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

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Summary

The Navy in February 2006 proposed to maintain in coming years a fleet of 313 ships, including, among other things, 11 aircraft carriers, 48 attack submarines (SSNs), 88 cruisers and destroyers, 55 Littoral Combat Ships (LCSs), 31 amphibious ships, and a Maritime Prepositioning Force (Future), or MPF(F), squadron with 12 new-construction amphibious and sealift-type ships. In conjunction with this proposed 313-ship fleet, the Navy submitted a 5-year (FY2007-FY2011) shipbuilding plan as part of the FY2007-FY2011 Future Years Defense Plan (FYDP), and a 30-year (FY2007-FY2036) shipbuilding plan that the Navy is required by law to submit each year.

Whether the Office of Secretary of Defense (OSD) supports the Navy's proposed 313-ship fleet is uncertain. The final report on the 2005 Quadrennial Defense Review supported a fleet of more than 281 ships, including 11 carriers, but did not explicitly endorse a 313-ship fleet including the numbers that the Navy has outlined for other types of ships.

Within the 313-ship proposal, some observers have questioned the Navy's planned figures for aircraft carriers, SSNs, and amphibious ships, and have suggested that a fleet with 12 carriers, 55 or more SSNs, and 35 or 36 amphibious ships would be more appropriate.

The Navy's 30-year shipbuilding plan does not include enough ships to fully support all elements of the 313-ship fleet consistently over the long run. Deficiencies in the shipbuilding plan relative to the 313-ship fleet include 1 amphibious ship, 4 cruise missile submarines (SSGNs), 12 SSNs, and (when calculated on a 35-year basis) 26 cruisers and destroyers.

The Navy says that for its shipbuilding plans to be affordable and executable, the Navy needs to control certain non-shipbuilding expenditures and build ships within estimated costs. Some observers have questioned the Navy's ability to do these things. The Congressional Budget Office estimates that shipbuilding costs will be about 34% higher than the Navy estimates. If the Navy cannot meet its goals regarding non-shipbuilding expenditures and shipbuilding costs, the Navy's shipbuilding plans may become difficult or impossible to execute, particularly after FY2011.

The Navy's shipbuilding plans raise potential issues regarding the shipbuilding industrial base, particularly in the areas of the submarine design and engineering base, and the surface combatant construction base.

The House Appropriations Committee, in its report (H.Rept. 109-504 of June 16, 2006) on H.R. 5631, expressed concern for the Navy's ability to execute its shipbuilding plans, particularly in light of recent cost growth in Navy shipbuilding programs. This report will be updated when events warrant.

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Introduction and Issue for Congress

The Navy in February 2006 proposed to maintain in coming years a fleet of 313 ships, including, among other things, 11 aircraft carriers, 48 attack submarines (SSNs), 88 cruisers and destroyers, 55 Littoral Combat Ships (LCSs), 31 amphibious ships, and a Maritime Prepositioning Force (Future), or MPF(F), squadron with 12 new-construction amphibious and sealift-type ships.[1] In conjunction with this proposed 313-ship fleet, the Navy submitted a 5-year (FY2007-FY2011) shipbuilding plan as part of the FY2007-FY2011 Future Years Defense Plan (FYDP), and a 30-year (FY2007-FY2036) shipbuilding plan that the Navy is required by law to submit each year.

The Navy's 313-ship proposal is intended to end a period of ambiguity and uncertainty in Navy ship force structure planning that began three years earlier, in February 2003, if not earlier. This ambiguity, together with year-to-year volatility in the composition of the Navy's shipbuilding plan, created difficulties for Congress in conducting oversight of Navy budgets and programs, and for industry in making rational business-planning decisions. Ambiguity in Navy force-structure planning may also have created difficulties for the Navy in defending its requirements in discussions with the Office of the Secretary of Defense (OSD). For details on this previous period of ambiguity, see **Appendix A**. Navy officials have stated that they hope to avoid substantial year-to-year changes in the composition of the associated five- or six-year Navy shipbuilding plan.

The issue for Congress is how to respond to the Navy's 313-ship proposal and associated shipbuilding plans. Decisions that Congress makes regarding Navy force structure and shipbuilding programs could significantly affect future U.S. military capabilities, Navy funding requirements, and the Navy shipbuilding industrial base.

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[1] U.S. Department of the Navy, *Report to Congress on Annual Long-Range Plan for Construction of Naval Vessels for FY2007*. Washington, 2006. 8 pp.

Background

Navy's Proposed 313-Ship Fleet

What types of ships are included in the 313-ship proposal, and how does this proposal compare to previous Navy ship force structure proposals?

Table 1 shows the composition of the Navy's 313-ship proposal and compares it to other recent Navy force structure proposals. The 313-ship proposal can be viewed as roughly consistent with other recent Navy ship force-structure proposals.

Independent Studies On Navy Force Structure

What independent studies are available concerning potential future Navy ship force structures?

Section 216 of the conference report (H.Rept. 108-354 of November 7, 2003) on the FY2004 defense authorization bill (H.R. 1588/P.L. 108-136 of November 24, 2003) required the Secretary of Defense to provide for two independently performed studies on potential future fleet platform architectures (i.e., potential force structure plans) for the Navy. The two studies, which were conducted by the Center for Naval Analyses (CNA) and the Office of Force Transformation (OFT, a part of the Office of the Secretary of Defense), were submitted to the congressional defense committees in February 2005.[2]

A third independent study on potential future fleet platform architectures, which was conducted by the Center for Strategic and Budgetary Assessments (CSBA) on its own initiative, was made available to congressional and other audiences in March 2005. **Appendix B** summarizes these three studies.

Navy Plans For A "Future Force Mix Analysis"

The Navy anticipates conducting a "future force mix analysis" that could result in a new Navy ship force structure plan to replace the 313-ship proposal. A May 2006 Navy planning document states that the

> Navy will continue to refine capability and capacity requirements in POM-08 [the Program Objective Memorandum for the FY2008 budget] by reviewing the force mix against emerging and evolving threats. [The] Navy will conduct an analytic review and analysis of potential alternative capacity and capability mixes that will support Joint Force requirements and enable stable shipbuilding and procurement accounts.[3]

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[2] Section 216 is an amended version of a provision (Section 217) in the House-reported version of H.R. 1588. See H.Rept. 108-354, pp. 28-29, 612-613 and H.Rept. 108-106, pp. 255-256.

[3] U.S. Department of the Navy, *Navy Strategic Plan In Support of Program Objective Memorandum 08*, May 2006, p. 11.

Table 1. Recent Navy Ship Force Structure Proposals

Ship type	Reported 2006 Navy proposal for 313-ship fleet	Early-2005 Navy proposal for fleet of 260-325 ships		2002-2004 Navy proposal for 375-ship Navy[a]	2001 QDR plan for 310-ship Navy
		260-ships	325-ships		
Ballistic missile submarines (SSBNs)	14	14	14	14	14
Cruise missile submarines (SSGNs)	4	4	4	4	2 or 4[b]
Attack submarines (SSNs)	48	37	41	55	55
Aircraft carriers	11	10	11	12	12
Cruisers, destroyers, frigates	88	67	92	104	116
Littoral Combat Ships (LCSs)	55	63	82	56	0
Amphibious ships	31	17	24	37	36
MPF(F) ships[c]	12[c]	14[c]	20[c]	0[c]	0[c]
Combat logistics (resupply) ships	30	24	26	42	34
Dedicated mine warfare ships	0	0	0	26[d]	16
Other[e]	20	10	11	25	25
Total battle force ships	**313**	**260**	**325**	**375**	**310 or 312**

Sources: 2001 QDR report, U.S. Navy data, and *Report to Congress on Annual Long-Range Plan for Construction of Naval Vessels for FY2007*.

a. Initial composition. Composition was subsequently modified.

b. 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.

c. 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, MPF(F) ships are counted here as battle force ships.

d. The figure of 26 dedicated mine warfare ships includes 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.

e. Includes, among other things, command ships and support ships.

Navy Shipbuilding Plans

What ships are proposed for procurement in the Navy's shipbuilding plans?

FY2007-FY2011 Shipbuilding Plan. **Table 2** shows the Navy's FY2007-FY2011 ship-procurement plan.

Table 2. Navy FY2007-FY2011 Ship-Procurement Plan

(Ships fully funded in FY2006 shown for reference)

	FY06	FY07	FY08	FY09	FY10	FY11	Total FY07-FY11
CVN-21			1				1
SSN-774	1	1	1	1	1	1	5
DDG-1000		2[a]	0[a]	1	1	1	5
CG(X)						1	1
LCS	3[b]	2	3	6	6	6	23
LPD-17	1		1				1
LHA(R)		1			1		2
TAKE	1	1	1				2
LHA(R)-MPF(F)						1	1
TAKE-MPF(F)				1	1	1	3
LMSR-MPF(F)					1	1	2
MLP-MPF(F)				1		1	2
JHSV				1	1	1	3
Total	6	7	7	11	12	14	51
Subtotal larger ships (i.e., ships other than LCSs)	3	5	4	5	6	8	28

Sources: Department of the Navy, *Highlights of the Department of the Navy FY 2007 Budget*, Chart 15 (p. 5-3), and *Draft Report to Congress on Annual Long-Range Plan for Construction of Naval Vessels for FY 2007*.

Key: **CVN-21** = CVN-21 class nuclear-powered aircraft carrier. **SSN-774** = Virginia (SSN-774) class nuclear-powered attack submarine. **DDG-1000** = DDG-1000 (formerly DD[X]) class destroyer. **CG(X)** = CG(X) class cruiser. **LCS** = Littoral Combat Ship. **LPD-17** = San Antonio (LPD-17) class amphibious ship. **LHA(R)** = LHA(R) class amphibious assault ship. **TAKE** =Lewis and Clark (TAKE-1) class resupply ship. **LHA(R)-MPF(F)** = Modified LHA(R) intended for MPF(F) squadron. **TAKE-MPF(F)** = Modified TAKE intended for MPF(F) squadron. **LMSR-MPF(F)** = Modified large, medium-speed, roll-on/roll-off (LMSR) sealift ship intended for MPF(F) squadron. **MLP-MPF(F)** = Mobile Landing Platform ship intended for MPF(F) squadron. **JHSV** = Joint High-Speed Vessel for use as an intratheater connector (i.e., transport) ship.

a. Each of the two DDG-1000s to be procured in FY2007 is to be split-funded (i.e., incrementally funded) across FY2007 and FY2008.

b. Includes one LCS funded through the Navy's research and development account and two LCSs funded through the Shipbuilding and Procurement, Navy (SCN) account.

30-Year (FY2007-FY2036) Shipbuilding Plan. **Table 3** below shows the Navy's 30-year (FY2007-FY2036) ship-procurement plan.

Table 3. Navy 30-Year (FY2007-FY2036) Shipbuilding Plan

(including FY2007-FY2011 FYDP)

FY	Ship type (see key below)											
	CVN	SC	LCS	SSN	SSGN	SSBN	EWS	CLF	MIW	MPF(F)	Supt	TOTAL
07		2*	2	1			1	1				**7**
08	1	0*	3	1			1	1				**7**
09		1	6	1						2	1	**11**
10		1	6	1			1			2	1	**12**
11		2	6	1						4	1	**14**
12	1	1	6	2						2	1	**13**
13		2	5	2						1	2	**12**
14		1	6	2							2	**11**
15		2	6	2							1	**11**
16	1	1	5	2							1	**10**
17		2		2								**4**
18		2		2			1	1				**6**
19		2		2								**4**
20		2		2				1				**5**
21	1	2		2			1	2			1	**9**
22		2		2		1	1	2			2	**10**
23		2		2		1	1	2			3	**11**
24		2		2		1	2	2			2	**11**
25	1	2		2		1	1	3				**10**
26		2		2		1	1	3			1	**10**
27		2		2		1	2	2			1	**10**
28		2		2		1	2	1				**8**
29	1	2		1		1	1				1	**7**
30		2	1	2		1	2				2	**10**
31		2	3	1		1	1					**8**
32		2	2	2		1	1					**8**
33		2	3	1		1	1					**8**
34	1	2	6	2		1						**12**
35		2	6	1		1						**10**
36		2	6	2			1					**11**

Source: *Report to Congress on Annual Long-Range Plan for Construction of Naval Vessels for FY 2007*.

***** Two ships, each to be split-funded (i.e., incrementally funded) across FY2007 and FY2008.

Key: **FY** = Fiscal Year; **CVN** = aircraft carriers; **SC** = surface combatants (i.e., cruisers and destroyers); **LCS** = Littoral Combat Ships; **SSN** = attack submarines; **SSGN** = cruise missile submarines; **SSBN** = ballistic missile submarines; **EWS** = expeditionary warfare (i.e., amphibious) ships; **CLF** = combat logistics force (i.e., resupply) ships; **MIW** = mine warfare ships; **MPF(F)** = Maritime Prepositioning Force (Future) ships; **Supt** = support ships.

Oversight Issues for Congress

OSD Support For 313-Ship Proposal

Does the Office of the Secretary of Defense (OSD) support the 313-ship proposal? If not, where would that leave Navy ship force-structure planning?

When asked about the Navy's 313-ship proposal in December 2005, Secretary of Defense Donald Rumsfeld reportedly replied that it is Navy capabilities, not numbers of ships, that count.[4] When asked about the Navy's 313-ship proposal at a January 25, 2006, press conference, Secretary Rumsfeld declined to explicitly endorse the plan.[5]

The final report on DOD's 2005 Quadrennial Defense Review (QDR), released on February 3, 2006, states that DOD will "Build a larger fleet that includes 11 Carrier Strike Groups...."[6] The Navy as of early-February 2006 included 281 ships. The report specifically mentions force-structure goals for several parts of DOD,[7] but does not mention the Navy's 313-ship proposal or force-level goals for any ships other than aircraft carriers.[8]

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[4] Dave Ahearn, "Rumsfeld On Increasing Fleet Size: Capabilities, Not Numbers, Count," *Defense Today*, December 16, 2005.

[5] DOD transcript of press conference.

[6] U.S. Department of Defense. *Quadrennial Defense Review Report*. Washington, 2006. (February 6, 2006) p. 48.

[7] The report mentions specific force-structure goals for Army brigades (page 43), Army end strength (page 43), Marine Corps end strength (page 43), special force battalions (page 44; these are to be increased by one-third); psychological operations and civil affairs units (page45; these are to be increased by 3,500 personnel); the Air Force B-52 bomber force (page 46); Air Force combat wings (page 47); Air Force Minuteman III ballistic missiles (page 50); and Air Force inter-theater airlift aircraft (page 54).

[8] The report also states that based on a series of analyses, DOD

> concluded that the size of today's forces — both the Active and Reserve Components across all four Military Departments — is appropriate to meet current and projected operational demands. At the same time, these analyses highlighted the need to continue re-balancing the mix of joint capabilities and forces.
>
> (*Quadrennial Defense Review Report*, op cit, p. 41.)

Regarding the reference to "today's forces," the Navy, as mentioned earlier, included a total of 281 ships as of early-February 2006.

The QDR report also states that

> policy decisions, such as mobilization policies and war aims, may change over time and have implications for the shape and size of U.S. forces. Finally, as part

(continued...)

Secretary Rumsfeld's reported response in December 2005, his statements at the January 25, 2006, press conference, and the final report on the QDR together suggest that OSD supports a Navy with 11 carrier strike groups and more than the early-February 2006 total of 281 ships, but not necessarily the Navy's proposed 313-ship fleet, including the Navy's proposed subtotals for ship types other than aircraft carriers.

Appropriateness Of 313-Ship Proposal

Does the 313-ship proposal include appropriate numbers of ships?

