost of the ships being built, this sum is not very significant and is worth the benefits of keeping more yards involved.

Cost Associated With Split Learning Curves. Other things held equal, if keeping a higher number of shipyards involved in Navy shipbuilding results in producing a given class of ship at two yards rather than at one yard, the resulting "splitting of the learning curve" between the two yards might increase the cost of producing that class of ship by roughly 1% to 4%.[54] Navy officials, for example,

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[52] CRS Report 96-785 F, *Navy Major Shipbuilding Programs and Shipbuilders: Issues and Options for Congress*, op cit., p. 84.

[53] For a discussion, see CRS Report RL32418, *Navy Attack Submarine Force-Level Goal and Procurement Rate: Background and Issues for Congress*, by Ronald O'Rourke, pp. 48-50.

[54] The concept of the production learning curve refers to the reduction in labor hours needed to produce each item in a series as the workers at the facility learn (i.e., become more familiar with and experienced in building) the design. If an item is produced at two facilities rather than one, the workforce at each facility must travel down the learning curve, increasing average labor costs for the combined lot of items being built at both facilities. Given typical learning curves (i.e., rates of learning) for Navy ships and potential production runs ranging from a few ships to perhaps about 20 ships, splitting a learning curve for a class of Navy ships can increase shipyard labor costs for building the class by perhaps 3% to 13%. If shipyard labor costs account for roughly 20% to 40% of the total construction cost of a

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estimated that the 2002 agreement between the Navy, Northrop Grumman, and General Dynamics to consolidate production of the 12 planned LPD-17 amphibious ships at Northrop's Avondale and Ingalls shipyards rather than divide the class on two-for-one basis between the Northrop yards and GD/BIW, respectively, would reduce construction costs for the program by at least $437 million dollars.[55] This would equate to a savings of roughly 3% for a class of 12 LPD-17s costing an average of $1.2 billion each. Much of this savings was due to avoiding a split learning curve for the class. Keeping a higher number of yards involved in Navy shipbuilding, however, might not necessarily result in any instances of splitting the learning curve, in which case there would be no additional cost due to this factor.

As with the issue of shipyard fixed overhead costs, advocates of keeping a smaller number of yards involved in Navy shipbuilding could argue that the potential additional costs resulting from split learning curves are significant in an absolute sense, while advocates of keeping a larger number of yards involved in Navy shipbuilding could argue that even if this results in additional instances of split learning curves, the resulting additional costs would not be very significant as a percentage of the total cost of the ships being built and are worth the benefits of keeping more yards involved.

Cost of Government Supervision. Other things held equal, keeping a higher number of shipyards involved in Navy shipbuilding may result in higher costs to the Navy for supervising the work done at those yards. Additional personnel-related costs for supervising a larger number of sites might total millions of dollars a year.

Competition in Ship Design. Advocates of keeping a larger number of yards involved in Navy shipbuilding could argue that doing so would increase the likelihood of having two yards with recent experience in designing a given kind of ship, thus improving the government's ability to use competition in the design stage of ship acquisition programs to spur design innovation and achieve the best possible design. Recent experience in building a given category of ship, they could argue, could be particularly important in strengthening a yard's understanding of design producibility (i.e., designing a ship so that it can not only perform its missions well, but also be produced in the shipyard easily and at lower cost).

Advocates of keeping a smaller number of yards involved in Navy shipbuilding could argue that doing so could involve having individual yards building multiple types of ships, in which case the Navy might be no less likely to have at least two yards with recent experience in designing and building a given type of ship. Yards involved in building multiple types of ships, they could argue, might be better able

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[54] (...continued)
Navy ship, then this would equate to an increase in the total construction cost of the ship of 0.6% to 4.2%. For a discussion, see CRS Report 96-785 F, *Navy Major Shipbuilding Programs and Shipbuilders: Issues and Options for Congress*, op cit, pp. 95-101.

[55] Kerry Gildea, "Navy Evaluating Option For Building Added LPD-17 Earlier Than Planned," *Defense Daily*, April 4, 2003. The Navy earlier estimated that the savings would be at least $400 million. See David Rogers, "Pentagon's Revised Budget Nears Agreement In House And Senate," *Wall Street Journal*, October 9, 2002.

to transfer design innovations from one type of ship to another and take maximum advantage of the potential for exploiting commonality in systems and components across ship types so as to reduce cost.

