



China Naval Modernization: Implications for U.S. Navy Capabilities—Background and Issues for Congress

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April 26, 2013

Congressional Research Service

7-5700

www.crs.gov

RL33153

Summary

The question of how the United States should respond to China's military modernization effort, including its naval modernization effort, has emerged as a key issue in U.S. defense planning. The question is of particular importance to the U.S. Navy, because many U.S. military programs for countering improved Chinese military forces would fall within the Navy's budget.

Two DOD strategy and budget documents released in January 2012 state that U.S. military strategy will place a renewed emphasis on the Asia-Pacific region, and that as a result, there will be a renewed emphasis on air and naval forces in DOD plans. Administration officials have stated that notwithstanding reductions in planned levels of U.S. defense spending, the U.S. military presence in the Asia-Pacific region will be maintained and strengthened.

Decisions that Congress and the executive branch make regarding U.S. Navy programs for countering improved Chinese maritime military capabilities could affect the likelihood or possible outcome of a potential U.S.-Chinese military conflict in the Pacific over Taiwan or some other issue. Some observers consider such a conflict to be very unlikely, in part because of significant U.S.-Chinese economic linkages and the tremendous damage that such a conflict could cause on both sides. In the absence of such a conflict, however, the U.S.-Chinese military balance in the Pacific could nevertheless influence day-to-day choices made by other Pacific countries, including choices on whether to align their policies more closely with China or the United States. In this sense, decisions that Congress and the executive branch make regarding U.S. Navy programs for countering improved Chinese maritime military forces could influence the political evolution of the Pacific, which in turn could affect the ability of the United States to pursue goals relating to various policy issues, both in the Pacific and elsewhere.

China's naval modernization effort, which began in the 1990s, encompasses a broad array of weapon acquisition programs, including anti-ship ballistic missiles (ASBMs), submarines, and surface ships. China's naval modernization effort also includes reforms and improvements in maintenance and logistics, naval doctrine, personnel quality, education, training, and exercises. Observers believe that the near-term focus of China's military modernization effort has been to develop military options for addressing the situation with Taiwan. Consistent with this goal, observers believe that China wants its military to be capable of acting as a so-called anti-access force—a force that can deter U.S. intervention in a conflict involving Taiwan, or failing that, delay the arrival or reduce the effectiveness of intervening U.S. naval and air forces. Observers believe that China's military modernization effort, including its naval modernization effort, is increasingly oriented toward pursuing additional goals, such as asserting or defending China's territorial claims in the South China Sea and East China Sea; enforcing China's view—a minority view among world nations—that it has the right to regulate foreign military activities in its 200-mile maritime exclusive economic zone (EEZ); protecting China's sea lines of communications; protecting and evacuating Chinese nationals in foreign countries; displacing U.S. influence in the Pacific; and asserting China's status as a major world power.

Potential oversight issues for Congress include the following: whether the U.S. Navy in coming years will be large enough to adequately counter improved Chinese maritime anti-access forces while also adequately performing other missions of interest to U.S. policymakers around the world; the Navy's ability to counter Chinese ASBMs and submarines; and whether the Navy, in response to China's maritime anti-access capabilities, should shift over time to a more distributed fleet architecture.

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Introduction

Issue for Congress

The question of how the United States should respond to China's military modernization effort, including its naval modernization effort, has emerged as a key issue in U.S. defense planning. The Department of Defense (DOD) states that "China's rise as a major international actor is likely to stand out as a defining feature of the strategic landscape of the early 21st Century," and that China's military "is now venturing into the global maritime domain, a sphere long dominated by the U.S. Navy."¹ Admiral Michael Mullen, the then-Chairman of the Joints Chiefs of Staff, stated in June 2010 that "I have moved from being curious to being genuinely concerned" about China's military programs.²

The question of how the United States should respond to China's military modernization effort is of particular importance to the U.S. Navy, because many U.S. military programs for countering improved Chinese military forces would fall within the Navy's budget. An October 19, 2011, press report stated:

The US Navy views the Asia-Pacific region as a top strategic priority even as it faces possible budget cuts that could curtail other global missions, the naval chief said Wednesday [October 19].

With China's clout rising and its military might expanding, President Barack Obama's deputies and military commanders increasingly portray Asia as a key to American national security.

The new chief of naval operations, Admiral Jonathan Greenert, echoed that view and suggested growing pressure on the US defense budget would not derail plans to focus on the Pacific region.

"Asia will be clearly a priority and we will adjust our operations accordingly," Greenert told reporters in a teleconference.³

Decisions that Congress and the executive branch make regarding U.S. Navy programs for countering improved Chinese maritime military capabilities could affect the likelihood or possible outcome of a potential U.S.-Chinese military conflict in the Pacific over Taiwan or some other issue. Some observers consider such a conflict to be very unlikely, in part because of significant U.S.-Chinese economic linkages and the tremendous damage that such a conflict could cause on both sides. In the absence of such a conflict, however, the U.S.-Chinese military balance

¹ U.S. Department of Defense, *Annual Report to Congress [on] Military and Security Developments Involving the People's Republic of China 2011*. Washington, 2011. Executive summary and p. 1.

² Viola Gienger, "U.S. Concern Over China's Military Intent Growing, Mullen Says," *Bloomberg.com*, June 10, 2010. See also Daniel Ten Kate, "U.S. Criticism Of China's Military May Overshadow Asian Security Meeting," *Bloomberg.com*, July 15, 2010; and Jon Rabiuff, "Mullen Moves From 'Curious' To 'Concerned' Over China's Military," *Stripes.com*, July 21, 2010.

See also the February 28, 2012, testimony of Admiral Robert Willard, Commander, U.S. Pacific Command, before the Senate Armed Services Committee in **Appendix A**.

³ Dan De Luce, "For US Navy, Asia is crucial priority: admiral," *Agence France-Presse*, October 19, 2011.

in the Pacific could nevertheless influence day-to-day choices made by other Pacific countries, including choices on whether to align their policies more closely with China or the United States. In this sense, decisions that Congress and the executive branch make regarding U.S. Navy programs for countering improved Chinese maritime military forces could influence the political evolution of the Pacific, which in turn could affect the ability of the United States to pursue goals relating to various policy issues, both in the Pacific and elsewhere.

Scope, Sources, and Terminology

This report focuses on the potential implications of China's naval modernization for future required U.S. Navy capabilities. Other CRS reports address separate issues relating to China.

This report is based on unclassified open-source information, such as the annual DOD report to Congress on military and security developments involving China,⁴ an August 2009 report on China's navy from the Office of Naval Intelligence (ONI),⁵ and published reference sources such as *Jane's Fighting Ships*.

For convenience, this report uses the term China's naval modernization to refer to the modernization not only of China's navy, but also of Chinese military forces outside China's navy that can be used to counter U.S. naval forces operating in the Western Pacific, such as land-based anti-ship ballistic missiles (ASBMs), land-based surface-to-air missiles (SAMs), land-based air force aircraft armed with anti-ship cruise missiles (ASCMs), and land-based long-range radars for detecting and tracking ships at sea.

China's military is formally called the People's Liberation Army, or PLA. Its navy is called the PLA Navy, or PLAN (also abbreviated as PLA[N]), and its air force is called the PLA Air Force, or PLAAF. The PLA Navy includes an air component that is called the PLA Naval Air Force, or PLANAF. China refers to its ballistic missile force as the Second Artillery Corps (SAC).

⁴ Department of Defense, *Annual Report to Congress [on] Military and Security Developments Involving the People's Republic of China 2012*. Washington, May 2012. 43 pp. Hereafter *2012 DOD CMSD*. The 2009 and earlier editions of the report were known as the China military power report. The 2009 edition is cited as *2009 DOD CMP*, and earlier editions are cited similarly.

⁵ Office of Naval Intelligence, *The People's Liberation Army Navy, A Modern Navy with Chinese Characteristics*, Suitland (MD), Office of Naval Intelligence, August 2009. 46 pp. (Hereafter *2009 ONI Report*.)

Background

Overview of China's Naval Modernization Effort⁶

Date of Inception

Observers date the beginning of China's naval modernization effort to various points in the 1990s.⁷ Design work on the first of China's newer ship classes appears to have begun in the later 1980s.⁸ Some observers believe that China's naval modernization effort may have been reinforced or accelerated by a 1996 incident in which the United States deployed two aircraft carrier strike groups to waters near Taiwan in response to Chinese missile tests and naval exercises near Taiwan.⁹

Elements of Modernization Effort

China's naval modernization effort encompasses a broad array of weapon acquisition programs, including programs for anti-ship ballistic missiles (ASBMs), anti-ship cruise missiles (ASCMs), land-attack cruise missiles (LACMs), surface-to-air missiles, mines, manned aircraft, unmanned aircraft, submarines, aircraft carriers, destroyers, frigates, patrol craft, amphibious ships, mine countermeasures (MCM) ships, hospital ships, and supporting C4ISR¹⁰ systems. Some of these acquisition programs have attracted particular interest and are discussed in further detail below. China's naval modernization effort also includes reforms and improvements in maintenance and logistics, naval doctrine, personnel quality, education and training, and exercises.¹¹

Limitations and Weaknesses

Although China's naval modernization effort has substantially improved China's naval capabilities in recent years, observers believe China's navy continues to exhibit limitations or weaknesses in several areas, including capabilities for sustained operations by larger formations in distant waters,¹² joint operations with other parts of China's military,¹³ C4ISR systems,¹⁴ anti-

⁶ Unless otherwise indicated, shipbuilding program information in this section is taken from *Jane's Fighting Ships 2012-2013*, and previous editions. Other sources of information on these shipbuilding programs may disagree regarding projected ship commissioning dates or other details, but sources present similar overall pictures regarding PLA Navy shipbuilding.

⁷ China ordered its first four Russian-made Kilo-class submarines in 1993, and its four Russian-made Sovremenny-class destroyers in 1996. China laid the keel on its first Song (Type 039) class submarine in 1991, its first Luhu (Type 052) class destroyer in 1990, its Luhai (Type 051B) class destroyer in 1996, and its first Jiangwei I (Type 053 H2G) class frigate in 1990.

⁸ First-in-class ships whose keels were laid down in 1990 or 1991 (see previous footnote) likely reflect design work done in the latter 1980s.

⁹ DOD, for example, states that "The U.S. response in the 1995-96 Taiwan Strait crisis underscored to Beijing the potential challenge of U.S. military intervention and highlighted the importance of developing a modern navy, capable of conducting A2AD [anti-access/area-denial] operations, or 'counter-intervention operations' in the PLA's lexicon." (2011 DOD CMSD, p. 57.)

¹⁰ C4ISR stands for command and control, communications, computers, intelligence, surveillance, and reconnaissance.

¹¹ For a discussion of improvements in personnel, training, and exercises, see *2009 ONI Report*, pp. 31-40.

¹² DOD states that "By the latter half of the current decade, China will likely be able to project and sustain a modest- (continued...)"

air warfare (AAW), antisubmarine warfare (ASW), MCM, a dependence on foreign suppliers for certain key ship components,¹⁵ and a lack of operational experience in combat situations.¹⁶

The sufficiency of a country's naval capabilities is best assessed against that navy's intended missions. Although China's navy has limitations and weaknesses, it may nevertheless be sufficient for performing certain missions of interest to Chinese leaders. As China's navy reduces its weaknesses and limitations, it may become sufficient to perform a wider array of potential missions.

Goals of Naval Modernization Effort

Capabilities for Taiwan Scenarios, Including Acting as Anti-Access Force

DOD and other observers believe that the near-term focus of China's military modernization effort, including its naval modernization effort, has been to develop military options for addressing the situation with Taiwan.¹⁷ Consistent with this goal, observers believe that China wants its military to be capable of acting as a so-called anti-access force—a force that can deter U.S. intervention in a conflict involving Taiwan, or failing that, delay the arrival or reduce the effectiveness of intervening U.S. naval and air forces.