Number of Aircraft Carriers. Some observers have questioned whether the Navy's proposed total of 11 aircraft carriers will be sufficient, particularly in light of past Navy plans that have called for 12 carriers. These observers have argued that if the carrier force is reduced in the near term to 11 ships through the proposed retirement of the carrier John F. Kennedy (CV-67), then it will fall further, to 10 ships, during the two-year period 2013-2014. Even if an 11-carrier force is adequate, they argue, a 10-carrier force might not be, even if only for a two-year period. These observers also note that the Navy plans to increase the carrier force back to 12 ships in 2019 and maintain it at that level thereafter. This, they argue, suggests that the Navy would actually prefer to have 12 carriers in coming years, rather than 11. The issue is discussed in more detail in another CRS report.[9]

Number of Attack Submarines. Some observers have questioned whether the Navy's proposed total of 48 attack submarines will be sufficient, and have suggested that a total of 55 or more would be more appropriate, particularly in light of requests for forward-deployed attack submarines from U.S. regional military commanders, and the modernization of China's naval forces, including its submarines. The issue is discussed in more detail in another CRS report.[10]

Number of Amphibious Ships. Some observers have questioned whether the Navy's proposed total of 31 amphibious ships will be sufficient, and have suggested that a total of 35 or 36 would be more appropriate, since a total of 35 would be better able to meet the Marine Corps' requirement for having 30 operationally available amphibious ships (i.e., ships not in overhaul) at any one time,

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[8] (...continued)

> of a process of continuous reassessment and improvement, this wartime construct will be further developed over time to differentiate among the Military Departments as to how they should best size and shape their unique force structures, for use by the Combatant Commanders, since all parts of the construct do not apply equally to all capability portfolios.
>
> (*Quadrennial Defense Review Report,* op cit, pp. 38-39.)

[9] CRS Report RL32731, *Navy Aircraft Carriers: Proposed Retirement of USS John F. Kennedy — Issues and Options for Congress*, by Ronald O'Rourke.

[10] CRS Report RL32418, *Navy Attack Submarine Force-Level Goal and Procurement Rate: Background and Issues for Congress*, by Ronald O'Rourke. See also CRS Report RL33153, *China Naval Modernization: Implications for U.S. Navy Capabilities — Background and Issues for Congress*, by Ronald O'Rourke.

and since the Marine Corps has testified in recent years that a force of 36 ships would be needed for the amphibious force to fully meet a fiscally constrained goal of being able to lift the assault echelons of 2.5 Marine Expeditionary Brigades (MEBs). The issue is discussed in more detail in another CRS report.[11]

Total Number of Ships.

Historical Fleet Size and Previous Force Plans. One possible method for assessing the appropriateness of the total number of ships being proposed by the Navy is to compare that number to historical figures for total fleet size. Historical figures for total fleet size, however, might not be a reliable yardstick for assessing the appropriateness of the Navy's proposed 313-ship fleet, 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.

The Navy, for example, reached a late-Cold War peak of 568 battle force ships at the end of FY1987,[12] and as of May 22, 2005 had declined to a total of 282 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 February 2006 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 February 2006 fleet in areas such as profusion of precision-guided air-delivered weapons, numbers of Tomahawk-capable ships, and sophistication of C4ISR systems.[13]

In coming years, Navy missions may shift again, to include, as a possible example, a greater emphasis on being able to counter improved Chinese maritime

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[11] CRS Report RL32513, *Navy-Marine Corps Amphibious and Maritime Prepositioning Ship Programs: Background and Oversight Issues for Congress*, by Ronald O'Rourke.

[12] Some publications, such as those of the American Shipbuilding Association, have stated 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. The battle force ships figure is the number used in government discussions of the size of the Navy. 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. 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.

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

military capabilities.[14] 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 281-ship fleet of February 2006 may or nor may not be capable of performing its stated missions; and a fleet 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 Navy force structure plans, such as those shown in **Table 1**, might provide some insight into the potential adequacy of a proposed new force-structure plan, but changes over time in mission requirements, 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, particularly if those past force structure plans are more than a few years old. The Reagan-era plan for a 600-ship Navy, for example, 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.[15]

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[14] For a discussion, see CRS Report RL33153, *China Naval Modernization: Implications for U.S. Navy Capabilities — Background and Issues for Congress*, by Ronald O'Rourke.

[15] Navy force structure plans that predate those shown in **Table 1** 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), and the 310-ship fleet of the Clinton Administration's 1997 QDR. The table below summarizes some key features of these plans.

(continued...)

Current Force-Planning Issues. Current force-planning issues that Congress may consider in assessing the appropriateness of the Navy's 313-ship proposal include the following:

- naval requirements for the global war on terrorism (GWOT) and for irregular conflicts such as insurgencies;
- naval requirements for countering improved 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.

Each of these is discussed briefly below.

Global War on Terrorism and Irregular Warfare. The potential effects of the GWOT 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 has received somewhat less attention. In terms of ships, possible effects on requirements for U.S. naval forces include an increased emphasis on one or more of the following:

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[15] (...continued)

Features of Recent Navy Force Structure Plans

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

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 two or four additional converted Trident cruise missile submarines (SSGNs) for the 2001 QDR plan and four additional SSGNs for the 375-ship proposal.
f. Plus one additional aircraft carrier in the service life extension program (SLEP).
g. Eleven active carriers plus one operational reserve carrier.
h. Plan originally included 242 surface combatants but this was later reduced to 228.
i. Number needed to lift assault echelons of one Marine Expeditionary Force (MEF) plus one Marine Expeditionary Brigade (MEB).
j. 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.

- 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, particularly smaller ones like the LCS) and smaller surface craft for conducting coastal patrol and intercept operations, including countering small boats and craft and countering pirate-like operations;[16]

- ships (such as attack submarines) for covertly inserting and recovering Navy special operations forces, known as SEALs;[17]

- 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.

Although the primary stated missions of the LCS relate to defeating littoral anti-access forces of opposing countries rather than to countering terrorists, some observers view the inclusion of 55 LCSs in the Navy's proposed 313-ship fleet as evidence that the proposal is aimed in part at meeting operational demands associated with the Navy's role in the GWOT. Supporters of the Navy's planned MPF(F) squadron argue that this squadron could be valuable in sea-based counter-terrorist operations. In addition, the Navy in recent months has taken some actions that reflect a stated specific interest in increasing the Navy's role in the GWOT. Among these are the establishment of a Navy riverine force that is to consist of three squadrons of 12 boats each, and a total of about 700 personnel. These boats, as small craft, are not included in the Navy's proposed total of 313 ships.[18]

Chinese Maritime Military Forces. China's naval modernization has potential implications for required U.S. Navy capabilities in terms of preparing for a conflict in the Taiwan Strait area, maintaining U.S. Navy presence and military influence in the Western Pacific, and countering Chinese ballistic missile submarines. Preparing for a conflict in the Taiwan Strait area could place a premium on the following: on-station or early-arriving Navy forces, capabilities for defeating China's maritime anti-access forces, and capabilities for operating in an environment that could be characterized by information warfare and possibly electromagnetic pulse (EMP) and the use of nuclear weapons.

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

[17] SEAL stands for Sea, Air, and Land.

[18] For further discussion of the Navy's role in the GWOT, see CRS Report RS22373, *Navy Role in Global War on Terrorism (GWOT) — Background and Issues for Congress*, by Ronald O'Rourke.

China's naval modernization raises potential issues concerning the size of the Navy; the Pacific Fleet's share of the Navy; forward homeporting of Navy ships in the Western Pacific; the number of aircraft carriers, submarines, and ASW-capable platforms; Navy missile defense, air-warfare, anti-air warfare (AAW), antisubmarine warfare (ASW), and mine warfare programs; Navy computer network security; and EMP hardening of Navy systems. Aircraft carriers, cruisers and destroyers, and attack submarines are viewed by some observers as ships that might be particularly appropriate for countering improved Chinese maritime military forces.[19]

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; electromagnetic rail guns; directed-energy weapons (such as lasers); and integrated electric-drive propulsion technology, to name just a few. Historically, 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. However, 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. The Navy is considering transferring an aircraft carrier from the continental United States to either Hawaii or Guam and increasing the number of attack submarines homeported at Hawaii or Guam. The Navy has also experimented with the concept of deploying a Navy ship for an extended period of time (e.g., 12, 18, or 24 months, rather than the traditional deployment period of 6 months) and rotating successive crews out the ship every 6 months — a concept the Navy calls 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. For some types of ships, additional forward homeporting and use of Sea Swap might reduce the number of ships 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.[20]

Jointness. DOD's increased emphasis on achieving increased jointness (i.e., coordination and integration of the military services) in U.S. military plans and

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[19] For further discussion, see CRS Report RL33153, *China Naval Modernization: Implications for U.S. Navy Capabilities — Background and Issues for Congress*, by Ronald O'Rourke.

[20] For additional discussion of Sea Swap, see CRS Report RS21338, *Navy Ship Deployments: New Approaches — Background and Issues for Congress*, by Ronald O'Rourke.

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.

Adequacy Of Shipbuilding Plans For Maintaining 313 Ships

Do the Navy's shipbuilding plans adequately support the 313-ship proposal?

Navy Projection Of Future Force Levels. **Table 4** shows the Navy's projection of future force levels that would result from implementing the Navy's 30-year shipbuilding plan.

Total Number And Mix Of Ships. As can be seen in **Table 4**, the Navy projects that the fleet would increase to 315 ships in FY2012, peak at 330 ships in FY2017-FY2018, and then decline to less than 313 ships in FY2026 and subsequent years, reaching a minimum of 293 ships in FY2034.

The FY2012 fleet of 315 ships would not match the mix of ships called for in the Navy's 313-ship proposal. For example, the fleet in FY2012 would include 21 LCSs rather than 55, and 2 new-construction MPF(F) ships rather than 12. The fleet would draw closer to the mix in the 313-ship proposal in subsequent years, as the LCS, MPF(F), and other shipbuilding programs continued, and as older ships currently in the force retired from service.

Numbers Of Selected Ship Types.

Summary. Insufficiencies in the Navy's 30-year shipbuilding plan relative to force-level goals for specific ship types in the proposed 313-ship fleet include one LPD-17, four SSGNs, eight SSNs, 26 cruisers and destroyers (when calculated on a 35-year basis), and the timing of some of the replacement SSBNs. Below are discussions by individual ship type.

Aircraft Carriers. As mentioned earlier, the Navy projects that the carrier force will drop to 10 ships in FY2013-FY2014 due to a gap between the retirement of the Enterprise (CVN-65) and the commissioning of CVN-78 (the first of the planned CVN-21 class carriers). The Navy projects that it will maintain a force of 12 carriers starting in FY2019, when CVN-79 is commissioned. The Navy could

keep the carrier force at 11 ships in FY2019 and subsequent years by accelerating the retirement of an existing carrier.

Table 4. Navy Projection Of Future Force Levels

(resulting from implementation of 30-year shipbuilding plan shown in Table 3)

FY	Ship type (see key below)											
	CVN	SC	LCS	SSN	SSGN	SSBN	EWS	CLF	MIW	MPF(F)	Supt	TOTAL
07	11	105	1	52	4	14	34	32	14	0	18	**285**
08	11	108	4	53	4	14	33	35	14	0	18	**294**
09	11	110	6	54	4	14	33	35	14	0	18	**299**
10	11	112	9	53	4	14	33	33	14	0	18	**301**
11	11	113	15	53	4	14	33	30	14	0	19	**306**
12	11	112	21	54	4	14	33	30	14	2	20	**315**
13	10	106	27	55	4	14	32	30	14	4	21	**317**
14	10	99	33	53	4	14	32	30	14	7	19	**315**
15	11	93	38	52	4	14	31	30	14	10	17	**314**
16	11	91	44	50	4	14	31	30	14	11	17	**317**
17	11	92	50	50	4	14	31	30	13	11	18	**324**
18	11	93	55	48	4	14	31	30	12	12	20	**330**
19	12	93	55	48	4	14	31	30	10	12	21	**330**
20	12	94	55	47	4	14	30	30	8	12	21	**327**
21	12	95	55	47	4	14	30	30	6	12	21	**326**
22	12	93	55	47	4	14	30	30	5	12	21	**323**
23	12	93	55	46	4	14	30	30	2	12	22	**320**
24	12	93	55	45	4	14	30	30	1	12	23	**319**
25	12	92	55	44	4	14	30	30	0	12	21	**314**
26	12	89	55	43	4	14	30	30	0	12	22	**311**
27	12	88	55	42	2	14	30	30	0	12	22	**307**
28	12	87	55	40	1	14	30	30	0	12	22	**303**
29	12	85	55	40	0	13	30	30	0	12	22	**299**
30	12	82	55	41	0	12	30	30	0	12	22	**296**
31	12	79	55	42	0	11	30	30	0	12	21	**292**
32	12	77	55	44	0	12	30	30	0	12	22	**294**
33	12	75	55	46	0	13	30	30	0	12	21	**294**
34	12	73	55	48	0	12	30	30	0	12	21	**293**
35	12	73	55	49	0	12	30	30	0	12	21	**294**
36	12	73	55	51	0	12	30	30	0	12	21	**296**

Source: *Report to Congress on Annual Long-Range Plan for Construction of Naval Vessels for FY 2007*.

Key: **FY** = Fiscal Year; **CVN** = aircraft carriers; **SC** = surface combatants (i.e., cruisers and destroyers); **LCS** = Littoral Combat Ships; **SSN** = attack submarines; **SSGN** = cruise missile submarines; **SSBN** = ballistic missile submarines; **EWS** = expeditionary warfare (i.e., amphibious) ships; **CLF** = combat logistics force (i.e., resupply) ships; **MIW** = mine warfare ships; **MPF(F)** = Maritime Prepositioning Force (Future) ships; **Supt** = support ships.

Ballistic Missile Submarines (SSBNs). The 313-ship plan calls for a total of 14 SSBNs, and the 30-year shipbuilding plan includes a total of 14 replacement

SSBNs procured at a rate of one per year during the period FY2022-FY2035. The 14 replacement ships, however, are not procured on a schedule that would permit a timely one-for-one replacement for some of the 14 existing SSBNs. As a result, the Navy projects that the SSBN force will drop to 12 ships in the 2030s, with a dip to 11 during the year 2031. The force would build back up to 14 ships as the final replacement SSBNs enter service around 2040. Accelerating the procurement of some of the SSBNs to earlier years would permit the SSBN force to remain at a steady level of 14 ships while existing ships were replaced by new ones.

Converted Trident Submarines (SSGNs). Although the 313-ship plan calls for a total of four SSGNs, the 30-year shipbuilding plan includes no replacements for the four current SSGNs, which the Navy projects will reach retirement age and leave service in FY2027-FY2029.

Attack Submarines (SSNs). Although the 313-ship plan calls for a total of 48 SSNs, the 30-year shipbuilding plan does not include enough SSNs to maintain a force of 48 boats consistently over the long run. The Navy projects that the SSN force will drop below 48 boats in 2020, reach a minimum of 40 boats (17% less than the required figure of 48) in 2028 and 2029, and remain below 48 boats through 2033. Maintaining a force of 48 boats consistently over the long run would require adding eight SSNs into the 30-year shipbuilding plan by FY2022.

Cruisers And Destroyers. Although the 313-ship plan calls for a total of 88 cruisers and destroyers, the 30-year shipbuilding plan does not include enough cruisers and destroyers to maintain a force of 88 ships consistently over the long run. CRS projects that the cruiser-destroyer force will drop below 88 ships in 2027, reach a minimum of 62 ships (30% less than the required figure of 88) in 2044-2046, and increase to a long-term plateau of 70 ships (20% less than 88) in the 2050s. The shortfall in cruisers and destroyers will account for much of the shortfall in the overall size of the fleet, relative to the goal of 313 ships, in the 2030s and beyond. To maintain a force of 88 cruisers and destroyers over the long run could require adding 26 cruisers and destroyers to the long-term shipbuilding plan by FY2039.

