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CBO
STUDY

Options for the Navy's Future Fleet

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The Congress of the United States ■ Congressional Budget Office

Table 2-1.

New Classes of Ships Scheduled to Enter the Fleet Through 2035

New Class	Year First Ship Is Authorized	Year First Ship Is Commissioned	Quantity to Be Purchased Through 2035	Existing Ships Being Retired		
				Current Class	Quantity Now in Service[a]	Year First Ship Retires
Aircraft Carriers						
CVN-21	2008	2015	7	Kitty Hawk (CV-63)	1	2008
				Enterprise (CVN-65)	1	2013
				John F. Kennedy (CV-67)	1	2006 [b]
				Nimitz (CVN-68)	9	2025
Surface Combatants						
Freedom (LCS-1)	2005	2007	76 [c]	Oliver Hazard Perry (FFG-7)	30	1994
Zumwalt (DDG-1000)[d]	2007	2012	7	Spruance (DD-963)	1	1998
CG(X)	2011	2016	19	Ticonderoga (CG-47)	24	2004
DDG(X)	2023	2028	25	Arleigh Burke (DDG-51)	62 [e]	2026
Submarines						
Virginia (SSN-774)	1998	2004	30	Los Angeles (SSN-688)	49	1995
Improved Virginia	2020	2026	27			
SSBN(X)	2022	2029	14	Ohio (SSBN-726)	14	2027
Amphibious Ships						
San Antonio (LPD-17)	1996	2006	9	Austin (LPD-4)	11	2004
LHA-6/LHD(X)	2007	2012 [f]	8	Tarawa (LHA-1)	4	2006 [g]
				Wasp (LHD-1)	7	2029
MPF(F) (various)	2009	2012	12			
LSD(X)	2018	2022 [f]	12 [f]	Whidbey Island (LSD-41)	8	2022
				Harpers Ferry (LSD-49)	4	2032
Support Ships						
Lewis and Clark (T-AKE)	2000	2006	11	Kilauea (AE-26)	5	2010
				Sacramento (AOE-1)	3	2005
T-ATF(X)	2013	2015	4	Powhatan (T-ATF-166)	4	2015
T-AO(X)	2018	2022	15	Henry J. Kaiser (T-AO-187)	14	2022
T-AGOS(X)	2021	2025	4	Victorious (T-AGOS-19)	3	2024
				Impeccable (T-AGOS-23)	1	2031
ARS(X)	2022	2026	4	Safeguard (ARS-50)	4	2026
T-AOE(X)	2025	2029	4	Supply (T-AOE-6)	4	2029

Source: Congressional Budget Office.

Note: Ships with a "T-" designation refer to vessels operated by the Military Sealift Command. For the meaning of other letter designations for ships, see Summary Box 2 on page xiv.

a. At the beginning of 2006.

b. The Navy proposes to retire the *John F. Kennedy* in 2006, but it must obtain Congressional authorization to do so.

c. Includes replacements bought in the 2030s for Freedom class littoral combat ships that retire after 25 years of service.

d. Formerly known as the DD(X).

e. There are 48 DDG-51s in service today, but the Navy has ordered a total of 62.

f. Projected.

g. *Belleau Wood*, the first LHA-1 to retire, will be replaced by *Makin Island*, the last of the LHDs.

The Navy currently plans to build 30 Virginia class submarines, with the procurement rate rising to two per year in 2012 and beyond. However (as discussed in more detail below), the size of the attack submarine force will begin to fall substantially in 10 years because the Navy is unlikely to build Virginias fast enough to replace Los Angeles class submarines, which will begin to be retired in large numbers after 2015.

The principal criticism of the Virginia program has been its cost. In response to the rising unit (per-ship) cost of those submarines, the Navy and DoD are considering alternative approaches to provide undersea warfare capabilities in the future. The Navy, in conjunction with the Defense Advanced Research Projects Agency, is looking at concepts that could yield a nuclear-powered submarine about half the size of a Virginia, but with all of the same capabilities, for between two-thirds and three-quarters of the Virginia's price tag. The main way to achieve that reduction in size and cost would be to use an all-electric drive system in which the drive shaft would be eliminated and replaced with small, podded motors mounted on the outside of the hull. Eliminating the drive shaft would save substantial space and (potentially) cost.