Competition in (or Benchmarking of) Ship Construction. Competition in the awarding of contracts for building follow-on ships in Navy shipbuilding programs (i.e. the ships that follow the lead ship in each class) was a common feature in Navy shipbuilding programs in the 1980s but became less common in the 1990s and is rare today, primarily because of the decrease in Navy shipbuilding rates since the end of the Cold War. Some policymakers believe that competition in the awarding of contracts for building follow-on ships can be advantageous for the government in terms of constraining production costs, maintaining adherence to delivery schedules, and maintaining high production quality standards. Results in constraining costs can offset the additional costs (such as additional shipyard fixed overhead costs) of keeping a larger number of yards involved in building Navy ships.

Advocates of keeping a larger number of yards involved in Navy shipbuilding could argue that doing so increases the chances of having two yards with recent experience in building various kinds of Navy ships, thus preserving a potential for resuming effective competition in the awarding of contracts for building these ships, should shipbuilding rates in the future increase to levels that can support a resumption of competition. Even if procurement rates do not increase enough to support a resumption of competition, they could argue, keeping at least two yards involved in building a given kind of ship permits the government to use one yard's performance in that program to benchmark the performance of the other yard involved in that program. In August 2004, for example, the Navy criticized Newport News' performance in its portion of the Virginia-class submarine program, noting that cost growth on Electric Boat's portion of the program was much smaller.[56]

Advocates of keeping a smaller number of yards involved in Navy shipbuilding could argue that it is unlikely that shipbuilding rates will rise in coming years to levels that would permit the government to resume meaningful competition in the awarding of contracts to build follow-on ships, but that having a smaller number of yards that each build multiple kinds of ships could in any event preserve at least two yards with recent experience in building various kinds of ships, preserving a potential for resuming competition or for using one yard's performance on a program to benchmark another yard's performance. In instances where a certain kind of ship is being built by only one yard, they could argue, the performance of other yards in building other kinds of ships could still be used to indirectly benchmark the performance of the first yard using performance measures that are common to multiple types of Navy shipbuilding efforts.

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[56] See Christopher J. Castelli, "Virginia-Class Program Delivers Lead Sub, But Cost Concerns Lom," *Inside the Navy*, October 18, 2004; Christopher J. Castelli, "Young Suggests Changing Work Distribution For Submarine Program," *Inside the Navy*, October 4, 2004; Tony Capaccio, "General Dynamics, Northrop Review Of Sub Work Sought," *Bloomberg.com*, September 29, 2004; Bloomberg News. "Northrop's Submarine Work Draws Criticism From Navy," *Baltimore Sun*, September 16, 2004; Tony Capaccio, "Northrop Sub Work Has Cost Growth, Delays, Navy Says," *Bloomberg News*, September 15, 2004.

Labor Markets. Advocates of keeping a larger number of yards involved in Navy shipbuilding could argue that this would increase the number of local or regional labor markets from which shipyard workers could be recruited and trained, increasing the likelihood that yards could hire and train high-quality workers and making it potentially easier to rapidly increase the number of workers involved in Navy shipbuilding, should a sudden increase in required shipbuilding rates call for such an expansion.

Advocates of keeping a smaller number of yards involved in Navy shipbuilding could argue that a sufficient number of labor markets would still be involved to support the hiring and training of new workers, and that attracting new workers when needed will not be difficult because jobs building Navy ships are relatively well-paying manufacturing jobs that are highly sought after due to recent declines in the number of such jobs available in certain other sectors of the economy.

Potential Work Other Than Navy Shipbuilding. Building ships for the Navy is the primary business for most of the nine candidate yards. Other forms of work, however, contribute to the workloads and revenues of these yards and can thus become a consideration in discussions of which yards should be involved in Navy shipbuilding programs. These other forms of work traditionally have included repairing and modernizing Navy ships and building and repairing commercial ships.