Amphibious Ships. Although the 313-ship plan calls for a total of 10 LPD-17s, the FY2007-FY2011 shipbuilding plan ends procurement of LPD-17s after the procurement of a ninth ship in FY2008. Although the 313-ship plan calls for a total of 31 amphibious ships, the Navy projects that the force will drop to 30 ships in 2020.

Affordability And Executibility of Shipbuilding Plans

Are the Navy's shipbuilding plans affordable and executable?

The Navy says that for its shipbuilding plans to be affordable and executable, four things need to happen:

- Navy Operation and Maintenance (O&M) spending needs to remain flat in real terms (i.e., not grow in inflation-adjusted terms);

- Navy Military Personnel (MilPer) spending needs to remain flat in real terms;

- Navy research and development (R&D) spending needs to decrease from current levels and remain at the decreased level over the long run; and

- Navy ships need to be built at the Navy's currently estimated prices.

The Navy says the first three things are needed for the Navy to be able to increase the shipbuilding budget from an average in recent years of about $10.5 billion per year in constant FY2007 dollars to a long-term average of about $14.4 billion per year in constant FY2007 dollars — an increase of about 37% in real terms.[21]

Some observers have questioned whether all four of the above things will happen, arguing the following:

- DOD in the past has not been fully successful in meeting its goals for controlling O&M costs.

- The Navy does not have full control over its MilPer costs — they can be affected, for example, by decisions that Congress makes on pay and benefits.

- While Navy may be able to decrease R&D spending in coming years as a number of new systems shift from development to procurement, it may be difficult for the Navy to keep R&D spending at that reduced level over the long run, because the Navy at some point will likely want to start development of other new systems.

- Several Navy shipbuilding programs have experienced significant cost growth in recent years, and CBO estimates that Navy ships will cost substantially more to build than the Navy estimates.

Regarding the last point, CBO estimates, as shown in **Table 5**, that the Navy's shipbuilding plan could cost an average of about $19.5 billion per year in constant FY2007 dollars to execute — about 35% more than the Navy estimates. If aircraft carrier refueling overhauls are also included in the calculation, CBO's estimated cost ($20.6 billion per year in constant FY2007 dollars) is about 33% higher than the Navy's estimate ($15.5 billion in constant FY2007 dollars). The table also shows that if the 30-year shipbuilding plan is augmented to include the extra ships needed to fully support all elements of the 313-ship plan over the long run (see discussion

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[21] Source: CBO telephone conversation with CRS, May 31, 2006. See also Statement of J. Michael Gilmore, Assistant Director, and Eric J. Labs, Principal Analyst, [On] Potential Costs of the Navy's 2006 Shipbuilding Plan, [Testimony] before the Subcommittee on Projection Forces Committee on Armed Services U.S. House of Representatives, March 30, 2006.

in previous section), CBO estimates the average annual cost at $21.9 billion per year excluding carrier refueling overhauls, and $22.9 billion per year including carrier refueling overhauls, both figures in constant FY2007 dollars.

Table 5. Average Annual Shipbuilding Costs
(Billions of constant FY2007 dollars per year)

	New-construction ships only	New-construction ships + carrier refueling overhauls
Navy shipbuilding budget in recent years	10.5	11.7
Navy estimate of cost of 30-year plan	14.4	15.5
CBO estimate of cost of 30-year plan	19.5	20.6
CBO estimate of cost of 30-year plan plus additional ships needed to fully support all elements of 313-ship fleet consistently over the long run	21.7	22.9

Source: CBO telephone conversation with CRS, May 31, 2006. See also Statement of J. Michael Gilmore, Assistant Director, and Eric J. Labs, Principal Analyst, [On] Potential Costs of the Navy's 2006 Shipbuilding Plan, [Testimony] before the Subcommittee on Projection Forces Committee on Armed Services U.S. House of Representatives, March 30, 2006.

If one or more of the four required things listed above does not happen, it might become difficult or impossible to execute the Navy's shipbuilding plans. The risk of the plan becoming unexecutable may become particularly acute after FY2011, when the Navy plans to increase annual procurement from 1 destroyer and 1 submarine per year to more than 1 cruiser and destroyer and 2 submarines per year.

Adequacy Of Shipbuilding Plans For Industrial Base

Do the Navy's shipbuilding plans adequately support the shipbuilding industrial base?

Total Number of Ships Per Year. As shown in **Table 3**, under the Navy's 30-year shipbuilding plan, procurement would increase to 10 to 14 ships per year in FY2009-FY2016, decrease to 4 to 6 ships per year in FY2017-FY2020, and then increase again to 10 or 11 ships per year starting in FY2022. This pattern could put the shipbuilding industry through a production roller coaster that could reduce shipbuilding efficiencies and, other things held equal, increase shipbuilding costs.

Larger Ships. Although the total number of ships to be procured under the Navy's FY2007-FY2011 shipbuilding plan increases from 7 ships per year in FY2007 and FY2008 to 11 ships in FY2009, 12 ships in FY2010, and 14 ships in FY2011, much of this increase is due the planned increase in the number of LCSs procured each year. When the LCSs are set aside, the total number of larger ships to be procured grows from five in FY2007 to eight in FY2011.

As shown in **Table 2**, the Navy's FY2007-FY2011 plan includes a total of 28 larger ships (i.e., ships other than LCSs), or an average of about 5.6 larger ships per year. This average rate, if implemented, would be similar to rate of procurement that

has been maintained for larger ships since the early 1990s (see **Appendix C**). Consequently, for the six yards that build the Navy's larger ships, the Navy's FY2007-FY2011 shipbuilding plan would, if implemented, result in a continuation, more or less, of the relatively low workloads and employment levels these yards have experienced in recent years.

Aircraft Carriers. The Navy's 30-year shipbuilding plan calls for procuring one carrier every four of five years, starting with CVN-78 in FY2008. In terms of the shipyard's ability to efficiently shift production from one carrier to the next, a four-year interval might be preferable than a five-year interval (and a three-year interval might be even more preferable). None of the intervals in the Navy's 30-year plan are as long as the planned seven-year interval between CVN-77 (procured in FY2001) and CVN-78 (to be procured in FY2008).

Submarines.

Submarine Construction. For the two submarine shipbuilders — General Dynamics' Electric Boat Division (GD/EB) and Northrop Grumman Newport News (NGNN) — the Navy's plan to continue procuring one Virginia-class SSN per year through FY2011 would maintain Virginia-class submarine construction work at levels about the same as those in recent years.

The Navy is planning to increase the SSN procurement rate from the current one ship per year to two ships per year starting in FY2012. The submarine industrial base could execute an increase to two ships per year by an earlier date, although the construction times for the additional boat or boats procured might be somewhat longer than usual. The Navy has expressed misgivings about accelerating the start of two per year prior to FY2012, in large part because the additional funding that would be required in the years in question could force reductions in other Navy programs in those years.

Submarine Design And Engineering. Navy and industry officials are concerned about the future of the submarine design and engineering base, which currently faces the prospect, for the first time in about 50 years, of not having a new submarine design project on which to work. Since many of the design and engineering skills needed for submarines are not exercised fully, or at all, through the design of surface ships, attempting to maintain the submarine design and engineering base by giving it surface-ship design work is viewed by Navy and industry officials as a risky approach. This view has been reinforced by the recent experience of the United Kingdom, which attempted unsuccessfully to maintain its submarine design and engineering base by giving it surface-ship design work. The UK later experienced substantial difficulties in its subsequent Astute-class SSN design and engineering effort. These difficulties were substantial enough that employees from GD/EB's design and engineering staff were used to help overcome problems in the Astute-class effort.

Options for additional work for the submarine design and engineering base over the next few years include the following:

- **Expanded Virginia-class modification effort.** The Navy is currently funding certain work to modify the Virginia-class design, in part to reach the Navy's Virginia-class cost-reduction target. The scope of this effort could be expanded to include a greater number and variety of modifications. An expanded modification effort would add to the amount of submarine design and engineering work currently programmed, but by itself might not be sufficient in terms of volume of work or number of skills areas engaged to fully preserve the submarine design and engineering base.

- **New Advanced SEAL Delivery System (ASDS).** The ASDS is a mini-submarine that is attached to the back of an SSGN or SSN to support operations by Navy special operations forces (SOF), who are called SEALs, an acronym that stands for Sea, Air, and Land. DOD has decided, after building one copy of the current ASDS design, not to put that design into serial production. Some observers have proposed developing a new ASDS design with the intention of putting this new design into serial production. This option, like the previous one, would add to the amount of submarine design and engineering work currently programmed, but by itself might not be sufficient in terms of volume of work or number of skills areas engaged to fully preserve the submarine design and engineering base.

- **Diesel-electric submarine for Taiwan.** In April 2001, the Bush Administration announced a proposed arms-sales package for Taiwan that included, among other things, eight diesel-electric submarines.[22] Since foreign countries that build diesel-electric submarines appear reluctant to make their designs available for a program to build such boats for Taiwan, some observers have proposed that the United States develop its own design for this purpose. This option would generate a substantial volume of work and engage many skill areas. Uncertainty over whether and when this project might occur could make it difficult to confidently incorporate it into an integrated schedule of work for preserving the U.S. design and engineering base. Although the project would engage many skill areas, it might not engage all of them. Skills related to the design of nuclear propulsion plants, for example, might not be engaged. This project might raise concerns regarding the potential for unintended transfer of sensitive U.S. submarine technology — an issue that has been cited by the Navy in the past for not supporting the idea of designing and building diesel-electric submarines in the United States for sale to foreign buyers.[23]

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[22] For more on the proposed arms sales package, including the diesel-electric submarines, see CRS Report RL30957, *Taiwan: Major U.S. Arms Sales Since 1990*, by Shirley A. Kan.

[23] An additional issue that some observers believe might be behind Navy resistance to the idea of designing and building diesel-electric submarines in the United States for sale to (continued...)

- **New SSN design**. Developing a completely new SSN design as the successor to the Virginia-class design would fully support the design and engineering base for several years. The Navy estimates that the cost of this option would be roughly equivalent to the procurement cost of three SSNs. The House version of the FY2006 defense authorization bill (H.R. 1815) proposed this idea, but the idea was not supported by the Navy, in large part because of its cost, and the conference version of the bill did not mandate it.

- **Accelerated start of next SSBN design.** Given the ages of the Navy's 14 current SSBNs, work on a replacement SSBN design would normally not need to start until FY2012-FY2014. The start of this project, however, could be accelerated to FY2007. The project would then be carried out as a steady-state effort over several years, rather than as a more-concentrated effort starting in FY2012-FY2014. This option could provide a significant amount of submarine design and engineering work for several years, and could engage all submarine design and engineering skills. The total cost of this effort would be comparable to that of the previous option of designing a new SSN, but this option would accelerate a cost that the Navy already plans to incur, whereas the option for designing a new SSN would be an additional cost.

The Navy has stated that it is aware of the need to devise a strategy to preserve the submarine design and engineering base, and that it has asked the RAND Corporation to study the issue and report back to the Navy later this year. Some supporters of the submarine design and engineering base are concerned that elements of the design and engineering base might atrophy below critical minimum levels during the time that the Navy is waiting to learn the results of the RAND study.

Cruisers and Destroyers. The 30-year shipbuilding plan calls for procuring an average of about 1.5 DDG-1000s/CG(X)s over the next 17 years. The light-ship displacement of the DDG-1000 (about 12,435 tons) is about 79% greater than that of the DDG-51 Flight IIA design (about 6,950 tons). If shipyard construction work for these two ship classes is roughly proportional to their light-ship displacements, and if the CG(X) is about the same size as the DDG-1000, then procuring an average of 1.5 DDG-1000s/CG(X)s per year might provide an amount of shipyard work equivalent to procuring about 2.7 DDG-51s per year. Splitting this work evenly between the two yards that build larger surface combatants — General Dynamics's Bath Iron Works (GD/BIW) of Bath, ME, and the Ingalls shipyard of Pascagoula,

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[23] (...continued)
foreign buyers, but which these observers believe the Navy is unwilling to state publicly, is a purported fear among Navy officials that the establishment of a U.S. production line for such boats would lead to political pressure for the Navy to accept the procurement of such boats for its own use, perhaps in lieu of nuclear-powered submarines. The Navy argues that non-nuclear-powered submarines are not well suited for U.S. submarine operations, which typically involve long, stealthy transits to the operating area, long submerged periods in the operating area, and long, stealthy transits back to home port.

MS, that forms parts of Northrop Grumman Ship Systems (NGSS) — might thus provide each yard with the work equivalent of about 1.35 DDG-51s per year.

Supporters of these two yards argued in the 1990s that a total of 3 DDG-51s per year (i.e., an average of 1.5 DDG-51s per year for each yard), in conjunction with other work being performed at the two yards (particularly Ingalls), was the minimum rate needed to maintain the financial health of the two yards.[24] Navy officials in recent years have questioned whether this figure is still valid. Building the equivalent of about 2.7 DDG-51s per year equates to about 90% of this rate.

If GD/BIW were to build the second and fourth DDG-1000s, then the rather lengthy interval between GD/BIW's first ship (to be procured in FY2007) and its second ship (to be procured in FY2010) could reduce GD/BIW's ability to efficiently shift production from one ship to the next.

If affordability considerations limit DDG-1000/CG(X) procurement to one ship per year in FY2011 and subsequent years, the workload for the cruiser-destroyer industrial base in those years would be reduced substantially from levels that would be achieved under the Navy's 30-year plan. Procuring one DDG-1000/CG(X) per year might provide an amount of shipyard work equivalent to procuring about 1.8 DDG-51s per year, and splitting this work evenly between GD/BIW and Ingalls might provide each yard with the work equivalent of about 0.9 DDG-51s per year, which would be equivalent to 60% of the rate cited in the 1990s by supporters of the two shipyards as the minimum needed to maintain the financial health of the two yards.

If the Navy at some point holds a competition between the two yards for the right to build the third and subsequent DDG-1000s, the yard that loses the competition could face a difficult business situation, particularly if that yard is GD/BIW which is involved as a shipbuilder in no shipbuilding programs other than the DDG-51 and DDG-1000.[25] Consequently, if GD/BIW does not build DDG-1000s and does not receive other new ship-construction work, then GD/BIW could experience a significant reduction in workloads, revenues, and employment levels by the end of the decade. Theoretical scenarios for the yard under such circumstances could include closure and liquidation of the yard, the "mothballing" of the yard or some portion of it, or reorienting the yard into one that focuses on other kinds of work, such as building commercial ships, overhauling and modernizing Navy or commercial ships, or fabricating components of Navy or commercial ships that are being built by other yards. Reorienting the yard into one that focuses on other kinds of work, if feasible, could arguably result in workloads, revenues, and employment levels that were significantly reduced from current levels.

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[24] See, for example, CRS Report 94-343, *Navy DDG-51 Destroyer Procurement Rate: Issues and Options for Congress*, by Ronald O'Rourke, April 1994, pp. 59-62 (out of print, available from author).

[25] GD/BIW is also the prime contractor for the GD version of the Littoral Combat Ship (LCS), but the GD version is to be built by the Austal USA shipyard, of Mobile, AL.

If Ingalls were to lose such a competition and other work being done at Ingalls (particularly construction of amphibious ships) does not increase, then Ingalls could similarly experience a reduction in workloads, revenues, and employment levels. The continuation of amphibious-ship construction at Ingalls could make the scenarios of closure and liquidation or mothballing less likely for Ingalls than for GD/BIW, but workloads, revenues, and employment levels could still be reduced from current levels, and the cost of amphibious-ship construction and other work done at Ingalls (such as construction of new Coast Guard cutters) could increase due to reduced spreading of shipyard fixed overhead costs.

Littoral Combat Ships. The Navy's plan to increase LCS procurement to a maximum sustained rate of six ships per year starting in FY2009 would, if implemented, provide a substantial and continuing amount of work for the firms involved in this program. The two LCSs that the Navy has requested for FY2007 represent a decline from the three LCSs funded in FY2006, and would, if implemented, put these firms through a bit of a roller coaster by reducing the LCS workload in FY2007 before increasing it again in FY2008 to a projected level of three ships. Such a roller coaster might introduce some inefficiency into the LCS production effort.