ASBMs, attack submarines, and supporting C4ISR systems are viewed as key elements of China's emerging anti-access force, though other force elements—such as ASCMs, LACMs (for attacking U.S. air bases and other facilities in the Western Pacific), and mines—are also of significance.

China's emerging maritime anti-access force can be viewed as broadly analogous to the sea-denial force that the Soviet Union developed during the Cold War to deny U.S. use of the sea or

(...continued)

sized force, perhaps several battalions of ground forces or a naval flotilla of up to a dozen ships, in low-intensity operations far from China. This evolution will lay the foundation for a force able to accomplish a broader set of regional and global objectives. However, it is unlikely that China will be able to project and sustain large forces in high-intensity combat operations far from China prior to 2020." (2011 DOD CMSD, p. 27.)

¹³ DOD states that "Despite significant improvements, the PLA continues to face deficiencies in inter-service cooperation and actual experience in joint exercises and combat operations." (2011 DOD CMSD, p. 27.)

¹⁴ DOD states that

A fully integrated C4ISR system, as envisioned by PLA leaders, would enable the PLA to respond to complex battle-field conditions with a high level of agility and synchronization. To accomplish that vision, the PLA will need to overcome deficiencies in system integration and interservice coordination. Nevertheless, improvements in these systems will continue to enhance PLA battle-field awareness and lead to greater integration among the separate PLA services.

(2012 DOD CMSD, p. 8.)

¹⁵ DOD states, with regard to shipbuilding, that "China continues relying on foreign suppliers for some propulsion units and to a much lesser degree, fire control systems, cruise missiles, surface-to-air missiles, torpedo systems, sensors, and other advanced electronics." (2011 DOD CMSD, p. 43.) For an additional discussion, see John Pomfret, "Military Strength Is Eluding China," *Washington Post*, December 25, 2010: 1.

¹⁶ DOD states that "the PLA remains untested in modern combat. This lack of operational experience continues to complicate outside assessment of the progress of China's military transformation." (2010 DOD CMSD, p. 22)

¹⁷ For a DOD summary of these options—including maritime quarantine or blockade, limited force or coercive options, an air and missile campaign, and an amphibious invasion—see 2012 DOD CMSD, pp. 18-19.

counter U.S. forces participating in a NATO-Warsaw Pact conflict. One potential difference between the Soviet sea-denial force and China's emerging maritime anti-access force is that China's force includes ASBMs capable of hitting moving ships at sea.

Additional Goals Not Directly Related to Taiwan

DOD and other observers also believe that China's military modernization effort, including its naval modernization effort, is increasingly oriented toward pursuing additional goals not directly related to Taiwan, including the following:

- asserting or defending China's territorial claims in the South China Sea (SCS) and East China Sea (ECS)—claims that overlap with those of other countries and, in the case of the South China Sea, are somewhat ambiguous but potentially expansive enough to go well beyond what would normally be supported by international legal norms relating to territorial waters;¹⁸
- enforcing China's view—a minority view among world nations—that it has the legal right to regulate foreign military activities in its 200-mile maritime exclusive economic zone (EEZ);¹⁹
- protecting China's sea lines of communications, including those running through the Indian Ocean to the Persian Gulf, on which China relies for much of its energy imports;
- protecting and evacuating Chinese nationals living and working in foreign countries;
- displacing U.S. influence in the Pacific; and
- asserting China's status as a major world power.

The above goals not directly related to Taiwan suggest the following:

- China's maritime territorial claims have the potential for acting as a continuing cause of friction or tension in U.S.-Chinese relations.
- China's view that it has the legal right to regulate foreign military activities in its EEZ has the potential for acting as an ongoing source of potential incidents between U.S. and Chinese ships and aircraft in international waters and airspace close to China.
- In the absence of conflict, China's military forces, including in particular its naval forces, will be used on a day-to-day basis to promote China's political position in the Pacific. This would create an essentially political (as opposed to combat-related) reason for the United States or other countries to maintain a competitive presence in the region with naval and other forces that are viewed by

¹⁸ For more on China's territorial claims in the SCS and ECS, see CRS Report R42784, *Maritime Territorial and Exclusive Economic Zone (EEZ) Disputes Involving China: Issues for Congress*, by Ronald O'Rourke, and CRS Report R42930, *Maritime Territorial Disputes in East Asia: Issues for Congress*, by Ben Dolven, Shirley A. Kan, and Mark E. Manyin.

¹⁹ For more on China's view regarding its rights within its EEZ, see CRS Report R42784, *Maritime Territorial and Exclusive Economic Zone (EEZ) Disputes Involving China: Issues for Congress*, by Ronald O'Rourke.

observers in the Pacific as capable of effectively countering China's forces. Even if a U.S.-Chinese military conflict in the Pacific over Taiwan or some other issue were never to occur, the U.S.-Chinese military balance in the Pacific could nevertheless influence day-to-day choices made by other Pacific countries, including choices on whether to align their policies more closely with China or the United States. In this sense, decisions that Congress and the executive branch make regarding U.S. Navy programs for countering improved Chinese maritime military forces could influence the political evolution of the Pacific, which in turn could affect the ability of the United States to pursue goals relating to various policy issues, both in the Pacific and elsewhere.

DOD states that

Since the early 1980s, China's leaders have sustained an ambitious and broad-based military modernization program intended to transform the PLA into a modern force. Throughout this modernization drive, Taiwan contingency planning has dominated the agenda. Even though cross-Strait tensions have subsided since 2008, Taiwan remains a critical mission, and the PLA continues building capabilities aimed at Taiwan and at deterring, delaying, or denying possible third party intervention in a cross-Strait conflict. At the same time, the mandate of the new historic missions has provided the justification for new capabilities to accomplish diverse missions farther from China. Chinese military investments reflect these requirements and have led to the fielding of equipment and capabilities that support the PLA's traditional set of core missions (such as defending China's security, sovereignty and territorial integrity), and an expanding array of new missions at home and abroad.²⁰

Another set of observers states that

in addition to domestic security/homeland defense, [China's military and navy] have two major layers:

1. China has already developed, and continues to develop rapidly, potent high-end navy and "anti-Navy" capabilities. Like their other military counterparts, they are focused almost entirely on contested areas close to home.
2. It is also developing low-end capabilities. They are relevant primarily for low-intensity peacetime missions in areas further afield.

²⁰ 2012 DOD CMSD, p. 6. See also p. iv. Another observer states:

China's active defense strategy has a maritime component that aligns with the PRC's 1982 naval maritime plan outlined by then-Vice Chairman of the Military Commission, Liu Huaqing. This naval strategy delineated three stages. In the first stage, from 2000 to 2010, China was to establish control of waters within the first island chain that links Okinawa Prefecture, Taiwan and the Philippines. In the second stage, from 2010 to 2020, China would seek to establish control of waters within the second island chain that links the Ogasawara island chain, Guam and Indonesia. The final stage, from 2020 until 2040, China would put an end to U.S. military dominance in the Pacific and Indian Oceans, using aircraft carriers as a key component of their military force.

Recent Chinese military developments, rhetoric, and actions reflect implementation of this maritime strategy, on pace with the projections to seek control of the first island chain.

(Prepared statement by Stacy A. Pedrozo, Capt, JAGC, USN, U.S. Navy Military Fellow, Council on Foreign Relations, Before the U.S.-China Economic & Security Review Commission, January 27, 2011, p. 2. For DOD maps of the first and second island chains, see 2012 DOD CMSD, pp. 40 and 42.)

These two very different dynamics should not be conflated.

The second area has attracted headlines recently. China is in the process of developing a limited out-of-area operational capability to extend political influence and protect vital economic interests and PRC citizens working abroad in volatile parts of Africa and other regions. In essence, China seeks the bonus of being able to show the flag outside East Asia without the onus of assuming the cost and political liabilities of building a truly global high-end naval capability.

But while selected PLA Navy (PLAN) vessels make history by calling on ports in the Black Sea and Mediterranean to include first-ever visits to Israel and Bulgaria, the majority (like the rest of China's armed forces) are focused on areas closer to home—primarily still-contested territorial and maritime claims in the Yellow, East China, and South China Seas....

Given Beijing's substantial focus on issues unlikely to be resolved anytime soon, it is hardly surprising that there are no reliable indications at this time that China desires a truly-global blue water navy akin to that of the U.S. today, or which the Soviet Union maintained for some time, albeit at the eventual cost of strategic overextension. China does seek [sic] to develop a "blue water" navy in the years to come—but one that is more "regional" than "global" in nature. Chinese strategists term this a "regional [blue-water] defensive and offensive-type" ... navy....

...we believe Beijing is building a navy to handle a high-intensity conflict close to home where it can be supported by its large fleet of conventionally-powered submarines and shore-based missiles and aircraft. Vessels such as China's soon-to-be-commissioned aircraft carrier and Type 071 amphibious assault ships could be helpful in certain limited conflict scenarios against far-less-capable opponents—particularly in the South China Sea. Yet these large but limited capital ships' most likely use will be for handling missions geared toward:

1. The regional mission of showing the flag in disputed areas and attempting to deter potential adversaries;
2. Handling non-traditional security missions both in the East Asian/Western Pacific and Indian Ocean regions such as suppression of piracy, protecting/evacuating Chinese citizens trapped abroad by violence, and disaster response; as well as
3. Making diplomatically-oriented cruises such as the recent visits to Black Sea ports, which are aimed at showing the flag and showing foreign and domestic audiences that China is becoming a truly global power.

By contrast, there is currently little evidence that China is building a blue water capability to confront a modern navy like the U.S. beyond the PLAN's East/Southeast Asian home-region waters. Beijing is accruing a limited expeditionary capability, but is not preparing to go head-to-head with U.S. carrier battle groups outside of East Asia and the Western Pacific. There are a number of key indicators of Chinese progress toward building a strong regional navy with limited global operational capabilities...

The PLAN is acquiring the hardware it needs to prosecute a major regional naval showdown. Simultaneously, an increasingly-capable, but still limited number, of vessels can fight pirates, rescue Chinese citizens trapped by violence abroad, and make "show-the-flag" visits around the world. But the PLAN is not set up to confront the U.S. at sea more than 1,000 miles from China. Even if the PLAN surged production of key vessels such as replenishment ships, the resources and steps needed to build a globally-operational navy leave Beijing well over a decade away from achieving such capability in hardware terms alone. Building the more complex human software and operational experience needed to become capable of

conducting large-scale, high-end out-of-area deployments could require at least another decade. Meanwhile, however, China's challenges at home and on its contested periphery remain so pressing as to preclude such focus for the foreseeable future.

The bottom line is that China's present naval shipbuilding program aims to replace aging vessels and modernize the fleet, not to scale-up a modern fleet to the size and composition necessary to support and sustain high-end blue water power projection. China is building a two-layered navy with a high-end Near Seas component and a limited, low-end capability beyond, not the monolithic force that some assume.²¹

China's View Regarding Right to Regulate Foreign Military Activities in EEZ²²

China's view that it has the legal right to regulate foreign military activities in its EEZ appears to be at the heart of multiple incidents between Chinese and U.S. ships and aircraft in international waters and airspace, including incidents in March 2001, September 2002, March 2009, and May 2009 in which Chinese ships and aircraft confronted and harassed the U.S. naval ships *Bowditch*, *Impeccable*, and *Victorious* as they were conducting survey and ocean surveillance operations in China's EEZ, and an incident on April 1, 2001, in which a Chinese fighter collided with a U.S. Navy EP-3 electronic surveillance aircraft flying in international airspace about 65 miles southeast of China's Hainan Island in the South China Sea, forcing the EP-3 to make an emergency landing on Hainan island.²³

The issue of whether China has right under UNCLOS to regulate foreign military activities in its EEZ is related to, but ultimately separate from, the issue of maritime territorial disputes in the SCS and ECS. The two issues are related because China can claim EEZs from inhabitable islands over which it has sovereignty, so accepting China's claims to islands in the SCS or ECS could permit China to expand the EEZ zone within which China claims a right to regulate foreign military activities.