At the same time, the Office of Force Transformation argues that the Navy should reexamine the value of diesel-electric submarines, particularly those with closed systems, known as air-independent propulsion, that allow them to stay submerged for two to four weeks at very slow speeds. (Nuclear-powered submarines, by contrast, can stay submerged for months at high speeds.) Such submarines would cost far less than a Virginia and might be better suited to littoral areas because they would be much smaller than their nuclear counterparts.[22] Conversely, nuclear-powered submarines can operate far from U.S. shores for months at a time and can redeploy quickly when necessary. Diesel-electric submarines could not do that and would probably require the support of a mother ship to deploy to their operating areas overseas.

SSBN(X) Ballistic Missile Carrying Submarine. The first of the Navy's 14 remaining Ohio class submarines, which carry Trident ballistic missiles, will reach the end of its 42-year service life in 2027. If the Navy determines that it needs 14 SSBNs—as called for in the 313-ship requirement—it will have to start building replacements for those submarines in the early 2020s. Under the 2006 shipbuilding plan, the first SSBN(X) would be purchased in 2022, with procurement continuing at a rate of at least one per year through 2035.

With production still more than 15 years away, the Navy does not have a program or ship design for replacing the Ohio class submarines. Some senior Navy officials have stated that the SSBN(X) could be a variant of the Virginia class attack submarine to take advantage of existing designs and engineering efforts.[23] The technical feasibility of such an approach is uncertain, however. Although it would be possible to design and insert a ballistic missile section into a Virginia class submarine, the section could not be made large enough to accommodate existing D-5 missiles and still allow the submarine's crew to perform maintenance on the missile at sea, if necessary. Thus, a new SSBN design may be required to replace Ohio class submarines when they retire in the 2020s.[24] However, that new design could incorporate some elements of the Virginia class, such as the reactor and bow section, to help reduce costs.

In its 2003 long-range shipbuilding report, the Navy assumed that the first SSBN(X) would cost about $5.5 billion, with succeeding submarines costing an average of $4.2 billion. However, that report assumed that the first Virginia class submarine would cost $3.8 billion (compared with an actual cost of $4.9 billion) and that succeeding Virginias would cost an average of $2.4 billion (the Navy is expecting to pay about $2.6 billion for the ninth Virginia). A corresponding increase in estimated costs for the SSBN(X) could result in an average cost of $4.6 billion for submarines after the first one.

For an alternative, CBO assumed that a new SSBN(X) could be designed to carry 16 missiles, rather than the 24 of the Ohio class, with a displacement of about 15,000 tons, or nearly double that of the Virginia class. (Ohio class SSBNs are 2.4 times larger.) On the basis of the

22. Christopher J. Castelli, "Defense Department Nudges Navy Toward Developing Diesel Submarines," *Inside the Navy* (March 7, 2005). Also see Robert A. Hamilton, "Fleet Studies Raise Prospect of Non-nuclear Submarines; Pentagon Office Backs More Boats for Less Cost," *The Day* (New London, Conn.), March 2, 2005.

23. Jason Ma, "Modified Virginia-Class Subs Eyed to Replace Ohio-Class SSBNs," *Inside the Navy* (October 18, 2004).

24. The Navy apparently does not consider designing a new missile to fit a modified Virginia class submarine to be cost effective.

price per thousand tons that the Navy is currently paying to build submarines, CBO estimated that a lead SSBN(X) of that size could cost around $9 billion. Succeeding submarines would cost about $4.9 billion each at today's prices for labor and materials. However, because inflation in the shipbuilding industry is expected to outstrip general inflation (as discussed later in this chapter), the cost of the succeeding SSBN(X)s could be around $6 billion apiece (in 2007 dollars) by the 2020s.