The Navy has included two additional LCSs on its FY2007 unfunded requirements list (URL) — its "wish list" list of items that are desired but not included in the budget. Funding one of these two ships along with the two ships in the FY2007 budget would maintain last year's funded production level of three ships, while funding both of the ships in the URL would continue to increase LCS production toward the planned sustained rate of six ships per year. The Navy, however, projects that it will request funds for three ships in FY2008, so increasing the FY2007 production total to three or four ships might set the stage for putting the firms through a roller coaster unless production in FY2008 were increased to four or five ships. A production level of three or four ships in FY2007 and four or five ships in FY2008 could ease the transition to the planned production level of six ships in FY2009.

Amphibious Ships.

Large-Deck Amphibious Assault Ships. The Navy's FY2007-FY2011 shipbuilding plan and 30-year shipbuilding plan show a total of four LHA (Replacement), or LHA(R), large-deck amphibious assault ships, including variants built for the Navy's MPF(F) force, being procured in FY2007, FY2010, FY2011, and FY2013, followed by no further procurement of large-deck amphibious assault ships until the start of a projected class called the LHD(X) in FY2026. The procurement of four LHA(R)s in the seven-year period FY2007-FY2013 would provide a substantial amount of work to NGSS, the expected builder of these ships, and to other firms that would provide materials or components for the ships. The uneven spacing of the four LHA(R)s within the seven-year period might reduce some production efficiencies in the building of these ships. The lengthy interval between the last of these four LHA(R)s and the start of procurement in FY2026 of a future large-deck amphibious ships called LHD(X) could pose a challenge to any elements of the shipbuilding industrial base that are unique to, or heavily dependent on, production of large-deck amphibious assault ships.

LPD-17 Class Ships. The decision in the FY2007 budget to defer procurement of the ninth LPD-17 by one year, to FY2008, reflected in part a Navy concern about the potential ability of NGSS, following Hurricane Katrina, to support the construction of this ship if it were procured in FY2007. The Navy, however, states that the FY2007 advance procurement funding requested for this ship is sufficient to support the amount of work that would have occurred in FY2007 had the ship been fully funded in FY2007. Accelerating the procurement of this ship back to FY2007 is an item on the Navy's FY2007 URL.

Auxiliary And Sealift Ships. The Navy's plan to procure a squadron of Maritime Prepositioning Force (Future), or MPF(F), ships will provide additional work to NGSS in the form of additional large-deck amphibious ships (discussed above), and additional work to General Dynamics' National Steel and Shipbuilding Company (GD/NASSCO) in the form of three additional TAKE-1 class ships. The MPF(F) squadron will also include three new-construction Large, Medium-speed, Roll-on/Roll-off (LMSR) sealift ships and three new-construction Mobile Logistic Platform (MLP) ships. GD and Northrop could compete for the LMSRs, and both these firms and potentially others could compete for the MLPs. Since the builders of the LMSRs and MLPs have not been determined, the industrial-base impact of the MPF(F) plan is partly unclear.

FY2007 Legislative Activity

FY2007 Defense Authorization Bill (H.R. 5122/S. 2766)

House. Section 121 of H.R. 5122 would amend 10 USC 5062 to require that the Navy include not less than 48 operational attack submarines. Section 332 would require a report on the Navy's Fleet Response Plan. Section 333 would require a report on the Navy's surface ship rotational crewing programs. The House Armed Services Committee, in its report (H.Rept. 109-452 of May 5, 2006) on H.R. 5122, states:

> The committee applauds the Chief of Naval Operations for developing the Navy's future force structure and the accompanying long-term shipbuilding plan to build it. This long-term plan provides the shipbuilding industry a view into the future that has been lacking. However, the committee is concerned that the plan was developed using unrealistic assumptions that will not make the plan executable. Of greatest concern to the committee is the affordability of the ship construction plan. According to the Navy's estimates, execution of this plan requires a significant increase in shipbuilding funds from $8.7 billion in fiscal year 2006 to $17.2 billion in fiscal year 2011. Obtaining these additional funds in a period of anticipated federal spending reductions will be difficult. The plan also assumes that individual ship acquisition programs can avoid the cost growth that has plagued most Navy ship acquisition programs.
>
> The committee is concerned about the affordability of the Navy's long-term shipbuilding plan, recreating much of the uncertainty about the future of naval shipbuilding that the plan was designed to eliminate. (Page 67)

The report also states:

> The committee is concerned by the Chief of Naval Operation's plan to retire the USS John F. Kennedy. According to the Navy's long range shipbuilding plan, if the Navy retires the Kennedy, then the aircraft carrier force will drop to 11 between now and 2012, and then drop to 10 in 2013 and 2014. With the commissioning of CVN-78 in 2015, the aircraft carrier force increases to 11 and then back to 12 in 2019 and beyond.
>
> The committee believes it is the objective of the Chief of Naval Operations to maintain a force of 12 aircraft carriers since the long range shipbuilding plan shows a total of 12 aircraft carriers between 2019 and the far range of the plan in 2036. It is apparent to the committee that the decision to allow the force structure to fall to 10 in the near future is fiscally rather than operationally driven.
>
> The committee believes that the Navy should continue to maintain no less than 12 operational aircraft carriers in order to meet potential global commitments. The committee believes that a reduction below 12 aircraft carriers puts the nation in a position of unacceptable risk. (Page 67)

The report also states:

> The committee notes that the Department of Defense's legislative proposal for fiscal year 2007, included a section that would effectively allow retirement of the conventionally-powered aircraft carrier, USS John F. Kennedy, thereby reducing the carrier force structure from 12 to 11 ships.
>
> The committee believes that the Navy's decision to reduce the number of carriers was not based on mission requirements analysis; rather, the decision was based on fiscal constraints. Section 126 of the National Defense Authorization Act for Fiscal Year 2006 (Public Law 109-163) amended section 5062 of title 10, United States Code, to set a minimum carrier force structure of not less than 12 operational aircraft carriers. The committee believes the aircraft carrier force structure should be maintained at 12 ships in order to meet worldwide commitments.
>
> However, the committee would like to explore options for maintaining the USS John F. Kennedy in an operational status either within or outside the U.S. Navy, to include the possibility of transferring operational control to the North Atlantic Treaty Organization (NATO). Therefore, the committee directs the Secretary of Defense to submit a report to the congressional defense committees by March 1, 2007, that examines options for maintaining the USS John F. Kennedy in an operational status both within and outside the U.S. Navy. In examining the NATO option, the Secretary shall coordinate an assessment with the NATO Secretary General. The report shall include the cost and manning required, statutory restrictions that would preclude transfer of the USS John F. Kennedy to organizations or entities outside the U.S. Navy, and a classified annex on how the Navy would meet global operational requirements with an aircraft carrier force structure of less than 12 ships. (Pages 369-370)

The report also states:

> The committee is concerned that the U.S. shipbuilding/ship repair industrial base has significant capacity beyond what is necessary for all anticipated DOD

new construction and maintenance work, and believes that Navy ship acquisition programs are paying the price.

The Navy recently published a long-term shipbuilding plan that supports the goal of building and maintaining a 313 ship Navy by 2020. Although this plan provides the needed "stability" that the U.S. shipbuilding industry has been looking for, it does not appear to generate enough work to keep the major U.S. shipbuilders operating at their current capacity. Evidence of this is most obvious at General Dynamics Electric Boat Division where the contractor is planning to lay off hundreds of designers and engineers and thousands of production workers in the next several years. The plan to increase the procurement of Virginia class submarines from 1 to 2 per year has been delayed for over 10 years and the latest plan has the increase happening in fiscal year 2012. Similar challenges will affect the shipyards now constructing the last of the DDG-51 destroyers. Those yards are starting to ramp up to build the next generation destroyer, however, the next generation destroyer is not expected to be built in a sufficient quantity to keep the current workforce fully employed.

The committee directs the Secretary of the Navy to report to the congressional defense committees on measures that can be taken to manage the capacity of the shipbuilding/ship repair industrial base in a manner that would make Navy shipbuilding more affordable. Such report shall be submitted by the submission of the President's request for fiscal year 2008, as required by section 1105 of title 31, United States Code. (Pages 70-71)

Senate. Section 1011 of S. 2766 would repeal Section 126 of the FY2006 defense authorization act (H.R. 1815/P.L. 109-163), which amended 10 USC 5062 to require that the Navy include not less than 12 operational aircraft carriers. The Senate Armed Services Committee, in its report (S.Rept. 109-254 of May 9, 2006), states:

The 2006 Quadrennial Defense Review (QDR) Report determined that a naval force including 11 aircraft carriers meets the combat capability requirements of the National Military Strategy. In testimony before the Committee on Armed Services in March 2006, the Chief of Naval Operations (CNO) emphasized that the decision by the QDR followed a rigorous evaluation of future force structure requirements by the Navy, and that 11 aircraft carriers are sufficient to ensure the Navy's ability to provide coverage in any foreseeable contingency with persistent combat power. The committee is further aware that advances in ship systems, aircraft, and precision weapons, coupled with fundamental changes to fleet maintenance and deployment practices implemented by the Navy, have provided today's aircraft carrier and associated air wings substantially greater strike capability and greater force availability than possessed by the fleet during previous quadrennial defense reviews.

The Navy has reported on revisions to its method and frequency of deployments for vessels. Under the new concept, referred to as the "Fleet Response Plan," the Navy has reduced forward presence requirements in order to increase surge capability in response to national security demands. Under this approach, with 12 aircraft carriers in the fleet, the Navy proposed to have six carrier strike groups available for a crisis response within 30 days and two more carrier strike groups available in 90 days, referred to as "6 plus 2." At a force structure of 11 aircraft carriers, this becomes "6 plus 1" or "5 plus 2," which the Navy determined supports the National Military Strategy with acceptable risk.

> In certain cases, the success of the Fleet Response Plan relies on the timeliness of the decision to surge-deploy the naval forces, and with smaller force levels and reduced forward presence, the Fleet Response Plan approach may increase risk if we do not have the level of insight into the threat necessary for timely action. Further, the Navy's long-term plan for aircraft carrier force structure declines to 10 carriers in 2013, when the USS Enterprise is scheduled to retire. That carrier would be replaced by CVN-21 in 2015, which has yet to start construction. The Navy believes that they can manage this gap through a number of added measures, but if there are any delays in delivering CVN-21, this gap will increase.
>
> The committee maintains its concern, expressed in the Senate report accompanying S. 1042 (S.Rept. 109-69) of the National Defense Authorization Act for Fiscal Year 2006, regarding the declining size of the naval force and the reduction to the number of aircraft carriers. The committee agrees, however, with the Navy's determination that it is not feasible to maintain 12 operational aircraft carriers by restoring the USS John F. Kennedy (CV-67) to a deployable, fully mission-capable platform. The committee believes that it is vital to the national security of the United States that a fleet of at least 11 aircraft carriers be maintained to support the National Military Strategy, and has taken extraordinary action to support the CNO's force structure plan by authorizing increased procurement for shipbuilding and, specific to aircraft carriers, by authorizing additional advance procurement and incremental funding for the construction of the first 3 CVN-21 class aircraft carriers.
>
> Further, recognizing the increased need for timeliness of surge operations that today's smaller force structure places on the Fleet Response Plan, the committee reaffirms the judgment that the Chief of Naval Operations, Admiral Clark, provided in testimony before the Committee on Armed Services in February 2005, that the Atlantic Fleet should continue to be dispersed in two homeports. (Pages 379-380)

The report also states:

> The committee remains concerned about the size of the Navy's fleet. As a maritime nation, the strength of our economy, the face of our diplomacy, the course of our foreign policy, and the security of our nation are built upon the Navy's ability to maintain global presence and to exercise freedom of maneuver upon the seas. However, in the last 15 years, there has been a declining trend in shipbuilding and a diminishing capacity in the shipbuilding industrial base. The fleet has been reduced to its smallest size since before World War II. The committee believes that prudent decisions must be made to reverse the current trend in the construction of warships, or risk our margin of naval superiority for the next generation. (Pages 6-7)

The report also states:

> The Secretary of the Navy submitted a report to Congress on the long-range plan for construction of naval vessels with the fiscal year 2007 budget request. This plan reflects the determination by the Chief of Naval Operations (CNO) that the National Defense Strategy requires a fleet of 313 ships, including 48 attack submarines, to meet the threat in future years. In testimony before the Subcommittee on Seapower of the Committee on Armed Services, the Navy

witnesses described the level of 48 attack submarines as the minimum level necessary to support both wartime and peacetime requirements.

The Navy also indicated that, with currently planned construction, attack submarine forces drop below 48 submarines for 15 years. The future-years defense program (FYDP) supports building only one attack submarine per year through fiscal year 2011, with sufficient advance procurement during the FYDP to support increasing the production rate to two boats per year in fiscal year 2012. The Navy's leadership has stated that they need to get the price of Virginia-class attack submarines to a level of $2.0 billion per boat before increasing the build rate. The committee completely agrees with the Navy's affordability focus, but simultaneously views the most important step to improve affordability is to increase the production rate of the Virginia-class to more than one boat per year.

The committee understands that the Navy is trying to modernize in a constrained fiscal environment. However, the committee does not understand the continuing delays in increasing the construction rate. By the Navy's own assessment: (1) submarines perform a uniquely Navy mission; (2) the minimum requirement is to have 48 attack submarines; (3) submarine force levels will fall below 48 during the next decade and remain there for 15 years; (4) the Navy needs to achieve cost reductions in attack submarine construction in order to increase production rates without impinging on other priority shipbuilding programs; and (5) there are potential technology insertion opportunities that might help reduce costs and permit the Navy to increase the production rate.

Having said that, the Navy's and industry's plan for achieving the $2.0 billion per boat cost goal requires greater definition. The Navy has referred to efforts to develop a number of improvements for the Virginia-class that target cost reductions. The committee is concerned, however, that without more specific plans with defined goals and benchmarks, the Navy will get to the end of the FYDP and not necessarily be any closer to achieving real cost reductions in this program. Therefore, the committee directs the Secretary of the Navy to submit with the fiscal year 2008 budget request a detailed plan for developing cost reduction measures with defined goals and benchmarks for the Virginia-class production program. (Pages 115-116)

FY2007 Defense Appropriations Bill (H.R. 5631)

House. The House Appropriations Committee, in its report (H.Rept. 109-504 of June 16, 2006) on H.R. 5631, stated:

The Committee is pleased that the Navy has put stronger priority this year on the need for a robust and stable shipbuilding program. The fiscal year 2007 budget included funds for 7 new ships, compared to only 4 last year. The future years defense plan includes funds for 51 new ships between fiscal years 2007 and 2011, compared to 45 ships in last year's plan. The Navy has stated a requirement for 313 force level ships to meet the projected naval threat in the year 2020. Under the Navy's current plan, that level is reached in the year 2012 and sustained until 2026.