The EEZ issue is ultimately separate from the territorial disputes issue because even if all the territorial disputes in the SCS and ECS were resolved, and none of China's claims in the SCS and ECS were accepted, China could continue to apply its concept of its EEZ rights to the EEZ that it unequivocally derives from its mainland coast—and it is in this unequivocal Chinese EEZ that most of the past U.S.-Chinese incidents at sea have occurred.

²¹ Andrew Erickson and Gabe Collins, "China's Real Blue Water Navy," *The Diplomat* (<http://thediplomat.com>), August 30, 2012, accessed online on October 12, 2012, at <http://thediplomat.com/2012/08/30/chinas-not-so-scary-navy/>. The bracketed phrase "[blue-water]" is as in the original.

²² For further discussion of this topic, see CRS Report R42784, *Maritime Territorial and Exclusive Economic Zone (EEZ) Disputes Involving China: Issues for Congress*, by Ronald O'Rourke.

²³ For discussions of some of these incidents and their connection to the issue of military operating rights in EEZs, see Raul Pedrozo, "Close Encounters at Sea, The USNS Impeccable Incident," *Naval War College Review*, Summer 2009: 101-111; Jonathan G. Odom, "The True 'Lies' of the Impeccable Incident: What Really Happened, Who Disregarded International Law, and Why Every Nation (Outside of China) Should Be Concerned," *Michigan State Journal of International Law*, vol. 18, no. 3, 2010: 16-22, accessed online September 25, 2012 at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1622943; Oriana Skylar Mastro, "Signaling and Military Provocation in Chinese National Security Strategy: A Closer Look at the Impeccable Incident," *Journal of Strategic Studies*, April 2011: 219-244; and Peter Dutton, ed., *Military Activities in the EEZ, A U.S.-China Dialogue on Security and International Law in the Maritime Commons*, Newport (RI), Naval War College, China Maritime Studies Institute, China Maritime Study Number 7, December 2010, 124 pp. See also CRS Report RL30946, *China-U.S. Aircraft Collision Incident of April 2001: Assessments and Policy Implications*, by Shirley A. Kan et al.

If China's position on whether coastal states have a right under UNCLOS to regulate the activities of foreign military forces in their EEZs were to gain greater international acceptance under international law, it could substantially affect U.S. naval operations not only in the SCS and ECS, but around the world, which in turn could substantially affect the ability of the United States to use its military forces to defend U.S. interests overseas. Significant portions of the world's oceans are claimable as EEZs, including high-priority U.S. Navy operating areas in the Western Pacific, the Persian Gulf, and the Mediterranean Sea. The legal right of U.S. naval forces to operate freely in EEZ waters is important to their ability to perform many of their missions around the world, because many of those missions are aimed at influencing events ashore, and having to conduct operations from more than 200 miles offshore would reduce the inland reach and responsiveness of ship-based sensors, aircraft, and missiles, and make it more difficult to transport Marines and their equipment from ship to shore. Restrictions on the ability of U.S. naval forces to operate in EEZ waters could potentially require a change in U.S. military strategy or U.S. foreign policy goals.

Selected Elements of China's Naval Modernization Effort

Anti-Ship Ballistic Missiles (ASBMs)

China for several years has been developing and testing an anti-ship ballistic missile (ASBM), which is a theater-range ballistic missile²⁴ equipped with a maneuverable reentry vehicle (MaRV) designed to hit moving ships at sea. The ASBM is referred to as the DF-21D, and is believed to be a new variant of China's existing DF-21 (aka CSS-5) road-mobile medium-range ballistic missile (MRBM). DOD states that the missile has a range exceeding 1,500 km (i.e., about 810 nautical miles), and that it "is intended to provide the PLA the capability to attack large ships, including aircraft carriers, in the western Pacific Ocean."²⁵ Another observer states that "the DF-21D's warhead apparently uses a combination of radar and optical sensors to find the target and make final guidance updates.... Finally, it uses a high explosive, or a radio frequency or cluster warhead that at a minimum can achieve a mission kill [against the target ship]."²⁶

Observers have expressed strong concern about the DF-21D, because such missiles, in combination with broad-area maritime surveillance and targeting systems, would permit China to attack aircraft carriers, other U.S. Navy ships, or ships of allied or partner navies operating in the Western Pacific. The U.S. Navy has not previously faced a threat from highly accurate ballistic missiles capable of hitting moving ships at sea. For this reason, some observers have referred to the DF-21 as a "game-changing" weapon. Due to their ability to change course, the MaRVs on an

²⁴ Depending on their ranges, these theater-range ballistic missiles can be divided into short-, medium-, and intermediate-range ballistic missiles (SRBMs, MRBMs, and IRBMs, respectively).

²⁵ 2011 DOD CMSD, p. 3. 2012 DOD CMSD similarly states on page 22 that the range of the missile "exceeds 1,500 km." See also 2009 ONI Report, pp. 26-27. A July 12, 2011, *China Daily* news report described the DF-21D as a missile with a range of 2,700 kilometers, or about 1,460 nautical miles. (Hu Yinan, Li Xiaokun, and Cui Haipai, "Official Confirms China Building Aircraft Carrier," *China Daily* (www.chinadaily.com.cn), July 12, 2011, accessed online July 13, 2011, at http://www.chinadaily.com.cn/cndy/2011-07/12/content_12880708.htm.) A subsequent news report, however, states: "Jane's has learnt that the reference to 2,700 km was added by *China Daily* staff and is not corroborated by other Chinese reporting on the DF-21D." (J. Michael Cole, "China Confirms 'Carrier Killer,'" *Jane's Defense Weekly*, July 20, 2011: 6.)

²⁶ Richard Fisher, Jr., "PLA and U.S. Arms Racing in the Western Pacific," available online at http://www.strategycenter.net/research/pubID.247/pub_detail.asp. A mission kill means that the ship is damaged enough that it cannot perform its intended mission.

ASBM would be more difficult to intercept than non-maneuvering ballistic missile reentry vehicles.²⁷

Regarding the operational status of the DF-21D, DOD states that China is “augmenting the over 1,200 conventional short-range ballistic missiles deployed opposite Taiwan with a limited but growing number of conventionally armed, medium-range ballistic missiles, including the DF-21D anti-ship ballistic missile,”²⁸ and that “there are a number of notable examples of China’s improving military capabilities, including five new stealth and conventional aircraft programs and the initial deployment of a new anti-ship ballistic missile that we believe is designed to target U.S. aircraft carriers.”²⁹

A January 23, 2013, press report about a test of the weapon in the Gobi desert in western China stated:

The People’s Liberation Army has successfully sunk a US aircraft carrier, according to a satellite photo provided by Google Earth, reports our sister paper *Want Daily*—though the strike was a war game, the carrier a mock-up platform and the “sinking” occurred on dry land in a remote part of western China.³⁰

An August 25, 2011, press report states:

China has developed a “workable design” of the world’s first anti-ship ballistic missile, potentially capable of hitting and disabling a U.S. aircraft carrier, according to Pentagon officials.

China also has satellites in place “that could provide some targeting data on large surface ships in the region, and this expanding infrastructure is augmented by non-space-based sensors and surveillance assets,” said Navy Commander Leslie Hull-Ryde, a Pentagon spokeswoman on China, in an e-mail.

²⁷ For further discussion of China’s ASBM-development effort and its potential implications for U.S. naval forces, see Craig Hooper and Christopher Albon, “Get Off the Fainting Couch,” *U.S. Naval Institute Proceedings*, April 2010: 42-47; Andrew S. Erickson, “Ballistic Trajectory—China Develops New Anti-Ship Missile,” *Jane’s Intelligence Review*, January 4, 2010; Michael S. Chase, Andrew S. Erickson and Christopher Yeaw, “Chinese Theater and Strategic Missile Force Modernization and its Implications for the United States,” *The Journal of Strategic Studies*, February 2009: 67-114; Andrew S. Erickson and David D. Yang, “On the Verge of a Game-Changer,” *U.S. Naval Institute Proceedings*, May 2009: 26-32; Andrew Erickson, “Facing A New Missile Threat From China, How The U.S. Should Respond To China’s Development Of Anti-Ship Ballistic Missile Systems,” *CBSNews.com*, May 28, 2009; Andrew S. Erickson, “Chinese ASBM Development: Knowns and Unknowns,” *China Brief*, June 24, 2009: 4-8; Andrew S. Erickson and David D. Yang, “Using the Land to Control the Sea? Chinese Analysts Consider the Antiship Ballistic Missile,” *Naval War College Review*, Autumn 2009: 53-86; Eric Hagt and Matthew Durnin, “China’s Antiship Ballistic Missile, Developments and Missing Links,” *Naval War College Review*, Autumn 2009: 87-115; Mark Stokes, “China’s Evolving Conventional Strategic Strike Capability, *The Anti-ship Ballistic Missile Challenge to U.S. Maritime Operations in the Western Pacific and Beyond*, Project 2049 Institute, September 14, 2009. 123 pp.

²⁸ Michael T Flynn, Lieutenant General, U.S. Army, Director, Defense Intelligence Agency, Annual Threat Assessment, Statement Before the Senate Armed Services Committee, United States Senate, April 18, 2013, p. 17.

²⁹ Statement of Admiral Samuel J. Locklear, U.S. Navy, Commander, U.S. Pacific Command, Before the Senate Armed Services Committee on U.S. Pacific Command Posture, April 9, 2013, p. 7.

³⁰ “PLA ‘Sinks’ US Carrier in DF-21D Missile Test in Gobi,” *Want China Times* (<http://www.wantchinatimes.com>), January 23, 2013, accessed March 21, 2013, at <http://www.wantchinatimes.com/news-subclass-cnt.aspx?id=20130123000112&cid=1101>.

“Over the next few years, we expect China will work to refine and integrate many emerging systems, including the DF-21D” missile, she said....

China at this time “has provided no indication of whether they consider this an operational system,” Hull-Ryde said. She declined to say if the Pentagon believes the missile currently poses a threat to U.S. carriers.

Taiwan, which relies on the U.S. military presence, says in its new 2011 National Defense Report that China already has “produced and fielded” the missile “in small numbers,” said a translation provided by Andrew Erikson, an associate professor in the Naval War College’s Strategic Research Department.³¹

A July 12, 2011, news report from China quotes Chen Bingde, the chief of the PLA general staff, as stating that “the missile is still undergoing experimental testing” and that “it is a high-tech weapon and we face many difficulties in getting funding, advanced technologies and high-quality personnel, which are all underlying reasons why it is hard to develop this.”³² A February 18, 2011, press report from China quoted an unnamed source as saying that the DF-21D “is already deployed in the army.”³³ In December 2010 and January 2011, it was reported that DOD believes the missile has achieved the equivalent of what for a U.S. weapon would be called Initial Operational Capability (IOC).³⁴

Anti-Ship Cruise Missiles (ASCMs)

Among the most capable of the new ASCMs that have been acquired by China’s navy are the Russian-made SS-N-22 Sunburn (carried by China’s four Russian-made Sovremenny-class destroyers) and the Russian-made SS-N-27 Sizzler (carried by 8 of China’s 12 Russian-made Kilo-class submarines). China’s large inventory of ASCMs also includes several indigenous designs. DOD states that “The PLA Navy has or is acquiring nearly a dozen ASCM variants, ranging from the 1950s-era CSS-N-2 to the modern Russian-made SS-N-22 and SS-N-27B. The pace of ASCM research, development, and production within China has accelerated over the past

³¹ Tony Capaccio, “China Has ‘Workable’ Anti-Ship Missile Design, Pentagon Says,” *Bloomberg.com*, August 25, 2011.

³² Hu Yinan, Li Xiaokun, and Cui Haipei, “Official Confirms China Building Aircraft Carrier,” *China Daily* (www.chinadaily.com.cn), July 12, 2011, accessed online July 13, 2011, at http://www.chinadaily.com.cn/cndy/2011-07/12/content_12880708.htm. See also Bradley Perrett, “Imbalance of Power,” *Aviation Week & Space Technology*, July 18/25, 2011: 24-25.