LPD-17 Amphibious Transport Dock. The Navy's newest class of amphibious ships (which carry troops and equipment for Marine expeditionary forces) is the San Antonio (LPD-17) class amphibious transport dock.[25] Development of the LPD-17 began in 1990, and construction of the first ship was authorized in 1996. Those ships are intended to replace the Austin class LPD-4 transport docks, which will reach the end of their notional 40-year service life in the next 10 years. Although the original program envisioned buying 12 LPD-17s, the Navy now plans to procure a total of nine. It will have ordered eight of those ships by the end of 2006 and plans to buy one more in 2008. Most of the ships are being built by Northrop Grumman's Avondale Shipyard.

The decision to reduce the total purchase of LPD-17s has been controversial. Members of Congress have written to the Navy to express their concern about the reduction, and Marine Commandant Michael Hagee has stated publicly that, "In my professional opinion, the absolute bare minimum is nine. I have to think we're taking risks with nine. I would be much more comfortable with 10 LPD-17s."[26] The Navy's 313-ship requirement envisions 10 LPD-17s, but the 2006 shipbuilding plan includes only nine.

The construction program for the LPD-17 has been a troubled one, leading to an increase in the ship's cost. The 1996 Selected Acquisition Report for the program estimated that 12 LPD-17s would cost a little more than $1 billion apiece, on average (in 2007 dollars). Eight years later, that unit cost had grown by more than 50 percent—to an average of about $1.6 billion per ship, CBO estimates.[27]

LHA-6 Amphibious Assault Ship. The LHA-6 class—formerly LHA(R)—is intended to replace the current aging LHA-1 Tarawa class of amphibious assault ships. It may eventually replace the LHD-1 Wasp class as well. Officially, the Navy has selected a design for only the first LHA-6, called Flight 0; the design for subsequent ships is still to be determined. According to the 2006 Future Years Defense Program, the first LHA-6 will be authorized in 2007, the second in 2010, and remaining ships after 2011. The ship will have a displacement of 45,000 tons at full load or 30,000 tons at light load (without crew, materiel, weapons, or fuel). At that size, it will be 12 percent larger than the latest amphibious assault ship, the LHD-8, which is now under construction. Ingalls Shipbuilding is likely to build the future LHA-6s.

Although various elements in the Navy and the Marine Corps would have preferred a larger and more capable ship, concerns about the affordability of the LHA-6 have caused the Navy to design the first ship as essentially a repeat of the LHD-8. However, instead of a docking well (which would allow it to transport and deploy landing craft that move large equipment to shore), it will have enhanced aviation capabilities.

According to the 2007 FYDP, the Navy has programmed $2.7 billion for the first LHA-6 and $3.5 billion for the second, implying a much larger and more capable design for the second ship. CBO estimates that if all of the LHA-6s had the same basic design as the first one (in other words, if the larger follow-on design was discarded), the ships would cost an average of about $2.7 billion each at current labor and materials costs.

The Navy's 2006 shipbuilding plan envisions buying only two LHA-6s for the amphibious forces. (Two more LHA-6s would be bought, in 2011 and 2013, for the maritime prepositioning forces, as discussed below.) In the 2020s and early 2030s, six of the Navy's existing LHD class ships would be replaced with a new LHD(X) design. CBO assumed that the LHD(X) would look very much like the LHA-6.

25. For more information about amphibious ships and their roles, see Congressional Budget Office, *The Future of the Navy's Amphibious and Maritime Prepositioning Forces* (November 2004); and Ronald O'Rourke, *Navy-Marine Corps Amphibious and Maritime Prepositioning Ship Programs: Background and Oversight Issues for Congress*, CRS Report for Congress RL32513 (Congressional Research Service, August 5, 2004).

26. Jason Ma, "Hagee Prefers 10 LPD-17s, Declares Nine the 'Absolute Bare Minimum,'" *Inside the Navy* (March 14, 2005).

27. For more about the cause of the cost growth, see Congressional Budget Office, *The Future of the Navy's Amphibious and Maritime Prepositioning Forces*, pp. 17-18.

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