Despite these improvements, the Committee believes that the viability of the Navy's long range plan will remain tied to the service's ability to control

> costs in ship design and construction. Navy leadership agrees that cost control is essential, but the Navy has produced no plan or initiatives to meet the cost targets assumed in the long range shipbuilding plan. Furthermore, the recent history of ongoing shipbuilding programs indicates the trend in cost growth may be getting worse, and not better. The Committee encourages the Navy to set firm cost targets in its future shipbuilding programs, to develop specific initiatives addressing cost control, and to sign contracts that reduce the likelihood of cost growth. (Page 139)

The report also states:

> The Committee remains concerned over the lack of cost control in Navy shipbuilding programs. In last year's report, the Committee noted the rising cost growth in ongoing ship construction contracts, and required the Navy to submit a plan on resolving these issues. That report was submitted two months late, and was little more than a summary of cost overruns in shipbuilding over the past two decades. The Committee is concerned about the gap between the Navy's public statements about the need for firm cost controls, and the programmatic and contractual actions needed to accomplish that objective. Navy briefings this year document a litany of programs, including the CVN-77 aircraft carrier and certain attack submarines of the Virginia class, that continue to defy attempts to control costs. The Navy estimates an overrun of $867,900,000 over the next 3 years alone in the CVN-77 production effort. These funds cannot be obligated without Congressional legislation to raise the current cost cap on the program — a cap that was put in place several years ago to control costs. The fiscal year 2007 budget requests $136,000,000 for further cost growth in the U.S.S. Texas (SSN-775), and cost performance on the U.S.S. North Carolina (SSN-777) is seriously below Navy expectations. In fact, current cost performance on the Virginia class jeopardizes the ability of the Navy to meet the performance goals of the multiyear contract signed in 2004 as well as cost targets needed to increase the submarine production rate in future years. The Committee is unwilling to provide increased appropriations for cost overruns in the absence of compelling justification or a realistic and detailed plan for cost control. (Page 140)

Appendix A: Previous Ambiguity In Navy Ship Force-Structure Planning

This appendix reviews ambiguity in Navy ship force-structure planning prior to the Navy's reported 313-ship proposal.

310-Ship Plan From 2001 QDR

Until the Navy's reported 313-ship proposal, the last unambiguous ship force structure plan for the Navy that was officially approved and published by the Office of the Secretary of Defense (OSD) appeared in the September 2001 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),[26] 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).[27] 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.[28] 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."[29]

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.[30] And in

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

[27] U.S. Department of Defense, *Quadrennial Defense Review Report*, Washington, 2001, p. 22.

[28] 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.

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

[30] For more on the LCS program, see CRS Report RS21305, *Navy Littoral Combat Ship* (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 Of 2002-2004

Navy leaders in early 2002 began to mention an alternative proposal for a 375-ship Navy that initially included12 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.[31]

Although Navy leaders routinely referred to the 375-ship proposal from about February 2002 through about February 2004, 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 April 2004, Navy leaders began to back away from the 375-ship proposal, stating that 375 was an approximate figure, that the ships making up the total of 375 were subject to change, and perhaps most important, that the 375-ship figure reflected traditional concepts for crewing and deploying Navy ships, rather than new concepts — such as Sea Swap — that could significantly reduce future requirements for Navy ships.

Early-2005 Navy Proposal For Fleet Of 260 To 325 Ships

At a February 10, 2005 hearing before the Senate Armed Services Committee on the proposed FY2006 DOD budget and FY2006-FY2011 FYDP, Admiral Vernon Clark, the Chief of Naval Operations, testified that the Navy in future years may require a total of 260 to 325 ships, or possibly 243 to 302 ships, depending on how much the Navy uses new technologies and Sea Swap. Specifically, Clark stated:

> As we evolve advanced concepts for employment of forces, we will also refine analyses and requirements, to include the appropriate number of ships, aircraft, and submarines....

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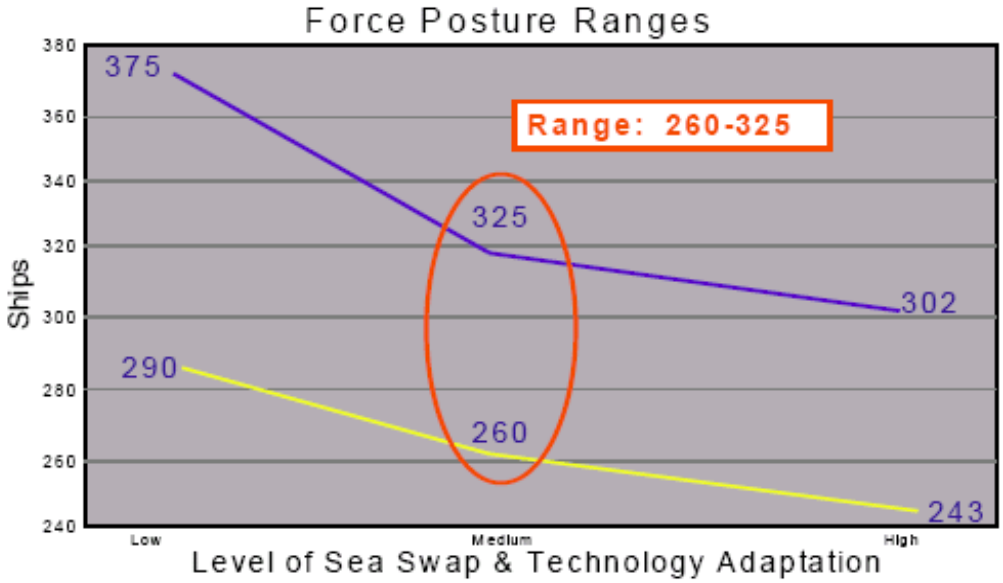
[30] (...continued)
(LCS): Background and Issues for Congress, by Ronald O'Rourke; and CRS Report RL32109, *Navy DDG-1000 (DD(X)) and LCS Ship Acquisition Programs: Oversight Issues and Options for Congress*, by Ronald O'Rourke.

[31] The composition of the plan was subsequently modified to include 12 aircraft carriers, 52 SSNs, 4 SSGNs, 165 surface combatants (109 cruisers and destroyers and 56 LCSs), 36 amphibious ships, 18 Maritime Prepositioning Force (Future) ships, and additional mine warfare and support ships.

In a sensor-rich construct, the numbers of platforms are no longer a meaningful measure of combat capability. And just as the number of people is no longer the primary yardstick by which we measure the strength or productivity of an organization in an age of increasing capital-for-labor substitutions, the number of ships is no longer adequate to gauge the health or combat capability of the Navy. The capabilities posture of the Fleet is what is most important. In fact, your Navy can deliver much more combat power, more quickly now than we could twenty years ago when we had twice as many ships and half again as many people....

Further, I believe that the current low rate of ship construction and the resultant escalation of platform cost will constrain the future size of the Fleet. As I have previously testified, I don't believe that it's all about numbers; numbers have a quality all their own, there's no question about that. But, it is more important that we buy the right kinds of capabilities in the ships that we're procuring in the future, and that we properly posture our force to provide the speed and agility for seizing and retaining the initiative in any fight.

The ultimate requirement for shipbuilding, however, will be shaped by the potential of emerging technologies, the amount of forward basing, and innovative manning concepts such as Sea Swap. Additional variables range from operational availability and force posture to survivability and war plan timelines.



The notional diagram [above] illustrates how manning concepts and anticipated technological adaptation will modify the number of ships required. The [upper and lower] lines represent levels of combat capability and the ships required to achieve that capability. For example, the left side of the diagram shows our current number of ships (290) and the current projection of ships required to fully meet Global War on Terror requirements (375) in the future. The right side of the diagram shows a projection that provides the same combat capability but fully leverages technological advances with maximum use of Sea Swap. It is a range of numbers because the degree of technological adaptation is a variable, as is the degree to which we can implement Sea Swap. The middle portion of the curve [in the ellipse] shows a projected range that assumes a less extensive projection of technological adaptation and use of Sea swap. Although simplified,

> this diagram shows how the application of transformational new technologies coupled with new manning concepts will enable us to attain the desired future combat capability with a force posture between 260 and 325 ships.[32]

Admiral Clark's testimony did not detail the compositions of these fleets by ship type or make clear whether any of these potential total ship figures have been endorsed by the Secretary of Defense as official DOD force-structure planning goals.

In March 2005, the Navy provided a report to Congress showing the notional compositions of 260- and 325-ship fleets in FY2035.[33] **Table 1** below compares the 310-ship plan from the 2001 QDR and the Navy's 375-ship proposal of 2002-2004 with the notional 260- and 325-ship fleets from the March 2005 Navy report to Congress.

Using the 260-ship fleet as a baseline, the range of 260 to 325 ships equates to a 25% range of variability in the potential total number of ships. For some ship categories — such as SSBNs and SSGNs — there is little or no difference between the 260- and 325-ship fleets. For other categories of ships, there are substantial percentage ranges of variability — 37% for cruisers, destroyers and frigates, 30% for LCSs; 41% for amphibious ships; and 43% for maritime prepositioning ships. For the remaining categories of ships — attack submarines, aircraft carriers, combat logistics ships, and other ships — the ranges of variability are 10% or less. In the case of aircraft carriers, the one-ship difference under two fleet plans can translate into a substantial difference in Navy funding requirements and shipbuilding work.

When asked why the Navy has not expressed its force-level requirements as a single figure, as it has in the past, or as a more tightly focused range, Navy officials have stated that additional analyses need to be performed to tighten the range, that some of the variability is due to the Navy's inability to predict the future with precision, and that the Navy needs to work to refine these figures further to establish a more stable set of requirements for ships.[34]

Capabilities-Based Planning and Numbers of Ships

As suggested in Admiral Clark's February 2005 testimony, 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

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[32] Source for quoted text and associated diagram: Statement of Admiral Vernon Clark, USN, Chief of Naval Operations, Before the Senate Armed Services Committee, Feb. 10, 2005, pp. 17-19.

[33] U.S. Department of the Navy, *An Interim Report to Congress on Annual Long-Range Plan For The Construction Of Naval Vessels For FY 2006*. The report was delivered to the House and Senate Armed Services Committees on March 23, 2005. Copies of the report were obtained by defense trade publications, and at least one of these publications posted the report on its website.

[34] See, for example, Geoff Fein, "Navy Needs To Better Refine Shipbuilding Numbers, Says Sestak," *Defense Daily*, Mar. 30, 2005; and Dave Ahearn, "Adm. Sestak Says Future Shipbuilding Needs Must Be Flexible," *Defense Today*, Mar. 30, 2005.

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 about required numbers of Navy ships and aircraft, Navy and DOD officials have argued, as Admiral Clark does in the above-cited testimony, 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 Navy is currently working to resolve uncertainties concerning the applicability of new technologies the Sea Swap concept, it arguably should become possible at some point to translate a set of desired Navy into desired numbers of ships and aircraft. Those numbers might be expressed as focused ranges rather than specific figures, and these focused ranges may change over time as missions, technologies, and crewing concepts 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 Ambiguity in Navy Force-Structure Plans

For the Navy. For the Navy, ambiguity concerning required numbers of Navy ships provided time to resolve uncertainties concerning the applicability of new technologies and the Sea Swap concept to various kinds of Navy ships. Navy (and DOD) officials may also have found this ambiguity convenient because it permitted them to speak broadly about individual Navy ship-acquisition programs without offering many quantitative details about them — details which they might be held accountable to later, or which, if revealed now, might disappoint Members of Congress or industry officials.

This ambiguity may also, however, have made it difficult for Navy officials, in conversations with the Office of the Secretary of Defense (OSD), to defend programs for procuring Navy ships in certain total numbers or at certain annual rates because OSD officials might view alternative total numbers or annual rates as sufficient for

maintaining a Navy that falls somewhere within the broad ranges of total numbers of ships that Navy officials have presented in their testimony.

For Congress. Ambiguity concerning required numbers of Navy ships made it more difficult 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 expressed in only general terms, it was more difficult for Congress 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.[35]

For Industry. Ambiguity concerning required numbers of Navy ships may have made it easier for industry officials to pour into broad remarks from the Navy or DOD their own hopes and dreams for individual programs. This could have led

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[35] For example, the conference report (H.Rept. 107-772) 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) 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)

See also the Legislative Activity section of this report, particularly for comments in committee reports on the FY2006 defense authorization and appropriation bills.

to excessive industry optimism about those programs. Ambiguity concerning required numbers of Navy ships also made it more difficult for industry to make rational business-planning decisions in areas such as production planning, workforce management, facilities investment, company-sponsored research and development, and potential mergers and acquisitions.[36]

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[36] 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.)

Appendix B: Independent Studies On Navy Force Structure

Section 216 of the conference report (H.Rept. 108-354 of November 7, 2003) on the FY2004 defense authorization bill (H.R. 1588/P.L. 108-136 of November 24, 2003) required the Secretary of Defense to provide for two independently performed studies on potential future fleet platform architectures (i.e., potential force structure plans) for the Navy. The two studies, which were conducted by the Center for Naval Analyses (CNA) and the Office of Force Transformation (OFT, a part of the Office of the Secretary of Defense), were submitted to the congressional defense committees in February 2005.[37]

A third independent study on potential future fleet platform architectures was conducted by the Center for Strategic and Budgetary Assessments (CSBA). CSBA conducted this study on its own initiative and made it available to congressional and other audiences in March 2005 as an alternative to the CNA and OFT studies.

This appendix summarizes and discusses these three studies.[38]

Force Structure Recommendations

CNA Report.[39] The CNA report uses essentially the same kinds of ships and naval formations as those planned by the Navy. The report recommends a Navy force structure range of 256 to 380 ships. The low end of the range assumes a greater use of crew rotation and overseas homeporting of Navy ships than the high end. **Table 6** below compares the CNA-recommended force range to the Navy's 375-ship fleet proposal of 2002-2004 and the notional 260- and 325-ship fleets for FY2035 presented in the Navy's March 2005 interim report to Congress.

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[37] Section 216 is an amended version of a provision (Section 217) in the House-reported version of H.R. 1588. See H.Rept. 108-354, pp.28-29, 612-613; and H.Rept. 108-106, May 16, 2003, pp.255-256.

[38] This appendix is adapted from a part of a statement made by the author before the Senate Armed Services Committee Subcommittee on Seapower, Hearing on Navy Capabilities and Force Structure, Apr. 12, 2005.

[39] Delwyn Gilmore, with contributions by Mark Lewellyn et al., *Report to Congress Regarding Naval Force Architecture*, Center for Naval Analyses, CRM D0011303.A2/1Rev, Jan. 2005.

Table 6. CNA-Recommended Force and Other Proposals

Ship type	CNA force range	Navy 375-ship proposal of 2002-2004[a]	Notional Navy fleets for FY2035	
			260 ships	325 ships
Ballistic missile submarines (SSBNs)	14	14	14	14
Cruise missile submarines (SSGNs)	4	4	4	4
Attack submarines (SSNs)	38 to 62	52	37	41
Aircraft carriers	10 to 12	12	10	11
Cruisers and destroyers	66 to 112	109	67	92
Littoral combat ships (LCSs)	40 to 70	56	63	82
Amphibious ships	18 to 30	36	17	24
Maritime Prepositioning Force (Future) ships	19 to 21	18	14	20
Combat logistics (resupply) ships	25 to 33	33	24	26
Other[b]	22	41	10	11
Total battle force ships	**256 to 380**	375	260	325

Source: Table prepared by CRS based on CNA report and March 2005 Navy report.

a. Composition as shown in CNA report as the program of record for 2022. An earlier and somewhat different composition is shown elsewhere in this CRS report.

b. Includes command ships, support ships (such as salvage ships and submarine tenders), dedicated mine warfare ships, and sea basing connector ships.

OFT Report.[40] The OFT report employs eight new ship designs that differ substantially from the designs of most ships currently in the fleet, under construction, or planned for procurement. Among the eight new ship designs are four types of large surface ships that would be built from a common, relatively inexpensive, merchant-like hull design developed in 2004 for the Navy's Maritime Prepositioning Force (Future) analysis of alternatives. These four types of ships, which would all displace 57,000 tons, include:

- **An aircraft carrier** that would embark a notional air wing of 30 Joint Strike Fighters (JSFs), 6 MV-22 Osprey tilt-rotor aircraft, and 15 unmanned air vehicles (UAVs). The total of 36 manned aircraft is about half as many as in today's carrier air wings, and the OFT architecture envisages substituting two of these new carriers for each

[40] U.S. Department of Defense, Office of the Secretary of Defense, *Alternative Fleet Architecture Design* (Report for the Congressional Defense Committees, Office of Force Transformation). The OFT report was also published in slightly modified form as Stuart E. Johnson and Arthur K. Cebrowski, *Alternative Fleet Architecture Design*. Washington, National Defense University, 2005. 96 pp. (Defense & Technology Paper 19, Center for Technology and National Security, National Defense University, August 2005)

of today's carriers. This new carrier would also have support spaces for unmanned underwater vehicles (UUVs), unmanned surface vehicles (USVs), and mission modules for the 1,000-ton surface combatant described below.