An additional form of work that has not been available to a significant degree in past years, but which is currently available, is construction of new Coast Guard cutters under the Coast Guard's Deepwater program (a major program for replacing the Coast Guard's aging cutters and aircraft). Accelerating the procurement of these cutters from more distant years into the near term, and expanding the total number of cutters to be procured under the program, could provide a significant amount of support over the next several years to the Navy shipbuilding industrial base, particularly for the shipyards that have been involved in building surface combatants (Northrop Grumman/Ingalls and General Dynamics/BIW). As discussed in other CRS reports, accelerating and expanding procurement of cutters under the Deepwater program could reduce their unit procurement costs by improving production economies of scale, more quickly reduce operation and maintenance costs associated with keeping older Coast Guard cutters in service, and more quickly improve the Coast Guard's abilities to fully perform all of its post-9/11 missions.[57]

Factors Relating to Other Issues.

Geographic Base of Support for Navy Shipbuilding. Advocates of keeping a larger number of yards involved in Navy shipbuilding could argue that doing so increases the number of locations around the country where Navy ships are built, thus broadening the geographic base of support for Navy shipbuilding, which can be important when supporters of Navy shipbuilding compete against supporters of other

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[57] For a discussion, see CRS Report RL32109, *Navy DD(X) and LCS Ship Acquisition Programs: Oversight Issues and Options for Congress*, by Ronald O'Rourke. pp. 78-81. See also CRS Report RS21019, *Coast Guard Deepwater Program: Background and Issues for Congress*, by Ronald O'Rourke.

DOD procurement programs, such as aircraft programs, for scarce DOD procurement dollars.

Supporters of keeping a small number of yards involved in Navy shipbuilding could argue that doing so could reduce shipbuilding costs and thereby make Navy shipbuilding more cost-competitive against other areas of DOD procurement for scarce DOD procurement dollars. They could also argue that the firms that own most of these yards — General Dynamics and Northrop Grumman — will defend these programs adequately in the competition for DOD procurement dollars so long as the Navy ensures that the firms' rates of return on investment for Navy shipbuilding are comparable to their rates of return for their other lines of defense work.

Distribution of Economic Benefits of Navy Shipbuilding. Advocates of keeping a larger number of yards involved in Navy shipbuilding could argue that the economic benefits of Navy shipbuilding (particularly in terms of providing relatively well paying manufacturing jobs) should be distributed to as large a number of areas around the country as possible, since Navy shipbuilding is financed with money collected from taxpayers around the country. Supporters of keeping a smaller number of yards involved in Navy shipbuilding could argue that DOD procurement programs often benefit some areas of the country more than others, and that being good stewards of the taxpayers' money means building ships at the lowest possible cost, even if that means building them in a smaller number of locations.

Potential Oversight Questions. Potential oversight questions for Congress regarding the number of shipyards that should be regularly involved in Navy shipbuilding in coming years include the following:

- What are the positions of the Navy, DOD, and the Administration regarding the number of shipyards that should be regularly involved in Navy shipbuilding in coming years? What are the Navy's, DOD's, and the Administration's views regarding the relative advantages and disadvantages of keeping a larger or smaller number of yards involved?

- Are the Navy, DOD, and the Administration committed to keeping all six of the yards that have built the Navy's major ships in recent years involved in Navy shipbuilding?

- If so, what steps is the Administration prepared to take to ensure this result? What are the positions of the Navy, DOD, and the Administration regarding the possibility of accelerating and expanding the procurement of larger cutters under the Coast Guard Deepwater program as a means of providing additional work for the shipbuilding industrial base over the next several years?

- If the Navy, DOD, and the Administration are not committed to keeping all six of the yards that have built the Navy's major ships in recent years involved in Navy shipbuilding, which yard or yards

does the Administration believe are most likely to not remain involved in Navy shipbuilding?

- Is the current plan to build LCSs at yards other than six yards that have built the Navy's major ships in recent years motivated in part by a desire by the Navy, DOD, or the Administration to encourage one or more of the six yards that have built the Navy's major ships in recent years to withdraw from Navy shipbuilding?