³³ Zhang Han and Huang Jingling, “New Missile ‘Ready by 2015,’” *Global Times* (<http://military.globaltimes.cn>), February 18, 2011. The new missile referred to in the title of the article is a missile other than the DF-21 that the article said is to have a range of up to 4,000 km, or about 2,160 nm.

³⁴ See, for example, the transcript of a January 5, 2011, Defense Writers Group roundtable with Vice Admiral David J. Dorsett, Deputy CNO for Information Warfare; Tony Capaccio, “China’s Anti-Ship Missiles Aren’t Effective Yet, U.S. Navy Says,” *Bloomberg.com*, January 3, 2011; “Deputy Chief of Naval Operations for Information Dominance (N2/N6): China Has Space-Based & Non-Space-Based C2 + ISR ‘capable of providing the targeting information necessary to employ the DF-21D’ Anti-Ship Ballistic Missile (ASBM),” blog entry dated January 4, 2011, accessed online on January 7, 2011, at <http://www.andrewerickson.com/>; and Yoichi Kato, “U.S. Commander Says China Aims to Be A ‘Global Military’ Power,” *Asahi.com (Asahi Shimbun)*, December 28, 2010. See also Andrew Erickson and Gabe Collins, “China Deploys World’s First Long-Range, Land-Based ‘Carrier Killer’: DF-21D Anti-Ship Ballistic Missile (ASBM) Reaches ‘Initial Operational Capability’ IOC,” *China SignPost*, December 26, 2010; Bill Gertz, “China Has Carrier-Killer Missile, U.S. Admiral Says,” *Washington Times*, December 28, 2010: 1; Associated Press, “China Moving Toward Deploying Anti-Carrier Missile,” *Washington Post*, December 28, 2010; Kathrin Hille, “Chinese Missile Shifts Power In Pacific,” *Financial Times*, December 29, 2010: 1.

decade,”³⁵ and that “The SONG, YUAN, SHANG and the still-to-be-deployed Type 095 [class submarines] all will be capable of launching the [new Chinese-made] long-range CH-SS-NX-13 ASCM, once the missile completes development and testing.”³⁶

Submarines

China’s submarine modernization effort has attracted substantial attention and concern. The August 2009 ONI report states that “since the mid-1990s, the PRC has emphasized the submarine force as one of the primary thrusts of its military modernization effort.”³⁷

Types Acquired in Recent Years

China since the mid-1990s has acquired 12 Russian-made Kilo-class non-nuclear-powered attack submarines (SSs) and put into service at least four new classes of indigenously built submarines, including the following:

- a new nuclear-powered ballistic missile submarine (SSBN) design called the Jin class or Type 094 (**Figure 1**);
- a new nuclear-powered attack submarine (SSN) design called the Shang class or Type 093;³⁸
- a new SS design called the Yuan class or Type 041 (or Type 039A) (**Figure 2**);³⁹ and
- another (and also fairly new) SS design called the Song class or Type 039/039G.

Figure 1. Jin (Type 094) Class Ballistic Missile Submarine



Source: Photograph provided to CRS by Navy Office of Legislative Affairs, December 2010.

³⁵ 2011 DOD CMSD, p. 30.

³⁶ 2011 DOD CMSD, p. 4.

³⁷ 2009 ONI Report, p. 20.

³⁸ Some sources state that a successor to the Shang class SSN design, called the Type 095 SSN design, is in development.

³⁹ Some observers believe the Yuan class to be a variant of the Song class and refer to the Yuan class as the Type 039A. The August 2009 ONI report states that the Yuan class may be equipped with an air-independent propulsion (AIP) system. (2009 ONI Report, p. 23.)

Figure 2. Yuan (Type 041) Class Attack Submarine



Source: Photograph provided to CRS by Navy Office of Legislative Affairs, December 2010.

The Kilos and the four new classes of indigenously built submarines are regarded as much more modern and capable than China's aging older-generation submarines. At least some of the new indigenously built designs are believed to have benefitted from Russian submarine technology and design know-how.⁴⁰ DOD states that the Yuan class design "probably includes an air-independent propulsion system."⁴¹

DOD and other observers believe the Type 093 SSN design will be succeeded by a newer SSN design called the Type 095. The August 2009 ONI report includes a graph (see **Figure 3**) that shows the Type 095 SSN, along with the date 2015, suggesting that ONI projects that the first Type 095 will enter service that year. DOD states that:

Two second-generation SHANG-class (Type-093) SSNs are already in service and as many as five third-generation SSNs will be added in the coming years. When complete, the new class of SSNs will incorporate better quieting technology, improving China's capability to conduct a range of missions from surveillance to the interdiction of surface vessels with torpedoes and ASCMs.⁴²

China in 2011 commissioned into a service a new type of non-nuclear-powered submarine, called the Qing class according to *Jane's Fighting Ships 2012-2013*, that is about one-third larger than the Yuan-class design. It is not clear whether this boast is the lead ship of a new class, or a one-of-

⁴⁰ The August 2009 ONI report states that the Yuan class may incorporate quieting technology from the Kilo class, and that it may be equipped with an air-independent propulsion (AIP) system. (2009 ONI Report, p. 23.)

⁴¹ 2012 DOD CMSD, p. 23.

⁴² 2012 DOD CMSD, p. 23.

a-kind submarine built for testing purposes. *Jane's Fighting Ships 2012-2013* refers to the boat as an auxiliary submarine (SSA).⁴³

Press reports in December 2012 and March 2013 stated that China had signed an agreement with Russia to purchase two dozen Su-35 fighters and four Amur/Lada class Russian-designed non-nuclear-powered attack submarines for China's Navy, with two of the submarines being built in Russia and two being built in China.⁴⁴ Russia, however, reportedly denied that such an agreement had been signed.⁴⁵

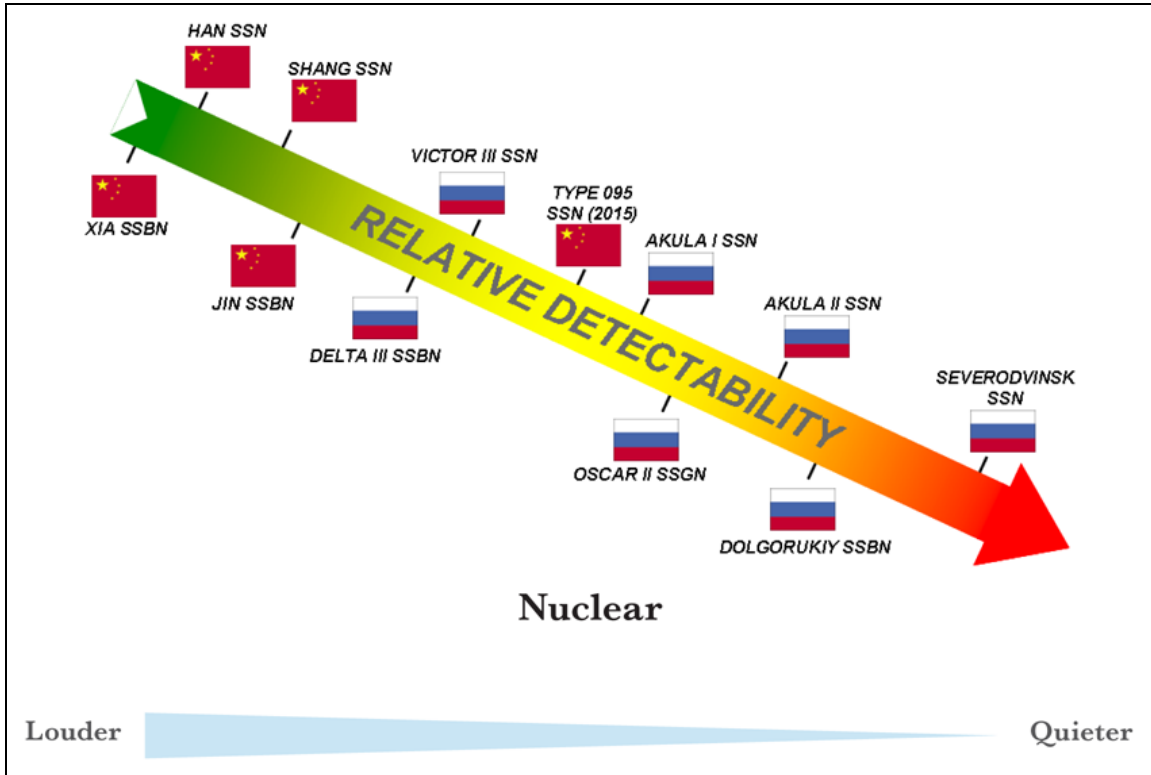
Figure 3 and **Figure 4**, which are taken from the August 2009 ONI report, show the acoustic quietness of Chinese nuclear- and non-nuclear-powered submarines, respectively, relative to that of Russian nuclear- and non-nuclear-powered submarines. The downward slope of the arrow in each figure indicates the increasingly lower noise levels (i.e., increasing acoustic quietness) of the submarine designs shown. In general, quieter submarines are more difficult for opposing forces to detect and counter. The green-yellow-red color spectrum on the arrow in each figure might be interpreted as a rough indication of the relative difficulty that a navy with capable antisubmarine warfare forces (such as the U.S. Navy) might have in detecting and countering these submarines: Green might indicate submarines that would be relatively easy for such a navy to detect and counter, yellow might indicate submarines that would be less easy for such a navy to detect and counter, and red might indicate submarines that would be more difficult for such a navy to detect and counter.

⁴³ *Jane's Fighting Ships 2012-2013*, p. 134.

⁴⁴ "China Mulls Buying Russian Submarines," *Moscow Times*, December 21, 2012, accessed March 21, 2013 at <http://www.themoscowtimes.com/business/article/china-mulls-buying-russian-submarines/473437.html>; "Russia to Sell Lada Class Submarines to China: Report," *Want China Times* (<http://www.wantchinatimes.com>), December 28, 2013, accessed March 21, 2013, at <http://www.wantchinatimes.com/news-subclass-cnt.aspx?id=20121228000007&cid=1101>; Agence France-Presse, "China To Buy Russian Fighters, Subs," *DefenseNews.com*, March 25, 2013.

⁴⁵ Wendell Minnick, "Russia: No Deal on Sale of Fighters, Subs to China," *DefenseNews.com*, March 25, 2013.

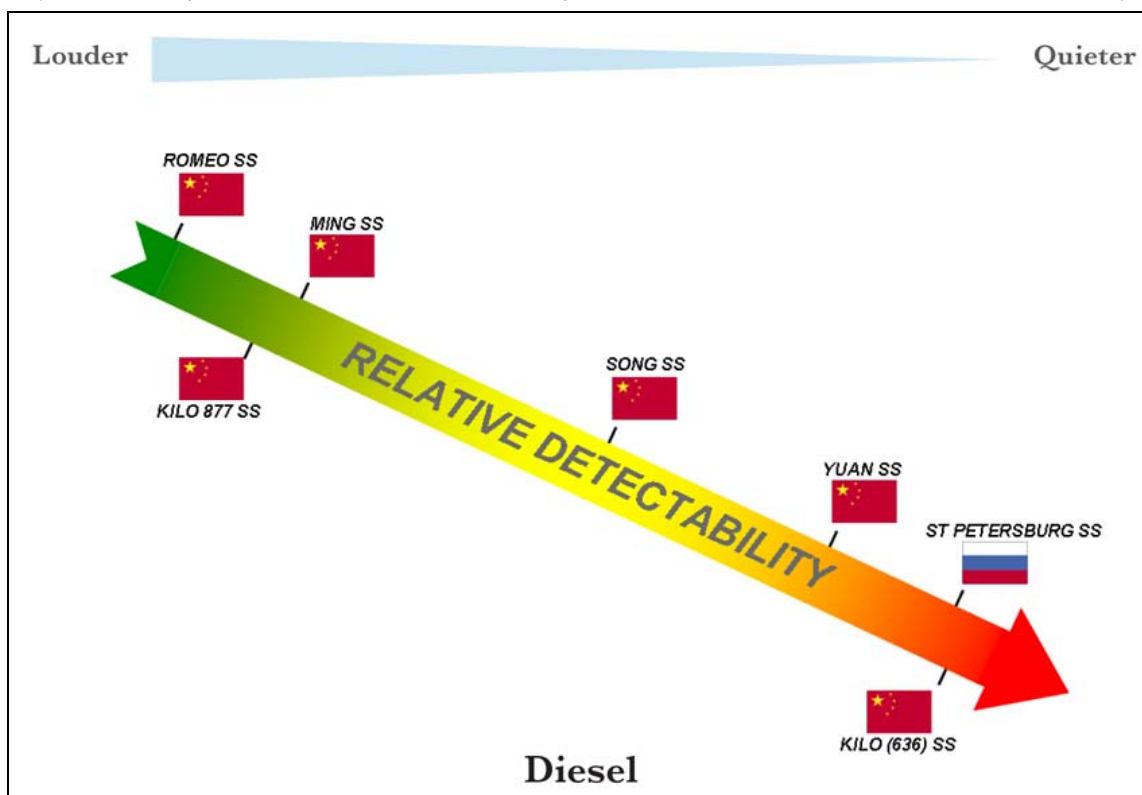
Figure 3. Acoustic Quietness of Chinese and Russian Nuclear-Powered Submarines



Source: 2009 ONI Report, p. 22.