- **A missile-and-rocket ship** that would be quipped with 360 vertical launch system (VLS) missile tubes and 4 trainable rocket launchers. Additional spaces on this ship could be used to support UUVs, USVs, and mission modules for the 1,000-ton surface combatant. Alternatively, these spaces could be used to provide limited stowage and working space for the 100-ton surface combatant described below, and mission modules for these 100-ton ships.

- **An amphibious assault ship** that would embark a notional air wing of either 30 CH-46 equivalents or 6 JSFs, 18 MV-22s, and 3 gyrocopter heavy-lift helicopters. It would also have spaces for Marine Corps equipment, unmanned vehicles, and mission modules for the 1,000-ton surface combatant.

- **A "mother ship" for small combatants** that would contain stowage and support spaces for the 100-ton surface combatant described below.

The four other new-design ships in the OFT architecture are:

- **A 13,500-ton aircraft carrier** based on a conceptual surface effect ship (SES)/catamaran hull design developed in 2001 by a team at the Naval Postgraduate School. This ship would embark a notional air wing of 8 JSFs, 2 MV-22s, and 8 UAVs. The total of 10 manned aircraft is roughly one-eighth as many as in today's carrier air wings, and the OFT architecture envisages substituting eight of these new carriers for each of today's carriers. This new ship would have a maximum speed of 50 to 60 knots.

- **A 1,000-ton surface combatant** with a maximum speed of 40 to 50 knots and standard interfaces for accepting various modular mission packages. These ships would self-deploy to the theater and would be supported in theater by one or more of the 57,000-ton ships described above.

- **A 100-ton surface combatant** with a maximum speed of 60 knots and standard interfaces for accepting various modular mission packages. These ships would be transported to the theater by the 57,000-ton mother ship and would be supported in theater by that ship and possibly also the 57,000-ton missile-and-rocket ship.

- **A non-nuclear-powered submarine** equipped with an air-independent propulsion (AIP) system. These AIP submarines would be lower-cost supplements to the Navy's nuclear-powered submarines (SSNs) and would be transported from home port to the

theater of operations by transport ships. The OFT architecture envisages substituting four of these submarines for the SSN in each carrier strike group.[41]

The 1,000- and 100-ton surface combatants would be built as relatively inexpensive sea frames, like the LCS.

The OFT report combines these eight types of ships, plus the Navy's currently planned TAOE-class resupply ship, into a fleet that would include a much larger total number of ships than planned by the Navy, about the same number of carrier-based aircraft as planned by the Navy, and large numbers of unmanned systems. The OFT report presents three alternative versions of this fleet, which the report calls Alternatives A, B, and C. The report calculates that each of these alternatives would be equal in cost to the equivalent parts of the Navy's 375-ship proposal. Each of these alternative force structures, like the equivalent parts of the Navy's 375-ship proposal, would be organized into 12 carrier strike groups (CSGs), 12 expeditionary strike groups (ESGs), and 9 surface strike groups (SSGs). The three alternative force structures are shown in **Table 7** below.

Table 7. Alternative Fleet Structures from OFT Report

Ship type	Alternative		
	A	**B**	**C**
57,000-ton aircraft carrier	24	***24***	***0***
57,000-ton missile-and-rocket ship	33	33	33
57,000-ton amphibious assault ship	24	24	24
57,000-ton mother ship	***0***	***24***	24
13,500-ton aircraft carrier	0	***0***	***96***
1,000-ton surface combatant	***417***	***0***	0
100-ton surface combatant	***0***	***609***	609
AIP submarine	48	48	48
TAOE-class resupply ship	12	12	12
Subtotal 1,000- and 100-ton ships	*417*	*609*	*609*
Subtotal other ships	*141*	*165*	*237*
Total ships[a]	**558[a]**	**774[a]**	**846[a]**

Source: Table prepared by CRS based on figures in OFT report.

a. The totals shown in early copies of the OFT report are 36 ships lower in each case due to an error in those copies in calculating the numbers of ships in the 12 carrier strike groups.

[41] The report states that "Alternatives to the SSNs in formations were diesel Air Independent Propulsion (AIP) submarines and unmanned undersea vehicles (UUVs). The AIP submarines were substituted for Virginia class SSNs on a cost basis of roughly four to one. These submarines could be nuclear-powered if they are designed and built based upon a competitive, cost suppressing business model." (Page 60) The strategy of transporting the AIP submarines to the theater using transport ships is not mentioned in the report but was explained at a February 18, 2005 meeting between CRS and analysts who contributed to the OFT report.

The totals shown in the table do not include SSNs, cruise missile submarines (SSGNs), and ballistic missile submarines (SSBNs) operating independently of the 12 CSGs, 12 ESGs, and 9 SSGs. The totals also do not include combat logistics ships other than the TAOEs (e.g., oilers, ammunition ships, and general stores ships) and fleet support ships. The Navy's 375-ship proposal, by comparison, includes all these kinds of ships.

As also can be seen from the table, the difference between Alternatives A and B is that the former uses 1,000-ton surface combatants while the latter uses 100-ton surface combatants that are transported into the theater by mother ships, and the difference between Alternatives B and C is that the former uses 57,000-ton aircraft carriers while the latter substitutes 13,500-ton carriers.

CSBA Report.[42] The CSBA report uses many of the same ship designs currently planned by the Navy, but also proposes some new ship designs. The CSBA report also proposes ship formations that in some cases are different than those planned by the Navy. **Table 8** below compares the CSBA-recommended force structure to CNA's recommended force range, the Navy's 375-ship fleet proposal of 2002-2004, and the notional 260- and 325-ship fleets for FY2035 presented in the Navy's March 2005 interim report to Congress.

[42] Robert O. Work, *Winning the Race: A Naval Fleet Platform Architecture for Enduring Maritime Supremacy*, Center for Strategic and Budgetary Assessments (CSBA), 2005.

Table 8. CSBA-Recommended Force and Other Proposals

Ship type	CSBA force	CNA force range	Navy 375-ship proposal of 2002-2004[a]	Notional Navy fleets for FY2035	
				260 ships	325 ships
Ballistic missile submarines (SSBNs)	12[b]	14	14	14	14
Cruise missile submarines (SSGNs)	6 [b]	4	4	4	4
Attack submarines (SSNs)	54[c]	38 to 62	52	37	41
Large-deck aircraft carriers (CVNs)	10	10 to 12	12	10	11
Medium aircraft carriers (CVEs)	4	0	0	0	0
Afloat forward staging base (AFSB)	1	0	0	0	0
Cruisers and destroyers	84 or 86	66 to 112	109	67	92
Littoral combat ships (LCSs)	84	40 to 70	56	63	82
Amphibious ships	32[d]	18 to 30	36	17	24
Maritime Prepositioning Force ships	16[e]	19 to 21[e]	18[e]	14[e]	20[e]
Combat logistics (resupply) ships	36[f]	25 to 33	33	24	26
Other[g]	34[h]	22	41	10	11
Total battle force ships	**373 or 375[i]**	**256 to 380**	**375**	**260**	**325**

Source: Table prepared by CRS based on CSBA report, CNA report, and March 2005 Navy report.

a. Composition as shown in CNA report as the program of record for 2022. An earlier and somewhat different composition is shown elsewhere in this CRS report.
b. Alternatively, 10 SSBNs and 8 SSGNs.
c. Includes one special-mission submarine. Total number drops slightly over next 12 years.
d. Includes eight LHDs and 24 LPD-17s.
e. In the CSBA force, these are existing MPF ships; in the other fleets, they are MPF(Future) ships.
f. Includes eight TAOEs, 11 TAKEs, and 17 TAOs.
g. Includes command ships, and support ships (such as salvage ships and submarine tenders), dedicated mine warfare ships, and sea basing connector ships.
h. Includes, among other ships, 2 TAVBs and 8 TLKAs associated with the amphibious and MPF ships.
i. In addition to these ships, the CSBA report notes that U.S. maritime forces would include 35 DOD prepositioning and surge sealift ships used primarily by the Army and Air Force, and 91 large, medium, and fast-response (i.e., small) cutters planned for procurement under the Coast Guard Deepwater acquisition program.

The CSBA report makes numerous specific recommendations for ship force structure and ship acquisition, including the following:

Aircraft Carriers. When the George H.W. Bush (CVN-77) enters service in 2008 or 2009:

- Retire the two remaining conventional carriers — the Kitty Hawk CV-63) and the Kennedy (CV-67).
- Convert the Enterprise (CVN-65) into an afloat forward staging base (AFSB) with a mixed active/reserve/civilian crew, to be used in peacetime for aviation testing and in crises for embarking special operations forces, Army or Marine Corps forces, or joint air wings.
- Begin replacing the 10 Nimitz (CVN-68) class carriers on a one-for-one basis with CVN-21-class carriers procured once every five years using incremental funding.
- Redesignate the LHA(R) as a medium sized carrier (CVE) and procure one every three years starting in FY2007 using incremental funding.[43]

Submarines.

- Maintain Virginia-class SSN procurement at one per year for the next several years, producing an eventual total of perhaps 20 Virginia-class boats.
- Begin immediately to design a new "undersea superiority system" with a procurement cost 50% to 67% that of the Virginia-class design, with the goal of achieving a procurement rate of two or three of these boats per year no later than FY2019.
- Study options for extending the service lives of the three Seawolf SSNs and the 31 final Los Angeles-class SSNs to mitigate the projected drop in SSN force levels during the 2020s.
- Reduce the SSBN force from 14 ships to 12 ships and convert an additional two SSBNs into SSGNs, for a total of six SSGNs.
- Study the option of reducing the SSBN force further, to 10 ships, which would permit another two SSBNs to be converted into SSGNs, for a total of eight SSGNs.[44]

Destroyers and Cruisers.

- Procure a single DDG-1000 in FY2007, using research and development funding, as the first of three surface combatant technology demonstrators.
- Start a design competition for a next generation, modular surface combatant or family of combatants, with capabilities equal to or greater than the DDG-1000/CG(X), but with a substantially lower procurement cost.

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[43] CSBA report, slides 154-158.

[44] CSBA report, slides 276, 284, 289, 297, 299.

- Build two additional surface combatant technology demonstrators to compete against the DDG-1000 design.
- Use the results of this competition to inform the design of a new surface combatant, called SCX, with a procurement cost perhaps one- third to one-half that of the DDG-1000.
- Begin procuring this new design in FY2015 as a replacement for the DDG-1000/CG(X) program.
- Consider modifying the LPD-17 design into a low-cost naval surface fire support ship carrying the Advanced Gun System (AGS) that was to be carried by the DDG-1000.
- Consider procuring two additional DDG-51s to help support the surface combatant industrial base in the near-term.[45]

Littoral Combat Ships and Coast Guard Deepwater Cutters.

- Procure six LCSs per year for a total of 84 LCSs — 42 of the Lockheed design, and 42 of the General Dynamics design.
- Organize these 84 ships into 42 divisions, each consisting of one Lockheed ship and one General Dynamics ship, so that each division can benefit from the complementary strengths of the two designs.
- Ensure that mission packages for the LCS and mission packages for the Coast Guard's large and medium Deepwater cutters are as mutually compatible as possible.
- Include the Coast Guard's Deepwater cutters when counting ships that contribute to the country's total fleet battle network.
- Begin a research and development and experimentation program aimed at building several competing stealth surface combatant technology demonstrators for operations in contested or denied-access waters.[46]

Amphibious Ships.

- Complete LHD-8 to create a force of eight LHDs.
- Rather than stopping procurement of LPD-17s after the ninth ship in FY2007, as now planned by the Navy, increase the LPD-17 procurement rate to two ships per year and use multiyear procurement (MYP) to procure a total of 24 LPD-17s.
- Retire the 12 existing LSD-41/49 class ships, leaving a 32-ship amphibious fleet consisting of eight LHDs and 24 LPD-17s.

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[45] CSBA report, slides 246, 249, and 251-253. Slide 249 states that possibilities for a reduced-cost alternative to the DDG-1000 include a surface combatant based on the LPD-17 design, a semi-submersible ship built to commercial standards (like a ship called the "Stryker" that was proposed several years ago), and a large or medium "carrier of large objects," perhaps built to relaxed commercial standards.

[46] CSBA report, slides 275, 277, and 283.

- Form eight "distributed expeditionary strike bases" — each of which would include one LHD, three LPD-17s, one Aegis cruiser, three Aegis destroyers, two LCSs, and one SSGN.[47]

MPF and Other Ships.

- Retain the three existing MPF squadrons over the near- to mid-term.
- Reconfigure two of the squadrons for irregular warfare.
- Use the third squadron as a swing asset to either reinforce the two irregular-warfare squadrons or to provide lift for assault follow-on echelon amphibious landing forces.
- Develop high-speed intra-theater and ship-to-shore surface connectors.
- Design an attack cargo ship (TAKA) to help support sustained joint operations ashore, with a target unit procurement cost of $500 million or less, and begin procuring this ship in FY2014.
- Replace the two existing hospital ships, the four existing command ships, and existing support tenders with new ships based on the LPD-17 design.
- Initiate a joint experimental program for future sea-basing platforms and technologies.[48]

The CSBA report raises several questions about the Navy's emerging sea basing concept for conducting expeditionary operations ashore. The report states:

> The work done thus far on sea basing is intriguing, but neither the concept nor the supporting technologies appear sufficiently mature to justify any near-term decisions such as canceling LPD-17 [procurement] in favor of MPF(F) ships, or removing the well deck from the big deck amphibious assault platforms, both of which would severely curtail the [fleet's] ability to launch surface assaults over the longer term.
>
> Given these large uncertainties, no major moves toward the sea basing vision should be made without further exploring the sea basing concept itself, and experimenting with different numbers and types of sea base platforms, connectors, and capabilities.[49]

Observations

Observations about the CNA, OFT, and CSBA reports can be made on several points, including the following:

- organizations and authors;
- analytical approach;

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[47] CSBA report, slides 227 and 236.

[48] CSBA report, slides 228-232, and 307.

[49] CSBA report, slide 212.

- use of prospective ship-procurement funding levels as a force-planning consideration;
- fleet size and structure;
- whether the recommended force qualifies as an alternative fleet architecture;
- fleet capability;
- transition risks; and
- implications for the industrial base.

Each of these is discussed below.

Organizations and Authors.

CNA Report. CNA is a federally funded research and development center (FFRDC) that does much of its analytical at the Navy's request. The CNA report's discussion of how crew rotation may alter force-level requirements for maintaining day-to-day forward deployments is somewhat detailed and may have been adapted from other work that CNA has done on the topic for the Navy.

OFT Report. The OFT report was prepared under the direction of retired Navy admiral Arthur Cebrowski, who was the director of OFT from October 29, 2001 until January 31, 2005 and the President of the Naval War College (NWC) from July 24, 1998 to August 22, 2001. During his time at NWC and OFT, Cebrowski was a leading proponent of network-centric warfare and distributed force architectures.

CSBA Report. The CSBA report was prepared by Robert Work, CSBA's analyst for maritime issues. CSBA describes itself as "an independent, policy research institute established to promote innovative thinking about defense planning and investment strategies for the 21st century. CSBA's analytic-based research makes clear the inextricable link between defense strategies and budgets in fostering a more effective and efficient defense, and the need to transform the US military in light of an emerging military revolution."[50] CSBA's Executive Director is Dr. Andrew F. Krepinevich, Jr., whose previous experience includes work in DOD's Office of Net Assessment, the office directed by Andrew Marshall. Krepinevich is generally considered a major writer on defense transformation.