Legislative Activity in 2004

FY2005 Defense Authorization Bill (H.R 4200/P.L. 108-375)

Section 1014 of the conference report (H.Rept. 108-767 of October 8, 2004) on H.R. 4200/P.L. 108-375 of October 28, 2004) states:

> SEC. 1014. INDEPENDENT STUDY TO ASSESS COST EFFECTIVENESS OF THE NAVY SHIP CONSTRUCTION PROGRAM.
>
> (a) STUDY. — The Secretary of Defense shall provide for a study of the cost effectiveness of the ship construction program of the Navy. The study shall be conducted by a group of industrial experts independent of the Department of Defense. The study shall examine both —
>
> (1) a variety of approaches by which the Navy ship construction program could be made more efficient in the near term; and
>
> (2) a variety of approaches by which, with a nationally integrated effort over the next decade, the United States shipbuilding industry might enhance its health and viability.
>
> (b) NEAR-TERM IMPROVEMENTS IN EFFICIENCY. — With respect to the examination under subsection (a)(1) of approaches by which the Navy ship construction program could be made more efficient in the near term, the Secretary shall provide for the persons conducting the study to —
>
> (1) determine the potential cost savings on an annual basis, with an estimate of return on investment, from implementation of each approach examined; and
>
> (2) establish priorities for potential implementation of the approaches examined.
>
> (c) UNITED STATES SHIPBUILDING INFRASTRUCTURE MODERNIZATION PLAN. — With respect to the examination under subsection (a)(2) of approaches by which the United States shipbuilding industry might enhance its health and viability through a nationally integrated effort over the next decade, the Secretary shall provide for the persons conducting the study to —
>
> (1) propose a plan incorporating a variety of approaches that would modernize the United States shipbuilding infrastructure within the next decade, resulting in a healthier and more viable shipbuilding industrial base;
>
> (2) establish priorities for potential implementation of the approaches examined; and
>
> (3) estimate the resources required to implement each of the approaches examined.

(d) REPORT. — Not later than October 1, 2005, the Secretary of Defense shall submit a report to the congressional defense committees providing the results of the study under subsection (a). The report shall include the matters specified in subsections (b) and (c).

In discussing this provision, the conference report stated:

The House bill contained a provision (sec. 1012) that would require the Secretary of Defense to have a study conducted by an entity independent of the Department of Defense on the cost-effectiveness of the ship construction program of the Navy. The study would examine various approaches for how the Navy ship construction program could be made more cost-effective in the near-term, and how the United States shipbuilding industry might be made globally competitive through a nationally integrated effort over the next decade.

The Senate amendment contained no similar provision.

The Senate recedes with an amendment that would require the Secretary of Defense to provide for a group of industrial experts to assess priorities for potential implementation of the various approaches in the near-term study, with an assessment of the return on investment. It would also require an assessment of priorities for potential implementation of the various approaches for the nationally, integrated effort, with the objective being to create a healthier and more viable U.S. shipbuilding industrial base.

The conferees believe the group chosen for this study should be five to ten industrial experts who represent an array of industrial sectors, not just the shipbuilding industry. Many sectors of the U.S. industrial base have had to retool processes and equipment to become more competitive. Since the rate of shipbuilding is much lower, competitiveness has not provided the same incentive for this sector. The conferees are aware of and support the work of the National Shipbuilding Research Program-Advanced Shipbuilding Enterprise (NSRP — ASE), including its lean shipbuilding initiative. The conferees would expect the group of industrial experts chosen for this study to become familiar with this work, and to consider the potential for using the NSRP — ASE to implement some of the various approaches. (Pages 755-756)

In its discussion of a proposed ballistic missile defense interceptor called the kinetic energy interceptor (KEI), which could be both ground- and sea-based, the conference report stated:

The conferees remain convinced that the KEI could be an important aspect of the overall ballistic missile defense architecture, potentially contributing intercept capabilities in boost, midcourse, and terminal phases of the threat missile flight. The conferees are concerned, however, with the lack of progress in defining basing modes. The conferees note that:

(1) Recent justifications for the KEI ground-based variant suggest that it might serve as the basis for midcourse intercept capability in Europe. At the same time, however, the budget request included $35.0 million for additional ground-based interceptors (GBI) for the ground-based midcourse defense element that could be deployed in Europe; and

(2) Consideration of sea-based concepts of operations and platforms do not appear to be progressing.

The conferees direct the Director of the Missile Defense Agency to provide a report to the congressional defense committees by February 1, 2005 that includes planned ground- and sea-basing modes for KEI (including specific sea-based platforms) and the concept of operations for each basing mode; how KEI will enhance ballistic missile defense system capabilities; the role KEI may play in European missile defense and how that role relates to the fielding of additional GBIs ground-based interceptors); and a comparison of anticipated sea-based KEI capabilities with other sea-based missile defense options. (Pages 579-580