Figure 4. Acoustic Quietness of Chinese and Russian Non-Nuclear-Powered Submarines

(Non-nuclear-powered submarines are commonly referred to as diesel or diesel-electric submarines)



Source: 2009 ONI Report, p. 22.

China's submarines are armed with one or more of the following: ASCMs, wire-guided and wake-homing torpedoes, and mines. The final eight Kilos purchased from Russia are reportedly armed with the highly capable Russian-made SS-N-27 Sizzler ASCM. In addition to other weapons, Shang-class SSNs may carry LACMs. Although ASCMs are often highlighted as sources of concern, wake-homing torpedoes are also a concern because they can be very difficult for surface ships to counter.

Although China's aging Ming-class (Type 035) submarines are based on old technology and are much less capable than China's newer-design submarines, China may decide that these older boats have continued value as minelayers or as bait or decoy submarines that can be used to draw out enemy submarines (such as U.S. SSNs) that can then be attacked by other Chinese naval forces.

In related areas of activity, China reportedly is developing new unmanned underwater vehicles,⁴⁶ and has modernized its substantial inventory of mines.⁴⁷ DOD states that "China has developed

⁴⁶ Lyle Goldstein and Shannon Knight, "Coming Without Shadows, Leaving Without Footprints," *U.S. Naval Institute Proceedings*, April 2010: 30-35.

⁴⁷ See, for example, Scott C. Truver, "Taking Mines Seriously, Mine Warfare in China's Near Seas," *Naval War College Review*, Spring 2012: 30-66.

torpedo and mine systems capable of area denial in a Taiwan scenario. Estimates of China's naval mine inventory exceed 50,000 mines, with many more capable systems developed in the past 10 years."⁴⁸

Submarine Acquisition Rate and Potential Submarine Force Size

Table 1 shows actual and projected commissionings of Chinese submarines by class since 1995, when China took delivery of its first two Kilo-class boats. The table includes the final nine boats in the Ming class, which is an older and less capable submarine design. As shown in **Table 1**, China by the end of 2012 is expected to have a total of 40 relatively modern attack submarines—meaning Shang, Kilo, Yuan, Song, and Qing class boats—in commission. As shown in the table, much of the growth in this figure occurred in 2004-2006, when 18 attack submarines (including 8 Kilo-class boats and 8 Song-class boats) were added, and in 2011-2012, when 9 attack submarines (including 8 Yuan-class boats and one Qing-class boat) were added or are expected to be added.

The figures in **Table 1** show that between 1995 and 2012, China placed or is expected to place into service a total of 51 submarines of all kinds, or an average of about 2.8 submarines per year. This average commissioning rate, if sustained indefinitely, would eventually result in a steady-state submarine force of about 57 to 85 boats of all kinds, assuming an average submarine life of 20 to 30 years.

Excluding the 12 Kilos purchased from Russia, the total number of domestically produced submarines placed into service between 1995 and 2012 is 39, or an average of about 2.2 per year. This average rate of domestic production, if sustained indefinitely, would eventually result in a steady-state force of domestically produced submarines of about 43 to 65 boats of all kinds, again assuming an average submarine life of 20 to 30 years.

The August 2009 ONI report states that “Chinese submarine procurement has focused on smaller numbers of modern, high-capability boats,” and that “over the next 10 to 15 years, primarily due to the introduction of new diesel-electric and [non-nuclear-powered] air independent power (AIP) submarines, the force is expected to increase incrementally in size to approximately 75 submarines.”⁴⁹

⁴⁸ 2012 DOD CMSD, p. 23.

⁴⁹ 2009 ONI Report, p. 21. The report states on page 46 that “Because approximately three-quarters of the current submarine force will still be operational in 10-15 years, new submarine construction is expected to add approximately 10 platforms to the force.” See also the graph on page 45, which shows the submarine force leveling off in size around 2015.

Table I. PLA Navy Submarine Commissionings

Actual (1995-2011) and Projected (2012-2016)

	Jin (Type 094) SSBN	Shang (Type 093) SSN	Kilo SS (Russian- made)	Ming (Type 035) SS ^b	Song (Type 039) SS	Yuan (Type 041) SS ^a	Qing SS	Annual total for all types shown	Cumulative total for all types shown	Cumulative total for modern attack boats ^c
1995			2 ^d	1				3	3	2
1996				1				1	4	2
1997				2				2	6	2
1998			1 ^d	2				3	9	3
1999			1 ^d		1			2	11	5
2000				1				1	12	5
2001				1	2			3	15	7
2002				1				1	16	7
2003					2			2	18	9
2004			1		3			4	22	13
2005			4		3			7	29	20
2006		1	3		2 ^e	1		7	36	27
2007	1	1 ^f						2	38	28
2008								0	38	28
2009						2		2	40	30
2010	1					1		2	42	31
2011						3	1 ^g	4	46	35
2012	1					5		6	51	40
2013	1					n/a	n/a	n/a	n/a	n/a
2014	1					n/a	n/a	n/a	n/a	n/a
2015						n/a	n/a	n/a	n/a	n/a
2016	1 ^h					n/a	n/a	n/a	n/a	n/a

Source: *Jane's Fighting Ships 2012-2013*, and previous editions.

Note: n/a = data not available.

- Some observers believe the Yuan class to be a variant of the Song class and refer to the Yuan class as the Type 039A.
- Figures for Ming-class boats are when the boats were launched (i.e., put into the water for final construction). Actual commissioning dates for these boats may have been later.
- This total excludes the Jin-class SSBNs and the Ming-class SSs.
- Jane's Fighting Ships 2012-2013* lists the commissioning date of one of the two Kilos as December 15, 1994.
- No further units expected after the 12th and 13th shown for 2006.
- Jane's Fighting Ships 2012-2013* states that production of the two Shang-class boats shown in the table is expected to be followed by production of a new SSN design known as the Type 095 class, of which a total of five are expected. A graph on page 22 of *2009 ONI Report* (reprinted in this CRS report as **Figure 3**) suggests that ONI expects the first Type 095 to enter service in 2015.
- It is unclear whether this is the lead ship of a new class, or a one-of-a-kind submarine built for test purposes. *Jane's Fighting Ships 2012-2013* refers to the boat as an auxiliary submarine (SSA).
- A total of six Jin-class boats is expected by *Jane's*, with the sixth unit projected to be commissioned in 2016.

JL-2 SLBM on Jin-Class SSBN

Each Jin-class SSBN is expected to be armed with 12 JL-2 nuclear-armed submarine-launched ballistic missiles (SLBMs). DOD estimates that these missiles will have a range of about 7,400 kilometers (about 3,996 nautical miles).⁵⁰ DOD states that “The JIN-class SSBN and the JL-2 will give the PLA Navy its first credible sea-based nuclear capability. The JL-2 program has faced repeated delays, but may reach initial operating capability within the next two years.”⁵¹ China reportedly conducted a flight test of the JL-2 on August 16, 2012.⁵²

Aircraft Carriers and Carrier-Based Aircraft

China, according to one set of observers, initiated studies on possible aircraft carrier options in the 1990s, and approved a formal aircraft carrier program in 2004.⁵³ Chinese officials have been talking openly since 2006 about eventually operating aircraft carriers.⁵⁴

China recently commissioned into service its first aircraft carrier—the *Liaoning* (**Figure 5**), a refurbished ex-Ukrainian aircraft carrier, previously named *Varyag*, that China purchased from Ukraine as an unfinished ship in 1998. China reportedly may also have begun building its first indigenous aircraft carrier. DOD states, “During the next decade China is likely to fulfill its carrier ambitions, becoming the last permanent member of the UN Security Council to obtain a carrier capability.”⁵⁵ The August 2009 ONI report states that “China is undertaking a program to both operationalize [the *Varyag*] (likely as a training platform) and build an indigenous carrier to join the fleet between 2015 and 2020.”⁵⁶

⁵⁰ 2012 DOD CMSD, p. 23. (The report indicates the range on page 43 as “>7,400 km,” meaning greater than 7,400 km.) A range of 7,400 km could permit Jin-class SSBNs to attack

- targets in Alaska (except the Alaskan panhandle) from protected bastions close to China;
- targets in Hawaii (as well as targets in Alaska, except the Alaskan panhandle) from locations south of Japan;
- targets in the western half of the 48 contiguous states (as well as Hawaii and Alaska) from mid-ocean locations west of Hawaii; and
- targets in all 50 states from mid-ocean locations east of Hawaii.

⁵¹ 2012 DOD CMSD, p. 23.

⁵² Bill Gertz, “Ready To Launch,” *Washington Free Beacon* (<http://freebeacon.com>), August 21, 2012.

⁵³ Andrew S. Erickson and Gabriel B. Collins, “The Calm Before the Storm,” *FP [Foreign Policy] National Security* (www.foreignpolicy.com), September 26, 2012. Another observer dates Chinese activities in support of an eventual aircraft carrier program back to the 1980s; see Torbjorg Hemmingsen, “PLAN For Action: New Dawn for Chinese Naval Aviation,” *Jane’s Navy International*, June 2012: 12-17.

⁵⁴ The August 2009 ONI report states that “Beginning in early 2006, PRC-owned media has reported statements from high-level officials on China’s intent to build aircraft carriers.”

⁵⁵ 2011 DOD CMSD, p. 46.

⁵⁶ 2009 ONI Report, p. 17. The report similarly states on page 1 that China “is refurbishing [the *Varyag*] and plans to build its own [aircraft carrier] within the next five to ten years,” and on page 19 that “the PRC will likely have an operational, domestically produced carrier sometime after 2015.” The report states on page 19 that the *Varyag* “is expected to become operational in the 2010 to 2012 timeframe, and will likely be used to develop basic proficiencies in carrier operations.”

Liaoning (Ex-Ukrainian Aircraft Carrier *Varyag*)

The *Liaoning*—named for the province containing Dalian, the city where the ship was refurbished—was commissioned into service on September 25, 2012, following a series of sea trials that began in August 2011. In late February 2013, it was reported that the ship had been assigned a permanent home port at Qingdao, the home base of China’s Northern Fleet.⁵⁷

Figure 5. Aircraft Carrier *Liaoning* (ex-Varyag)

Pictured at time of commissioning



Source: Picture posted at Foreign Policy.com, September 26, 2012.