Analytical Approach.

CNA Report. The CNA report grounds its analysis in traditional DOD force-planning considerations and campaign modeling. The report cites past DOD force-planning studies that reflect similar approaches. The implicit argument in the CNA report is that its findings have weight in part because they reflect a well-established and systematic approach to the problem.

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[50] See CSBA's website [http://www.csbaonline.org].

OFT Report. In contrast to the CNA report, the OFT report "calls into question the viability of the longstanding logic of naval force building."[51] The OFT report grounds its analysis in four major force-design principles that the report identifies as responsive to future strategic challenges and technological opportunities.[52] The report then seeks to design a fleet that it is consistent with these principles, and assesses that fleet using a new set of metrics that the report believes to be consistent with these principles. The implicit argument in the OFT report is that its findings have weight in part because they reflect major force-design principles that respond to future strategic challenges and technological opportunities.

CSBA Report. The CSBA report employs an extensive historical analysis of the missions and structure of the U.S. Navy and other navies. The report argues that the structure of the U.S. Navy has shifted over time in response to changes in technology and U.S. security challenges, and that U.S. military forces have entered a new security era (which the report calls the "Joint Expeditionary Era") during which the U.S. Navy will need to do three things.[53] To do these three things, the report argues, the Navy should be structured to include four different force elements.[54] The report constructs these four force elements and then combines them to arrive at an overall recommended Navy force structure. The implicit argument in the CSBA report is that its findings have weight in part because they reflect insights about future missions and force requirements gained through careful historical analysis of the missions and structure of the U.S. Navy and other navies.

Prospective Ship-Procurement Funding Levels as Consideration.

CNA Report. The CNA report aims at designing a cost-effective fleet. It also mentions cost estimates relating to the option of homeporting additional attack submarines at Guam.[55] Prospective ship-procurement funding levels, however, are not prominently featured in the CNA report as a force-planning consideration.

OFT Report. Prospective ship-procurement funding levels are a significant force-planning consideration in the OFT report. The report argues that an important metric for assessing a proposed fleet architecture is the ease or difficulty with which it can be scaled up or down to adapt to changes in ship-procurement funding levels.

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[51] OFT report, p. 1.

[52] The principles are complexity, smaller ships and improved payload fraction, network-centric warfare, and modularity.

[53] These three things are: (1) contribute to the global war on terrorism (GWOT); (2) prepare for possible nuclear-armed regional competitors; and (3) hedge against the possibility of a disruptive maritime competition with China.

[54] These four force elements are: (1) a sea-based power-projection and regional deterrence force; (2) a global patrol, GWOT, and homeland defense force; (3) a force for prevailing over enemy anti-access/area-denial forces; and (4) a strategic deterrence and dissuasion force.

[55] CNA Report, p. 36.

The OFT report contains a fairly detailed discussion of the Navy's budget situation that calls into question, on several grounds, the Navy's prospective ability to afford its 375-ship proposal. The report concludes that funding for Navy ship-procurement in future years may fall as much as 40% short of what would be needed to achieve the Navy's 375-ship fleet proposal. If the shortfall is 40%, the report estimates, the Navy could maintain a force of 270 to 315 ships, which is comparable in number to today's force of 282 ships, except that the future force would include a substantial number of relatively inexpensive LCSs. If proportionate reductions are applied to the OFT fleets shown in **Table 7**, Alternative A would include 402 to 469 ships, Alternative B would include 557 to 650 ships, and Alternative C would include 609 to 711 ships. Again, these totals would not include certain kinds of ships (independently operating SSNs, etc.) that are included in the total of 270 to 315 ships associated with the Navy's currently planned architecture.

CSBA Report. As with the OFT report, prospective ship-procurement funding levels are a significant force-planning consideration in the CSBA report. The CSBA report estimates that in future years, the Navy may have an average of about $10 billion per year in ship-acquisition funding. The report then aims at designing a force whose ships could be acquired for this average annual amount of funding.

Fleet Size and Structure.

CNA Report. The 380-ship fleet at the high end of the CNA range is similar in size and composition to the Navy's 375-ship fleet proposal. The 256-ship fleet at the low end of the CNA range is similar in size and composition to the Navy's 260-ship fleet for FY2035, except that the 260-ship fleet has more LCSs and fewer ships in the "other ships" category.[56]

OFT Report. The OFT-recommended fleet would have a much larger total number of ships than the Navy's planned fleet. The OFT fleet would also feature a much larger share of small combatants. Of the ships shown in **Table 7**, the small combatants account for about 75% in Alternative A, about 79% in Alternative B, and about 72% in Alternative C. (Adding into the mix SSNs and other kinds of ships not shown in **Table 7** would reduce these percentages somewhat.) In the Navy's notional 260- and 325-ship fleets, by contrast, LCSs account for about 25% of the total number of ships.

The OFT architecture is similar in certain ways to a fleet architecture proposed by the Naval Surface Warfare Center (NSWC) between 1989 and 1992 and sometimes referred to as the Carrier of Large Objects (CLO) proposal. The NSWC architecture, like the OFT architecture, employed a common hull design for a large

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[56] Additional points of comparison: The CNA range of 256 to 380 ships overlaps with potential ranges of 290 to 375 ships, 260 to 325 ships, and 243 to 302 ships presented in the Navy's February 2005 testimony to Congress. The mid-point of the CNA-recommended range (318 ships) is similar in terms of total numbers of ships to the 310-ship fleet from the 2001 Quadrennial Defense Review (QDR). Unlike the 2001 QDR fleet, however, the CNA-recommended force includes several dozen Littoral Combat Ships (LCSs) and smaller numbers of other kinds of ships.

ship that could be built in several variants for various missions, including aviation, missile launching and fire support, amphibious warfare, logistics support, and mother-ship support of small, fast, surface combatants. The small, fast surface combatants in the NSWC architecture were called scout fighters and were in the same general size range as the 100- and 1,000-ton surface combatants in the OFT architecture.[57]

CSBA Report. The CSBA force would have about the same total number of ships as the Navy's 375-ship fleet proposal. CSBA's subtotals for some ship categories are similar to subtotals in one or more of the other fleet proposals shown in **Table 6**. Significant differences between the CSBA proposal and the other fleet proposals shown in **Table 8** include:

- the four medium-sized aircraft carriers (CVEs);
- the conversion of a carrier into an afloat forward staging base;
- the composition of the cruiser-destroyer force (which would include SCXs rather than DDG-1000s and CG(X)s);
- the composition of the amphibious fleet (which would have additional LPD-17s in lieu of today's LSD-41/49s); and
- the composition of the maritime prepositioning force (which would continue to include, for a time at least, today's MPF ships rather than the Navy's planned MPF(F) ships).

Does it Qualify as an Alternative Force Architecture.

CNA Report. As mentioned earlier, the CNA report uses essentially the same kinds of ships and naval formations as those planned by the Navy. If an alternative fleet platform architecture is defined as one that uses ship types or naval formations that differ in some significant way from those currently used or planned, then the CNA-recommended force arguably would not qualify as an alternative fleet platform architecture.

OFT Report. Since the OFT report proposes building ships that are substantially different from those currently planned, and combines them ships into formations which, although similar in name to currently planned formations (i.e., CSGs, ESGs, and SSGs), might be viewed by some observers as substantially different in composition from the currently planned versions of these formations, the

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[57] For more on this proposed fleet architecture, see Norman Polmar, "Carrying Large Objects," *U.S. Naval Institute Proceedings*, December 1990, pp. 121-122; Michael L. Bosworth *et al*, "Multimission Ship Design for an Alternative Fleet Concept," *Naval Engineers Journal*, May 1991, pp. 91-106; Michael L. Bosworth, "Fleet Versatility by Distributed Aviation," *U.S. Naval Institute Proceedings*, Jan. 1992, pp. 99-102; and Victor A. Meyer, "Naval Surface Warfighting Vision 2030," *Naval Engineers Journal*, May 1992, pp. 74-88. See also "USN's '2030' Plan For Future Fleet," *Sea Power*, Apr. 1992, pp. 79, 82; Edward J. Walsh, "'Alternative Battle Force' Stresses Commonality, Capability," *Sea Power*, Feb. 1991, pp. 33-35; Robert Holzer, "Navy Floats Revolutionary Ship Design for Future Fleet," *Defense News*, May 14, 1990, pp. 4, 52; and Anne Rumsey, "Navy Plans Ship Look-A-Likes," *Defense Week*, Mar. 13, 1989, p. 3.

OFT-recommended force arguably would qualify as an alternative fleet platform architecture.

CSBA Report. Since the CSBA report proposes building ships that in some cases are different from those currently planned, and combines these ships into formations that in some cases are different in composition from those currently planned, the CSBA-recommended force arguably would qualify as an alternative fleet platform architecture, though less dramatically so than the OFT-recommended force.

New Ship Designs.

CNA Report. The CNA report does not propose any ship designs other than those already planned by the Navy.

OFT Report. The 57,000-ton aircraft carrier in the OFT report would be roughly the same size as the United Kingdom's new aircraft carrier design, and somewhat larger than the U.S. Navy's 40,000-ton LHA/LHD-type amphibious assault ships. Compared to the U.S. Navy's aircraft carriers, which displace 81,000 to 102,000 tons, this ship could be considered a medium-size carrier.

The 57,000-ton missile-and-rocket ship in the OFT report could be considered similar in some respects to the Navy/DARPA arsenal ship concept of 1996-1997, which would have been a large, relatively simple surface ship equipped with about 500 VLS tubes.[58]

The 13,500-ton aircraft carrier in the OFT report would be slightly larger than Thailand's aircraft carrier, which was commissioned in 1997, and somewhat smaller than Spain's aircraft carrier, which was based on a U.S. design and was commissioned in 1988. Due to its SES/catamaran hull design, this 13,500-ton ship would be much faster than the Thai and Spanish carriers (or any other aircraft carrier now in operation), and might have a larger flight deck. This ship could be considered a small, high-speed aircraft carrier.

The 1,000- and 100-ton surface combatants in the OFT report could be viewed as similar to, but smaller than, the 2,500- to 3,000-ton Littoral Combat Ship (LCS). Compared to the LCS, they would be closer in size to the Streetfighter concept (a precursor to the LCS that was proposed by retired admiral Cebrowski during his time at the Naval War College).

The AIP submarine in the OFT report could be similar to AIP submarines currently being developed and acquired by a some foreign navies.

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[58] For more on the arsenal ship, see CRS Report 97-455, *Navy/DARPA Arsenal Ship Program: Issues and Options for Congress*, by Ronald O'Rourke; and CRS Report 97-1044, *Navy/DARPA Maritime Fire Support Demonstrator (Arsenal Ship) Program: Issues Arising From Its Termination*, by Ronald O'Rourke. Both reports are out of print and are available directly from the author.

CSBA Report. The proposal in the CSBA report for an afloat forward staging base (AFSB) is similar to other proposals for AFSBs that have been reported in recent years, though other proposals have suggested using commercial ships or military sealift ships rather than converted aircraft carriers as the basis for the AFSB.[59]

The CVE in the CSBA report, like the 57,000-ton carrier in the OFT report, can be viewed as a medium-sized carrier. With a full load displacement of perhaps about 40,000 tons, the CVE would be somewhat smaller than the 57,000-ton carrier and consequently might embark a smaller air wing. The CVE, however, would be based on the LHA(R) amphibious ship design rather than a merchant-like hull, and consequently could incorporate more survivability features than the 57,000-ton carrier.

The proposal in the CSBA report for a new undersea superiority system with a procurement cost 50% to 67% that of the Virginia-class SSN design is similar to the Tango Bravo SSN discussed earlier in this testimony.

The proposals in the CSBA report for a reduced-cost new-design surface combatant called the SCX, and for a low-cost gunfire support ship, are broadly similar to the options for a reduced-cost new-design surface combatant discussed earlier in this testimony.

Fleet Capability.

CNA Report. The CNA report uses essentially the same kinds of ships and formations as planned by the Navy, and recommends generally the same numbers of ships as a function of force-planning variables such as use of crew rotation. As a consequence, the CNA-recommended force range would be roughly similar in overall capability to the Navy's planned architecture.

OFT Report. The OFT architecture differs so significantly from the Navy's planned architecture that assessing its capability relative to the Navy's planned architecture is not easy. As a general matter, the OFT report stresses overall fleet survivability more than individual-ship survivability, and argues that fleet effectiveness can be enhanced by presenting the enemy with a complex task of having to detect, track, and target large numbers of enemy ships. The OFT report

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[59] See, for example, Stephen M. Carmel, "A Commercial Approach to Sea Basing — Afloat Forward Staging Bases," *U.S. Naval Institute Proceedings*, Jan. 2004, pp. 78-79; Christopher J. Castelli, "Budget Anticipates Developing MPF(F) Aviation Variant From LMSR," *Inside the Navy*, Jan. 19, 2004; Christopher J. Castelli, "Brewer Proposes Commercial Ship To Test Seabasing Technologies," *Inside the Navy*, Jan. 27, 2003; Christopher J. Castelli, "In POM-04, Navy Cancels JCC(X), Plans To Substitute MPF(F) Variant," *Inside the Navy*, Sept. 2, 2002; Christopher J. Castelli, "Navy May Develop New Support Ships, Pursue Sealift Experimentation," *Inside the Navy*, May 27, 2002.

argues that in addition to warfighting capability, a fleet can be judged in terms of its capability for adapting to changes in strategic demands and funding levels.[60]

Readers who agree with most or all of these propositions might conclude that the OFT-recommended architecture would be more capable than the Navy's planned architecture. Readers who disagree with most or all of these propositions might conclude that the OFT-recommended architecture would be less capable than the Navy's planned architecture. Readers who agree with some of these propositions but not others (or who agree with these propositions up to a certain point, but less fervently than OFT), might conclude that the OFT-recommended architecture might be roughly equal in total capability to the Navy's planned architecture.

In addressing the question of fleet capability, the OFT report states:

> Alternative fleet formations consisting of small fast and relatively inexpensive craft combining knowledge and attaining flexibility through networking appear superior to the programmed fleet for non-traditional warfare in a variety of settings. This is due to increasing the complexity the enemy faces and increasing U.S. fleet options that in turn reduce enemy options. The speed and complexity of the alternative fleets can provide them with the capability to complicate and possibly defeat the attempts of non-traditional adversaries to

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[60] The OFT report argues that its recommended fleet architecture would:

- "provide a quantum leap ahead in capabilities against a spectrum of enemies ranging from large, highly developed competitors to small but determined asymmetric adversaries" (page 6) and be adaptable, in a dynamic and less-predictable security environment, to changing strategic or operational challenges;

- be capable of both participating in joint expeditionary operations and maintaining "the strategic advantage the Navy has developed in the global commons," avoiding a need to choose between optimizing the fleet for "performance against asymmetric challenges at the expense of its ability to confront a potential adversary capable of traditional high intensity conflict,"such as China; (pages 1 and 2)

- pose significant challenges to adversaries seeking to counter U.S. naval forces due to the "large numbers of combat entities that the enemy must deal with; a great variety of platforms with which the enemy must contend; speed; different combinations of forces; distribution of forces across large areas; and [adversary] uncertainty as to the mission and capabilities of a given platform;" (page i)

- permit more constant experimentation with new operational concepts, and thereby achieve higher rates of learning about how to evolve the fleet over time; and

- recognize potential future constraints on Navy budgets and make the Navy more smoothly scalable to various potential future resource levels by shifting from a fleet composed of limited numbers of relatively expensive ships to one composed of larger numbers of less expensive ships.