The *Liaoning* has an estimated full load displacement of about 60,000 tons, and might accommodate an air wing of 30 or more aircraft, including short-takeoff, vertical landing (STOVL) fixed-wing airplanes and some helicopters. By comparison, a U.S. Navy aircraft carrier has a full load displacement of about 100,000 tons and can accommodate an air wing of 60 or more aircraft, including conventional takeoff and landing (CTOL) airplanes (which tend to have a greater range/payload than STVOL airplanes) and some helicopters.⁵⁸

The *Liaoning* reportedly did not conduct aircraft operations during its sea trials, although in some of the trials, it reportedly carried mockups of China’s new J-15 carrier-based fighter.⁵⁹ On October

⁵⁷ See, for example, Associated Press, “Reports: China Carrier Permanent Base Is Qingdao,” *ABC News* (<http://abcnews.com>), February 27, 2013.

⁵⁸ For more on the *Liaoning*, see Paul M. Barrett, “China’s 65,000-Ton Secret,” *Bloomberg Businessweek*, January 30, 2012.

⁵⁹ Wendell Minnick, “China Carrier’s Sea Trial Includes New Fighter Mockups,” *Defense News*, July 9, 2012: 26. Some observers, however, have raised questions about the origin of skid marks that appeared in photographs of the ship’s flight deck around the time of its commissioning; see, for example, “John Reed, “Who Left Skidmarks on the (continued...)”

15, 2012, it was reported that the ship was conducting its first touch-and-go landing exercises with J-15s.⁶⁰ On November 25, 2012, it was reported that the *Liaoning* had conducted its first fixed-wing aircraft launches (using the ship's ski ramp) and arrested-wire landings with a J-15.⁶¹ A full air wing is not expected to be added to the *Liaoning* for some time. Observers expect it will then take a substantial amount of time for the ship's crew and air wing to become proficient in operating aircraft from the ship. At an August 24, 2011, DOD press briefing, a DOD said official that "it will take a number of additional years for an air group to achieve the sort of minimal level of combat capability aboard the carrier that will be necessary for them to start to operate from the carrier itself."⁶²

Indigenous Aircraft Carriers

An April 23, 2013, press report stated:

A senior officer with the People's Liberation Army (PLA) Navy said on Tuesday [April 23, 2013] that "China will have more than one aircraft carrier."

Song Xue, deputy chief of staff of the PLA Navy, told foreign military attaches at a ceremony to celebrate the Navy's 64th founding anniversary in Beijing, "The next aircraft carrier we need will be larger and carry more fighters."

However, Song said some foreign media reports on China's building new aircraft carriers in Shanghai were not accurate.⁶³

DOD stated in 2012 that "some components of China's first indigenously-produced carrier may already be under construction; that carrier could achieve operational capability after 2015. China likely will build multiple aircraft carriers and associated support ships over the next decade."⁶⁴ A November 30, 2012, press report states that China plans to build three indigenous carriers.⁶⁵

An August 28, 2012, press report states:

Reports in unofficial Chinese military blogs and websites say China planned to build these [indigenous] carriers at Jiangnan Shipyard's Chanxing Island shipbuilding base near Shanghai.

(...continued)

Flight Deck of China's New Aircraft Carrier?" *Foreign Policy* (<http://killerapps.foreignpolicy.com>), September 26, 2012. See also Bill Gertz, "Inside the Ring: China's Aircraft-Less Carrier," *Washington Times*, September 26, 2012.

⁶⁰ "China Begins Aircraft Carrier Flight Training," *Associated Press*, October 15, 2012. See also Andrew Erickson and Gabe Collins, "Delicate Touch: Flight Operations Begin on China's First Aircraft Carrier," *Wall Street Journal/China Real Time Report* (<http://blogs.wsj.com/chinarealtime>), October 17, 2012.

⁶¹ Edward Wong, "As Regional Tensions Rise, China Lands Jet On First Carrier," *New York Times*, November 26, 2012; Robert Saiget, "China Conducts First Landing On Aircraft Carrier," *DefenseNews.com (Agence France-Presse)*, November 25, 2012.

⁶² Transcript of DOD press briefing with Michael Schiffer, Deputy Assistant Secretary of Defense for East Asia, accessed at <http://www.defense.gov/transcripts/transcript.aspx?transcriptid=4868>. See also *2011 DOD CMSD*, pp. 3 and 46.

⁶³ "China's Second Aircraft Carrier Will Be 'Larger,'" *Xinhua*, April 23, 2013.

⁶⁴ *2012 DOD CMSD*, p. 22.

⁶⁵ Luo Yuan, "China Plans Four Carrier Strike Groups," *WantChinaTimes.com*, November 30, 2012.

However, professional and amateur analysts who study satellite images of Chinese shipyards have been unable to find any evidence of construction.⁶⁶

A May 21, 2012, press report stated:

Taiwan's intelligence chief said May 21 that China plans to build two aircraft carriers, in addition to the first in its fleet, a refitted former Soviet carrier currently undergoing sea trials....

Tsai [Teh-sheng, head of the island's National Security Bureau,] said construction of the warships is slated to start in 2013 and 2015, respectively, with delivery dates of 2020 and 2022, and that they would be conventionally powered.⁶⁷

An August 2, 2011, press report stated:

China has begun work on its first aircraft carrier and probably will develop two or more, along with outfitting a former Russian carrier that is set to begin sea trials soon, Pentagon officials said.

"We expect China to build at least one indigenous carrier, probably two or more, but they have not revealed how many they intend to build, what the construction schedule will [be] or what their missions will be," said a defense official familiar with intelligence assessments.

A second defense official said China regards aircraft carriers as key symbols of global power projection and is unlikely to build just two.

Other defense officials said assessments about the indigenous carriers are based on intelligence showing construction of the first indigenous carrier at the Changxing Island Shipyard in Shanghai.

The carrier appears in satellite photos to be similar in design to the Varyag, a Soviet-era carrier purchased by China that uses a sky-jump style takeoff ramp at the front of the ship....

"Two aircraft carriers are being built at the Jiangnan Shipyard in Shanghai," a Chinese official with ties to China's Communist Party leadership told Reuters last week.⁶⁸

A July 10, 2011, press report stated:

China has started construction of its first domestically made aircraft carrier, according to diplomatic and U.S. government sources....

Military sources close to developments in the Chinese Navy said the domestically made carrier is being constructed in a shipyard on Changxing Island in Shanghai.

The sources said the new carrier will likely be midsize, similar to the Varyag, and carry Jian-15 jet fighters, which China has just developed. The fighters will likely take off from a ski jump-style flight deck as is done on the Varyag....

⁶⁶ David Lague, "China's Aircraft Carrier: In Name Only," *Reuters.com*, August 28, 2012.

⁶⁷ Agence France-Presse, "China To Build 2 More Aircraft Carriers: Taiwan," *DefenseNews.com*, May 21, 2012.

⁶⁸ Bill Gertz, "China Begins To Build Its Own Aircraft Carrier," *Washington Times*, August 2, 2011: 1. Material in brackets as in original.

Security around the shipyard on Changxing Island has increased significantly since the start of this year, which military sources attribute to the start of construction of the carrier.⁶⁹

A late-2010 article states that

photographic evidence [suggests] that China has finally laid the building blocks and keel for its first indigenously designed aircraft carrier (CV), at Changxing Island Shipyard, Shanghai..... The new carrier is estimated to likely be from 245 to 265m [i.e., about 804 feet to 869 feet] in length and 65 to 70m [i.e., about 213 feet to 229 feet] in beam (this would make it slightly smaller than the modernised, angled deck former USS “Coral Sea” (CVA-43, for comparative purposes). Construction is likely to take eight to nine years, meaning the ship becomes operational (IOC) [in] 2019-2020.⁷⁰

Carrier-Based Aircraft

China reportedly was engaged in lengthy negotiations with Russia to purchase up to 50 Russian-made carrier-capable Su-33 fighter aircraft. Although the negotiations with Russia reportedly did not lead to a purchase of Su-33s, China has developed its own carrier-capable fighter, called the J-15 or Flying Shark, which reportedly is based on the Su-33.⁷¹ Some observers believe China may also develop a carrier-based version of its new J-31 stealth fighter prototype, which outwardly resembles the U.S. F-35 Joint Strike Fighter (JSF).⁷²

Potential Roles, Missions, and Strategic Significance

Although aircraft carriers might have some value for China in Taiwan-related conflict scenarios, they are not considered critical for Chinese operations in such scenarios, because Taiwan is within range of land-based Chinese aircraft. Consequently, most observers believe that China is acquiring carriers primarily for their value in other kinds of operations, and to symbolize China’s status as a major world power. DOD states that “Given the fact that Taiwan can be reached by land-based aviation, China’s aircraft carrier program would offer very limited value in a Taiwan

⁶⁹ Yomiuri Shimbun, “China Starts Constructing Own Flatop; ‘2 Carriers Operational Within 10 Yrs,’” *Daily Yomiuri Online* (www.yomiuri.co.jp), July 10, 2011, accessed online July 11, 2011 at <http://www.yomiuri.co.jp/dy/world/T110709003274.htm>.

⁷⁰ Keith Jacobs, “The Chinese and Japanese Navies Compared,” *Naval Forces*, No. VI, 2010: 80-85.

⁷¹ 2011 DOD CMSD, p. 46. See also Reuben F. Johnson, “Images Suggest Shenyang Making Progress on Carrier-Capable J-15,” *Jane’s Navy International*, March 2012: 11; David Axe, “The Limits Of China’s Fighter,” *The Diplomat* (the-diplomat.com), July 15, 2011; Gabe Collins and Andrew Erickson, “China’s J-15 No Game Changer,” *The Diplomat* (<http://the-diplomat.com>), June 23, 2011; Andrew Erickson and Gabe Collins, “‘Flying Shark’ Gaining Altitude: How might new J-15 strike fighter improve China’s maritime air warfare ability?” *China SignPost*, June 7, 2011, 11 pp.; Wendell Minnick, “China Confirms J-15 Carrier-Based Fighter; Aircraft Based on Russian-Designed Su-33,” *Defense News*, May 2, 2011: 4; David A. Fulghum, “New Chinese Ship-Based Fighter Progresses,” *Aviation Week & Space Technology*, April 28, 2011; David A. Fulghum, “New Chinese Ship-Based Heavy Fighter Readied For Flight Tests,” *Aerospace Daily & Defense Report*, April 27, 2011: 1-2; Michael Wines, “Chinese State Media, In A Show Of Openness, Print Jet Photos,” *New York Times*, April 26, 2011: 4.

⁷² John Reed, “China’s Second Stealth Jet May Be A Carrier Fighter,” *FP [Foreign Policy] National Security*, March 11, 2013, accessed April 26, 2013, at http://killerapps.foreignpolicy.com/posts/2013/03/11/chinas_second_stealth_jet_may_be_a_carrier_fighter. See also “J-31 May Become China’s Next Generation Carrier-Borne Fighter Jet,” *Global Times*, March 6, 2013.

scenario and would require additional naval resources for protection. However, it would enable China to extend its naval air capabilities elsewhere.⁷³

Chinese aircraft carriers could be used for power-projection operations, particularly in scenarios that do not involve opposing U.S. forces. Chinese aircraft carriers could also be used for humanitarian assistance and disaster relief (HA/DR) operations, maritime security operations (such as anti-piracy operations), and non-combatant evacuation operations (NEOs). Politically, aircraft carriers could be particularly valuable to China for projecting an image of China as a major world power, because aircraft carriers are viewed by many as symbols of major world power status. In a combat situation involving opposing U.S. naval and air forces, Chinese aircraft carriers would be highly vulnerable to attack by U.S. ships and aircraft, but conducting such attacks could divert U.S. ships and aircraft from performing other missions in a conflict situation with China.⁷⁴

DOD states that the *Liaoning* “will initially serve as a training platform for fixed-wing aircraft and as an additional asset for helicopter-borne HA/DR operations, until its full fixed-wing air regiment achieves operational capability in several years.”⁷⁵ DOD also states that “China currently has a land-based training program for carrier pilots; however, it will still take several additional years for China to achieve a minimal level of combat capability for its aircraft carriers.”⁷⁶ Some observers have referred to the *Liaoning* as China’s “starter” carrier.⁷⁷

Surface Combatants

China since the early 1990s has purchased four Sovremenny-class destroyers from Russia and put into service 10 new classes of indigenously built destroyers and frigates (some of which are variations of one another) that demonstrate a significant modernization of PLA Navy surface combatant technology. China reportedly is also building a new class of corvettes (i.e., light frigates) and has put into service a new kind of missile-armed fast attack craft that uses a stealthy catamaran hull design. The August 2009 ONI report states that “the PLA(N) surface force is one of the largest in the world, and its capabilities are growing at a remarkable rate,”⁷⁸ and that “in recent years, the most notable upgrade to the PLA(N) surface force has been its shipboard area-air-defense (AAD) capability.”⁷⁹ DOD states: “The PLA Navy has acquired modern, domestically-produced surface combatants.... These ships improve the PLA Navy’s area air

⁷³ 2011 DOD CMSD, p. 38.