> elude surveillance. The enemy could have difficulty determining what to expect and how to defeat them all. The superior speed and more numerous participants than in the programmed fleet provide a stronger intelligence base and more numerous platforms from which to conduct strikes and interceptions. This appears to be true even if the smaller craft are *individually* somewhat less capable and less able to sustain a hit than the larger ships in the programmed fleet.
>
> If these circumstances are not achieved, and the enemy can continue to elude and deceive, the [Navy's] programmed fleet often is as good as the [OFT] alternatives, sometimes even better. It is not necessarily better in cases in which individual ship survivability dominates, a perhaps counterintuitive result until we realize that *fleet* survivability not *individual ship* survivability is what dominates.
>
> An area in which programmed fleets might have an advantage would be when the long loiter time or deep reach of CTOL [conventional takeoff and landing] aircraft on programmed big-deck CVNs [nuclear-powered aircraft carriers] is needed. That said, there need be no great sacrifice. With airborne tanking, the VSTOL [very short takeoff and landing] aircraft in the alternatives could meet the deep strike and long loiter demands. Also, as mentioned earlier, a combination of advances in EMALS [electromagnetic aircraft launch system] and modifications to the JSF will make it possible to launch the JSF with only a marginal range-payload capability penalty. Moreover, trends in technology are providing *unmanned* aircraft greater capability, including greater loiter time and sensor capability.[61]

CSBA Report. The CSBA report argues that its architecture would provide a total capability equal to that of the Navy's planned architecture, but at a lower total cost, because the CSBA architecture would:

- employ new ship designs, such the new undersea superiority system and the SCX, that, because of their newer technologies, would cost less than, but be equal in capability to, current designs such as the Virginia-class SSN and DDG-1000 destroyer; and

- make more use of the LPD-17 hull design, whose basic design costs have already been paid, and which can be produced efficiently in large numbers and adapted economically to meet various mission requirements.

It is plausible that using newer technologies would permit new, reduced-cost, ship designs to be more capable than such designs would have been in the past. Whether the increases in capability would always be enough to permit these ships to be equal in capability to more expensive current designs is less clear. The Navy may be able to achieve this with a new SSN design, because several new submarine technologies have emerged since the Virginia-class design was developed in the 1990s, but achieving this with a new large surface combatant design could be more challenging, because the DDG-1000 design was developed within the last few years and few new surface combatant technologies may have emerged since that time. If

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[61] OFT report, pp. 75-76. Italics as in the original.

one or more of the reduced-cost designs turn out to be less capable than current designs, then the CSBA architecture would not generate as much total capability as the report projects.

The CSBA report also argues that its architecture would produce a force with a mix of capabilities that would better fit future strategic demands. To achieve this, the report recommends, among other things, reducing currently planned near-term procurement of new destroyers and MPF(F) ships, increasing currently planned procurement of new amphibious ships, and a changing the currently planned investment mix for aircraft carriers.

Readers who agree with CSBA's description of future strategic demands, and who agree that CSBA's recommended investment changes respond to those demands, might conclude that the CSBA-recommended architecture would be better optimized than the Navy's planned architecture to meet future needs. Readers who disagree with one or both of these propositions might conclude that the Navy's planned architecture might be better optimized, or that neither architecture offers clear advantages in this regard.

Implementation Risks.

CNA Report. Implementation risks associated with the force recommended in the CNA report include developing and designing the various types of ships included in the plan — including in particular the DDG-1000 destroyer, which is to incorporate a number of new technologies — and the issue of whether Navy funding levels in coming years would be adequate to build and maintain the recommended fleet.

OFT Report. The OFT report does not include a detailed plan for transitioning from today's fleet architecture to its proposed architecture,[62] but such a plan could be

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[62] On the topic of transitioning to the proposed fleet architecture, the report states:

> Implementation of the alternative fleet architecture should start now and should target option generation, short construction time, and technology insertion. The alternative further provides an opportunity to reinvigorate the shipbuilding industrial base. The many smaller ships, manned and unmanned, in the alternative fleet architecture could be built in more shipyards and would be relevant to overseas markets. The potential longevity of the existing fleet will sustain existing shipyards as they move into building smaller ships more rapidly in this broader market and more competitive environment. The shipyards would develop a competence, broad relevance, and operate in an environment driven by market imperatives instead of a framework of laws that frustrates market forces.
>
> As the new ships enter service and the fleet has the opportunity to experiment with new operational concepts (expanded network-centric warfare in particular) existing ships can be retired sooner to capture operations savings. At this point, the sooner the existing fleet is retired, the sooner the benefits of the alternative fleet architecture design will accrue. (Page 3)

(continued...)

developed as a follow-on analysis. The plan could involve replacing existing ship designs and associated formations as they retire with OFT's recommended new ship designs and associated formations. Implementation risks associated with the force recommended in the OFT report include developing and designing the eight new types of ships included in the plan, including the four types of large ships based on the 57,000-ton commercial-like hull, the 13,500-ton SES/catamaran aircraft carrier (since it would be much larger than other SES/catamaran ships), the AIP submarine (since the AIP technology is relatively new and a non-nuclear-powered submarine has not been designed and built for the U.S. Navy since the 1950s), and the 1,000- and 100-ton surface combatants (since new technologies are needed to achieve the increased payload fraction that these ships are to have). The OFT-recommended force could pose implementation risks due to the new kinds of naval formations that would be used, which could require development of new doctrine, concepts of operations, and tactics.

CSBA Report. A stated goal of the CSBA report is to provide a detailed, practical transition road map for shifting from today's fleet structure to the report's recommended fleet structure. The many specific recommendations made in the report could be viewed as forming such a road map. Implementation risks associated with the force recommended in the CSBA report include developing and designing the reduced-cost SSN and the reduced-cost SCX surface combatant, particularly since these two new ship designs are be equal in capability to the more expensive designs they would replace.

Implications For Industrial Base.

CNA Report. Since the CNA report uses essentially the same kinds of ships and naval formations as those in use today or planned by the Navy, and recommends similar numbers of ships, the industrial-base implications of the CNA-recommended force would appear to be similar to those of the Navy's current plans.

OFT Report. The OFT report seeks to reduce unit shipbuilding costs, and thereby permit an increase in total ship numbers, by shifting the fleet away from complex, highly integrated ship designs that are inherently expensive to build and toward less-complex merchant-like hulls and small sea frames that are inherently less expensive to build. Similarly, the OFT report seeks to increase shipbuilding options for the Navy by shifting the fleet away from complex, highly integrated ship designs that can be built only by a limited number of U.S. shipyards and toward less-complex merchant-like hulls and small sea frames that can be built by a broader array of shipyards. The OFT report also aims to make it easier and less expensive to modernize ships over their long lives, and thereby take better advantage of rapid developments in technology, by shifting from highly integrated ship designs to merchant-like hulls and sea frames.

As a consequence of these objectives, the OFT report poses a significant potential business challenge to the six shipyards that have built the Navy's major

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[62] (...continued)
Additional general discussion of implementation is found on pp. 76-77 of the report.

warships in recent years. The report's discussion on implementing its proposed architecture states in part:

> The shipbuilding industrial base would also need to start to retool to build different types of ships more rapidly. Smaller shipyards, which presently do little or no work for the Navy could compete to build the smaller ships, thereby broadening the capabilities base of ship design and construction available to the Navy. The change to smaller, lower unit cost ships would also open up overseas markets. With more shipyards able to build the ships and potential for a broader overall market, the U.S. shipbuilding industry would have the chance to expand its competence, innovation and relevance. Taken together this would sharpen the industry's ability to compete and provide alternatives to a ship procurement system that is beset by laws and regulations that frustrate, even pervert, market forces.[63]

The report's concluding section lists five "dangers" that "risk the Navy's 'losing the way.'" One of these, the report states, is "Shielding the shipbuilding industrial base from global competition," which the report states "guarantees high cost, limited innovation, and long cycle times for building ships."[64]

CSBA Report. The CSBA report similarly raises significant potential issues for the six shipyards that have built the Navy's major warships in recent years. The report states that "Rationalizing the defense industrial base is... a critical part of DoN's [the Department of the Navy's] maritime competition strategy, and should be the subject of immediate consideration and deliberation by the Congress, DoD, and the DoN."[65] The report states:

> Numerous studies have indicated that the six Tier I yards [i.e., the six yards that have built the Navy's major warships in recent years] have "exorbitant excess capacities," which contribute to the rising costs of [Navy] warships, primarily because of high industrial overhead costs. These capacities are the result of "cabotage laws and fluctuating national security acquisition policies that force shipbuilders of combatants to retain capacities to address required surges in coming years." This last point is especially important: the DoN contributes greatly to the problem of "exorbitant capacities" by its consistent tendency to portray overly optimistic ramp ups in ship production in budget "out years."[66]

The report recommends the following as part of its overall transition strategy:

- Minimize production costs for more expensive warships (defined in the report as ships costing more than $1.4 billion each) by consolidating production of each kind of such ship in a single shipyard, pursuing learning curve efficiencies, and requesting use of multiyear procurement (MYP) whenever possible.

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[63] OFT report, p. 76.

[64] OFT report, p. 80.

[65] CSBA report, slide 314.

[66] CSBA report, slide 315.

- Minimize production costs for warships and auxiliaries costing less than $1.4 billion each by emphasizing competition, shifting production to smaller "Tier II" yards, using large production runs, and enforcing ruthless cost control.[67]

The report states that "the strategy developed in this report suggests that [Navy] planners might wish to:"

- maintain production of aircraft carriers at NGNN,
- consolidate production of large surface combatants and amphibious ships at NG/Ingalls, and
- consolidate submarine building GD/EB, or with a new, single submarine production company.[68]

The report states that the second of these possibilities is guided by the building sequence of LPD-17s and SCXs recommended in the report, NG/Ingalls' ability to build a wider variety of ships than GD/BIW, NG/Ingalls' surge capacity, and the availability of space for expanding NG/Ingalls if needed.[69]

The report states that the third of these possibilities is guided by the low probability that procurement of Virginia-class submarines will increase to two per year, the cost savings associated with consolidating submarine production at one yard, GD/EB's past experience in building SSBNs and SSNs, GD/EB's surge capacity, and the fact that building submarines at GD/EB would maintain two

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[67] CSBA report, slide 316. Other steps recommended as part of the report's overall transition strategy (see slides 124 and 125) include the following:

- Plan to a fiscally prudent steady-state shipbuilding budget of $10 billion per year.
- Maximize current capabilities and minimize nonrecurring engineering costs for new platforms by maintaining and pursuing hulls in service, in production or near production that can meet near- to mid-term GWOT requirements and that are capable of operating in defended-access scenarios against nuclear-armed regional adversaries.
- Identify and retain or build large numbers of common hulls that have a large amount of internal reconfigurable volume, or that can carry a variety of modular payloads, or that can be easily modified or adapted over time to new missions.
- Pursue increased integration of Navy and Marine warfighting capabilities and emphasize common systems to increase operational effectiveness and reduce operation and support (O&S) costs.
- Focus research and development efforts on meeting future disruptive maritime challenges, particularly anti-access/area-denial networks composed of long-range systems and possibly weapons of mass destruction.

[68] CSBA report, slides 317-318.

[69] CSBA report, slide 318.

shipyards (GD/EB and NGNN) capable of designing and building nuclear-powered combatants of some kind.[70]

The report acknowledges that yard consolidation would reduce the possibilities for using competition in shipbuilding in the near term and increase risks associated with an attack on the shipbuilding infrastructure, but notes that DOD consolidated construction of nuclear-powered carriers in a single yard years ago, and argues that competition might be possible in the longer run if future aircraft-carrying ships, the SCX, and the new undersea superiority system could be built in Tier II yards.[71]

The report states:

> Given their current small yearly build numbers, consolidating construction of aircraft carriers, surface combatants, and submarines in one yard [for each type] makes sense. However, the same logic does not hold true for auxiliaries and smaller combatants. These ships can normally be built at a variety of Tier I and Tier II yards; competition can thus be maintained in a reasonable and cost-effective way. For example, competing auxiliaries and sea lift and maneuver sea base ships between NASSCO, Avondale, and Tier II yards may help to keep the costs of these ships down.
>
> Building multiple classes of a single ship [type] is another prudent way to enforce costs, since the DoN can divert production of any ship class that exceeds its cost target to another company/class that does not. Simultaneously building both the [Lockheed] and [General Dynamics] versions of [the] LCS, and the Northrop Grumman National Security Cutter, Medium [i.e., the medium-sized Deepwater cutter] gives the DoN enduring capability to shift production to whatever ship stays within its cost target....
>
> Of course, Congress and the DoN may elect to retain industrial capacity, and to pay the additional "insurance premium" associated with having excess shipbuilding capacity. For example: Congress and the DoN might wish to retain two submarine yards until the [undersea superiority system] design is clear, and wait to rationalize the submarine building base after potential [undersea superiority system] yearly production rates are clear....
>
> In a similar vein, Congress and the DoN might wish to retain two surface combatant yards until the design of the SCX is clear, and wait to rationalize the surface combatant building base after potential SCX yearly production rates are clear. In this regard, Congress could consider authorizing a modest additional number of [Aegis destroyers] to keep both BIW and Ingalls "hot" until the SCX is designed....
>
> The key point is that the US shipbuilding infrastructure must be rationally sized for expected future austere shipbuilding budgets, and whatever fiscally prudent [Navy] transition plan is finally developed by DoN planners.[72]

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[70] CSBA report, slide 318. See also slide 298.

[71] CSBA report, slides 318-319.

[72] CSBA report, slide 319.

Summary

In summary, the following can be said about the three reports:

- The CNA report presents a fairly traditional approach to naval force planning in which capability requirements for warfighting and for maintaining day-to-day naval forward deployments are calculated and then integrated. The CNA-recommended force parallels fairly closely current Navy thinking on the size and composition of the fleet. This is perhaps not surprising, given that much of CNA's analytical work is done at the Navy's request.

- The OFT report fundamentally challenges current Navy thinking on the size and composition of the fleet, and presents an essentially clean-sheet proposal for a future Navy that would be radically different from the currently planned fleet. This is perhaps not surprising, given both OFT's institutional role within DOD as a leading promoter of military transformation and retired admiral Cebrowski's views on network-centric warfare and distributed force architectures.

- The CSBA report challenges current Navy thinking on the size and composition of the fleet more dramatically than the CNA report, and less dramatically than the OFT report. Compared to the CNA and OFT reports, the CSBA report contains a more detailed implementation plan and a more detailed discussion of possibilities for restructuring the shipbuilding industrial base.

Appendix C: Size of Navy and Navy Shipbuilding Rate

The total number of battle force ships in the Navy reached a late-Cold War peak of 568 at the end of FY1987 and began declining thereafter.[73] The Navy fell below 300 battle force ships in August 2003 and included 281 battle force ships as of February 14, 2006.

Table 9 below shows past (FY1982-FY2006) and projected (FY2007-FY2011) rates of Navy ship procurement.

Table 9. Battle Force Ships Procured (FY1982-FY2006) or *Projected (FY2007-FY2011)*

82	**83**	**84**	**85**	**86**	**87**	**88**	**89**	**90**	**91**	**92**	**93**	**94**	**95**	**96**
17	14	16	19	20	17	15	19	15	11	11	7	4	4	5
97	**98**	**99**	**00**	**01**	**02**	**03**	**04**	**05**	**06**	***07***	***08***	***09***	***10***	***11***
4	5	5	6	6	6	5	7	8	6	*7*	*7*	*11*	*12*	*14*

Source: CRS compilation based on examination of defense authorization and appropriation committee and conference reports for each fiscal year. The table excludes non-battle force ships that do not count toward the 310- or 375- ship goal, such as sealift and prepositioning ships operated by the Military Sealift Command and oceanographic ships operated by agencies such as the National Oceanic and Atmospheric Administration (NOAA).

[73] Some publications, such as those of the American Shipbuilding Association, have stated 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. The battle force ships figure is the number used in government discussions of the size of the Navy. 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 Nov. 16, 2001, the Navy included a total of 337 active ships, while the Navy states that as of Nov. 19, 2001, the Navy included a total of 317 battle force ships. 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.