⁷⁴ For further discussion, see Andrew Erickson and Gabe Collins, “The ‘Flying Shark’ Prepares to Roam the Seas: pros and cons [for China] of China’s aircraft carrier program,” *China SignPost*, May 18, 2011, 5 pp.; Aaron Shraberg, “Near-Term Missions for China’s Maiden Aircraft Carrier,” *China Brief*, June 17, 2011: 4-6; and Andrew S. Erickson, Abraham M. Denmark, and Gabriel Collins, “Beijing’s ‘Starter Carrier’ and Future Steps,” *Naval War College Review*, Winter 2012: 15-55.

⁷⁵ 2012 DOD CMSD, p. 7.

⁷⁶ 2012 DOD CMSD, p. 22.

⁷⁷ See, for example, “China Plans New Generation of Carriers as Sea Disputes Grow,” *Bloomberg News*, April 24, 2013.

⁷⁸ 2009 ONI Report, p. 16. This comment may relate not solely to China’s surface combatants (e.g., destroyers, frigates, and fast attack craft), but to China’s entire surface fleet, which includes other types of ships as well, such as aircraft carriers, amphibious ships, and auxiliary and support ships.

⁷⁹ 2009 ONI Report, p. 18.

defense capability significantly, which will be critical as the PLA Navy expands its operations into areas beyond the range of shore-based air defense.”⁸⁰ One observer states that

2011 was the start of a new wave of shipbuilding for PLAN. This trend only accelerated into this year [2012]. Most of the major Chinese naval shipyards have been very busy with naval and civilian maritime ministry orders in the past year. Part of this could be the downturn in the world’s shipbuilding market, but an even larger part is that the time has come for this second wave of PLAN modernization (the first being from 2003 to 2006). JiangNan shipyard has been leading the way with 8 [Type] 052C/D ships [destroyers] in various stages of completion before commissioning along with construction of [Type] 039B submarines and Minesweepers. HuDong shipyard has continued its work with at least 3 [Type] 054A frigates along with Type 903 AOR [resupply ships] and multiple [Type] 056 patrol ships. Huangpu shipyard is finishing up on its [Type] 054A [frigate] orders, but is building numerous [Type] 056 patrol ships, small specialty naval ships and cutters for different maritime agencies. One of the prominent sightings at HP shipyard is the number of rescue ships and CMS [China Maritime Surveillance agency maritime law enforcement] ships that are in various stages of completion. Wuchang shipyard also has its shares of cutters along with [Type] 039B submarines and [Type] 056 patrol ships. Even the smaller shipyards around the country have been getting many orders for auxiliary ships, smaller combat ships and rescue ship/cutters for civilian ministry. The only one that seems to not be getting much work right now is Dalian shipyard. Going forward, this heavy construction activity should continue into next year with JN, HD and HP shipyard continue being the largest naval shipyards in the country.⁸¹

Sovremenny-Class Destroyers

China in 1996 ordered two Sovremenny-class destroyers from Russia; the ships entered service in 1999 and 2001. China in 2002 ordered two additional Sovremenny-class destroyers from Russia; the ships entered service in 2005 and 2006. Sovremenny-class destroyers are equipped with the Russian-made SS-N-22 Sunburn ASCM, a highly capable ASCM.

Six New Indigenously Built Destroyer Classes

China since the early 1990s has put into service six new classes of indigenously built destroyers, two of which are variations of another. The classes are called the Luhu (Type 052), Luhai (Type 051B), Luyang I (Type 052B), Luyang II (Type 052C), the Luyang III (Type 052D), and Louzhou (Type 051C) designs. Compared to China’s remaining older Luda (Type 051) class destroyers, which entered service between 1971 and 1991, these six new indigenously built destroyer classes are substantially more modern in terms of their hull designs, propulsion systems, sensors, weapons, and electronics. The Luyang II-class ships (**Figure 6**) and the Luyang III-class ships appear to feature phased-array radars that are outwardly somewhat similar to the SPY-1 radar used in the U.S.-made Aegis combat system.⁸² Like the older Luda-class destroyers, these six new destroyer classes are armed with ASCMs.

⁸⁰ 2012 DOD CMSD, p. 23.

⁸¹ Blog entry entitled “2012 in Review,” December 28, 2012, accessed March 21, 2013 at <http://www.informationdissemination.net/2012/12/2012-in-review.html>.

⁸² 2009 ONI Report, p. 1.

Figure 6. Luyang II (Type 052C) Class Destroyer

Source: Photograph provided to CRS by Navy Office of Legislative Affairs, December 2010.

As shown in **Table 2**, China between 1994 and 2007 commissioned only one or two ships in its first four new indigenously built destroyers classes, suggesting that these classes were intended as stepping stones in a plan to modernize the PLA Navy's destroyer technology incrementally before committing to larger-scale series production of Luyang II-class destroyers. As also shown in **Table 2**, after commissioning no new destroyers in 2008-2011, commissionings of new Luyang II-class destroyers appears to have resumed. Regarding the 2008-2011 gap in commissionings, one observers states, "The relocation of JiangNan shipyard and indigenization of DA80/DN80 gas turbine (QC-280) delayed the production of follow-on units [of Luyang II-class destroyers] for several years."⁸³

⁸³ Blog entry entitled "2012 in Review," December 28, 2012, accessed March 21, 2013 at <http://www.informationdissemination.net/2012/12/2012-in-review.html>.

Table 2. PLA Navy Destroyer Commissionings

Actual (1994-2011) and Projected (2012-2014)

	Sovremenny (Russian-made)	Luhu (Type 052)	Luhai (Type 051B)	Luyang I (Type 052B)	Lyugang II (Type 052C)	Louzhou (Type 051C)	Luyang III (Type 052D)	Annual total	Cumulative total
1994		1						1	1
1995								0	1
1996		1						1	2
1997								0	2
1998								0	2
1999	1		1					2	4
2000								0	4
2001	1							1	5
2002								0	5
2003								0	5
2004				2	1			3	8
2005	1				1			2	10
2006	1					1		2	12
2007						1		1	13
2008								0	13
2009								0	13
2010								0	13
2011								0	13
2012					1			1	14
2013					2			2	16
2014					1		n/a	n/a	n/a

Source: *Jane's Fighting Ships 2012-2013*, and previous editions.

One observer states that

[Luyang II-class ships] are now in mass production, with eight hulls in service [i.e., five more than shown being in service through 2012 in **Table 2**], the first commissioned in 2004. At least six 052Cs have been launched [i.e., put into the water for the final phase of their construction] since the end of 2010, according to Chinese media reports, of which two are reportedly in service at present. Beijing appears to have decided that the Type 052 series, a rough analog of the Arleigh Burke [DDG-51]-class destroyers that form the backbone of the U.S. Navy, is the latest class of warship whose design is good enough to justify large-scale production....

Given the rapid ramp-up of Type 052C production in the past several years, we think the prospect of similar mass production of the Type 052D is quite possible....

The 052D differs significantly from its predecessor the Type 052C in several important ways. It has a completely different type of vertical launch system ("VLS"), with missile canisters instead of what look like revolvers; a different gun system; and what appear to be bigger phased-array radar faces....

The Type 052D appears to be a very modern warship that, with continued improvements in China's maritime surveillance and targeting infrastructure and more intensive training of crews, can help make the PLA Navy even more formidable throughout the Asia-Pacific region."⁸⁴

An August 29, 2012, press report states that

two [Type 052D] hulls were pictured at China State Shipbuilding Corp's Jiangnan Changxing shipyard near Shanghai earlier this month. The first "dock launch" occurred yesterday.

According to China military watchers, as many as 10 Type 052D DDGs could be under construction. If true, this would be a departure from past practice for Chinese shipbuilders, which usually develop one or two hulls and launch a series of tests before entering mass production. Analysts have speculated that Chinese engineers may have become confident enough in the subsystems used on the new destroyer to risk accelerated development.

At 160m [meters] long and 18m wide, the Type 052D is slightly larger than its predecessor, the Type 052C, and is believed to weigh just over 6,000 tonnes. Reports indicate the vessel will use a Type 346 Active Phased Array Radar System and a Type 518 L-band long-range radar.

Meanwhile, the main 100mm gun on the Type 052C, which has reportedly been unreliable, appears to have been replaced by a new PJ-38 130mm gun. The vessel also comes with a helicopter-landing platform and close-in weapon systems.

According to China Military News, the new destroyer comes with two 32-unit vertical launch systems capable of launching HQ-9B air-defense missiles, anti-ship and anti-submarine missiles. The original YJ-62 missile launchers used on the Type 052C do not appear to be present on the new DDG. It has been speculated that the Type 052D could be equipped with a navalized version of the DH-10 land-attack cruise missile.⁸⁵

Four New Indigenously Built Frigate Classes

China since the early 1990s has put into service four new classes of indigenously built frigates, two of which are variations of two others. The classes are called the Jiangwei I (Type 053 H2G), Jiangwei II (Type 053H3), Jiangkai I (Type 054), and Jiangkai II (Type 054A) designs. Compared to China's remaining older Jianghu (Type 053) class frigates, which entered service between the mid-1970s and 1989, the four new frigate classes feature improved hull designs and systems, including improved AAW capabilities. As shown in **Table 3**, production of Jiangkai II-class ships (**Figure 7**) continues, and *Jane's* projects an eventual total of at least 16.

⁸⁴ Gabe Collins and Andrew Erickson, "New Destroyer a Significant Development for Chinese Sea Power," *Wall Street Journal/China Real Time Report* (<http://blogs.wsj.com/chinarealtime>), October 9, 2012.

⁸⁵ J. Michael Cole, "China Building New Type 052D Guided Missile Destroyer," *Taipei Times* (www.taipeitimes.com), August 29, 2012, accessed online on October 11, 2012 at <http://www.taipeitimes.com/News/taiwan/archives/2012/08/29/2003541468>. See also Toshi Yoshihara and James R. Holmes, "The Mater 'PLAN': China's New Guided Missile Destroyer," *The Diplomat* (<http://thediplomat.com>), September 4, 2012; and "The Emergence of 052D," *Information Dissemination* (www.information-dissemination.net), September 1, 2012.

Figure 7. Jiangkai II (Type 054A) Class Frigate



Source: Photograph provided to CRS by Navy Office of Legislative Affairs, December 2010.

Table 3. PLA Navy Frigate Commissionings

Actual (1991-2011) and Projected (2012-2013)

	Jiangwei I (Type 053 H2G)	Jiangwei II (Type 053H3)	Jiangkai I (Type 054)	Jiangkai II (Type 054A)	Annual total	Cumulative total
1991	1				1	1
1992	1				1	2
1993	1				1	3
1994	1				1	4
1995					0	4
1996					0	4
1997					0	4
1998		1			1	5
1999		4			4	9
2000		1			1	10
2001					0	10
2002		2			2	12
2003					0	12
2004					0	12
2005		2	1		3	15
2006			1		1	16
2007					0	16
2008				4	4	20
2009					0	20
2010				3	3	23
2011				2	2	25
2012				2	2	27
2013				5	5	32

Source: *Jane's Fighting Ships 2012-2013*, and previous editions.

Type 056 Corvette

China is building a new type of corvette (i.e., light frigate) called the Type 056. One observer states,

The first 056 class No. 582 was officially handed over to PLAN on the 25th of February [2013] as Wu Shengli, Commander of PLAN personally came to inspect the ship. While it is referred to as light frigate by Chinese news, it really should be classified as a corvette or OPV [offshore patrol vessel] based on its size and displacements. This class is expected to be the next mass produced PLAN shipping class.

The type 056 class fills the gap [in ship sizes] between the 4000-ton [Type] 054A class frigate and 220-ton [Type] 022 class FAC [fast attack craft]. As of now, at least 9 other [Type] 056s have already been launched by the 4 shipyards building them. The overall number of this class is expected to be between the final count of [Type] 054A [ships] (probably around 20) and [Type] 022 [craft] (around 80). They are expected to replace the 10 Type 053 class Jianghu frigates currently serving in the South China Sea Patrol flotilla and the close to 50 Type 037 class missile boats.

In many ways, the type 056 hull is based on the Pattani class OPV that China built for Thailand from 2005 to 2006, although more signature reduction work is done such as the shielding of the funnels.⁸⁶

Figure 8. Type 056 Corvette

Shown under construction



Source: Blog entry entitled “PLAN’s New Type 056 Class,” August 12, 2012, accessed October 12, 2012, at <http://www.informationdissemination.net/2012/08/plans-new-type-056-class.html>.

This same observer stated earlier that:

The [Type] 056 program seems to follow an even more aggressive production schedule than [Type] 022 FACs [fast attack craft]. We are seeing four shipyards (Hu Dong, Huang Pu, Wu Chang and Liao Nan) producing [Type] 056s simultaneously before the first [Type] 056 was ever launched. In fact, the first [Type] 056 launched from both HP and HD shipyard had their funnels and the bow section reworked after they were already launched.⁸⁷

Houbei (Type 022) Fast Attack Craft

As an apparent replacement for at least some of its older fast attack craft, or FACs (including some armed with ASCMs), China in 2004 introduced a new type of ASCM-armed fast attack craft, called the Houbei (Type 022) class (**Figure 9**), that uses a stealthy, wave-piercing, catamaran hull.⁸⁸ Each boat can carry eight C-802 ASCMs. DOD states, “These boats have

⁸⁶ Blog entry entitled “China’s New Type 056,” March 12, 2013, accessed March 21, 2013, at <http://www.informationdissemination.net/2013/03/chinas-new-type-056.html>.

⁸⁷ Blog entry entitled “2012 in Review,” December 28, 2012, accessed March 21, 2013 at <http://www.informationdissemination.net/2012/12/2012-in-review.html>.

⁸⁸ For an article discussing how the Type 022 design appears to have been derived from the designs of Australian high-speed ferries, see David Lague, “Insight: From a Ferry, a Chinese Fast-Attack Boat,” *Reuters*, June 1, 2012.

increased the PLA Navy's littoral warfare capabilities."⁸⁹ The August 2009 ONI report states that "the Houbei's ability to patrol coastal and littoral waters and react at short notice allows the PLA(N)'s larger combatants to focus on offshore defense and out-of-[home]area missions without leaving a security gap along China's coastline."⁹⁰ The Houbei class was built in at least six shipyards; construction of the design appeared to stop in 2009 after a production run of about 60 units.

Figure 9. Houbei (Type 022) Class Fast Attack Craft

With an older Luda-class destroyer behind



Source: Photograph provided to CRS by Navy Office of Legislative Affairs, December 2010.

Surface Ships Operated by Non-PLAN Maritime Agencies

In addition to the PLAN surface combatants discussed above, China operates numerous additional surface ships in several paramilitary maritime law enforcement agencies that are outside the PLAN. These agencies include, but may not be limited to, China Marine Surveillance (CMS), the Fisheries Law Enforcement Command (FLEC), the China Coast Guard (CCG), the Maritime Safety Administration (MSA), and the Customs Anti-Smuggling Bureau (CASB). China often uses ships operated by these agencies, rather than PLAN ships, to assert and defend its maritime territorial claims and fishing interests in the South China Sea and East China Sea. While the ships operated by these agencies are unarmed or lightly armed, they can nevertheless be effective in confrontations with unarmed fishing vessels or other ships.

The CMS, FLEC, and MSA fleets reportedly are being modernized rapidly, and some of the newest ships operated by these agencies are relatively large. One observer states that

⁸⁹ 2012 DOD CMSD, p. 23.

⁹⁰ 2009 ONI Report, p. 20. For further discussion of the Houbei class, see John Patch, "A Thoroughbred Ship-Killer," *U.S. Naval Institute Proceedings*, April 2010: 48-53.

While the PLAN has grabbed all the attention, China's paramilitary maritime agencies, almost under the radar, have been undergoing a much more aggressive transformation. "China's naval build-up has been moderate compared with its coast guard build-up, which has been extremely rapid," argues Lyle Goldstein, an associate professor at the US Navy War College's China Maritime Studies Institute. "No other coast guard in the world is looking at that kind of build-up."...

[CMS's] ships are unarmed.... In May 2012, *China Daily* reported that CMS was due to receive 36 new ships by 2013: several weighing over 1,500 tonnes, 15 weighing 1,000 tons and 14 weighing 600 tons. It is also taking delivery of 54 new speedboats. The report said the agency has "around 300" surveillance ships, of which 30 are in the 1,000+ tonne class, as well as 10 aircraft and four helicopters. A *China Daily* report in June 2011 said that by 2020 CMS would... increase its fleet to 520 vessels. The report added that the service would have 16 fixed-wing aircraft by 2015....

[FLEC] is a large organisation, with... around 2,000 vessels, most of them small and distributed nationwide. However, it too has begun bringing a series of large, ocean-going patrol vessels into service, with the result that the former perception of the FLEC as a somewhat backward and neglected branch of the Chinese law enforcement bureaucracy is beginning to change. It has eight or nine cutters displacing over 1,000 tonnes; its most advanced ship, the 2,500-tonne *Yuzheng 310*, was commissioned into service in 2010 and features two important innovations: it was the first newly built FLEC ship to be armed and to carry a helicopter. *Yuzheng 88*, a 15,000-tonne, ex-PLAN supply ship now used by the FLEC, is also armed....

The most militarised of China's maritime law enforcement agencies, [CCG's] ships are routinely armed. There is little information in the public domain about the China Coast Guard's modernisation plans, which has added to the impression that it is not receiving the political and financial attention that some of China's other maritime agencies have recently enjoyed. It is reported to have around 500 ships, most of which are small patrol boats. Two ex-PLAN Jianghu-class frigates were transferred to the coast guard in 2007; the first of a new class of offshore patrol vessel, the Type 718 *Haijing 1001*, was launched in 2006. The China Coast Guard has around 30 ships displacing 1,000 tonnes or more....

[MSA] has around 200 patrol ships.... The MSA has been the recipient of investment and of a more ambitious mission set, with several large cutters having recently been commissioned. A December 2010 Xinhua report stated that "China's largest and most advanced patrol vessel", the 5,400-tonne *Haixun 01*, would enter MSA service in July 2012. The MSA's largest ships at present are the 3,000 tonne *Haixun 11* and *Haixun 31* and the 1,500-ton *Haixun 21*. The China rescue and Salvage Bureau (CRSB) also falls under the aegis of the MSA. This has several large cutters, including *Nanhaijiu 101*, which displaces 6,200 tonnes, and at least four other ships in the 3,000- to 5,000-tonnes range built between 2005 and 2010....

[CASB] appears to have received the least investment of the five agencies in recent years, with no reports of major procurements in the public domain. It is believed to have more than 200 patrol vessels, some of which are armed.

This summary demonstrates, firstly, that three of China's maritime agencies—CMS, the FLEC and the MSA—are rapidly increasing their tonnage and manpower; they are also acquiring much larger vessels than they have operated before, enabling high-endurance missions further away from China's shores (the China Coast Guard and the Customs Anti-

Smuggling Bureau might be undergoing similar expansions, but if so they have not been given the same publicity).⁹¹

A July 30, 2012, press report states:

China launched its largest and most advanced patrol vessel Haixun 01 on Saturday [July 28, 2012] in Wuhan, Hubei province, as the nation steps up efforts to protect its marine sovereignty and enhance rescue efficiency on its coastal waters.

The new flagship is the first patrol vessel capable of completing both maritime surveillance and rescue missions, according to a statement from the Shanghai Maritime Bureau, which will manage the ship.

The vessel is responsible for cruising on China's territorial waters, searching and saving lives at sea, investigating maritime disputes, monitoring oil spills and conducting emergency disposals, the statement said, adding the vessel can also tow ships and put out fires on other boats.

The 5,418-ton ship⁹² is 128.6 meters [i.e., about 422 feet] in length. It can sail at speed of 37 km per hour [i.e., about 20 knots], and has a maximum sailing distance of 18,520 km [i.e., 10,000 nm] without refueling.⁹³

In March 2013, China announced that it was consolidating four of the five above-discussed maritime law enforcement agencies (all but the MSA) into a single Maritime Police Bureau under the State Oceanic Administration.⁹⁴

Figure 10 shows a picture of the above-discussed Haixun 01 maritime patrol ship.

⁹¹ Trefor Moss, "China's Other Navies," *Jane's Defence Weekly*, July 11, 2012: 28-29, 31-32. See also Blog entry entitled "China's Recent Expansion of the Maritime Agencies," January 20, 2013, accessed March 21, 2013, at <http://www.informationdissemination.net/2013/01/chinas-recent-expansion-of-maritime.html>; Lyle J. Goldstein, *Five Dragons Stirring Up the Sea, Challenge and Opportunity in China's Improving Maritime Enforcement Capabilities*, Newport (RI), Naval War College, China Maritime Studies Institute, China Maritime Study Number 5, April 2010, 39 pp.; and *Jane's Fighting Ships 2012-2013*, pp. 166-167.

⁹² For purposes of comparison, the reported displacement figure of 5,418 tons is roughly 30% greater than the 4,166-ton displacement of a U.S. Navy Oliver Hazard Perry (FFG-7) class frigate, and roughly 80% greater than the roughly 3,000-ton displacement of a U.S. Navy Littoral Combat Ship (LCS).

⁹³ Tan Zongyang, "China Launches Advanced Patrol Vessel," *China Daily* (chinadaily.com.cn), July 30, 2012, accessed July 30, 2012 at http://www.chinadaily.com.cn/cndy/2012-07/30/content_15628983.htm.

⁹⁴ See, for example, Wang Qian, "Meng Named Head of Maritime Police Bureau," *ChinaDaily.com*, March 19, 2013; Andrew Erickson and Gabe Collins, "New Fleet on the Block: China's Coast Guard Comes Together," *China Real Time Report* (<http://blogs.wsj.com/chinarealtime>), March 11, 2013; "Nation Merging Maritime Patrol Force," *China.org.cn*, March 11, 2013; "China Streamlines Maritime Law Enforcement Amid Island Disputes," *Bloomberg News*, March 10, 2013; Agence France-Presse, "China to Unify Marine Bodies Amid Disputes," *SpaceDaily.com*, March 10, 2013; Xinhua, "China to Restructure Oceanic Administration, Enhance Law Enforcement," *Global Times* (www.globaltimes.cn), March 10, 2013.

Figure 10. Haixun 01 Maritime Patrol Ship



Source: "Chinese Patrol Vessel to Exercise with USCG in Hawaii," Chuck Hill's CG [Coast Guard] Blog, August 26, 2012, accessed online on October 11, 2012, at <http://chuckhillscgblog.net/2012/08/26/chinas-largest-patrol-vessel-to-exercise-with-uscg-in-hawaii/>.

Amphibious Ships

Yuzhao (Type 071) Amphibious Ship

China has put into service a new class of amphibious ships called the *Yuzhao* or *Type 071 class* (Figure 11). The lead ship in the class entered service in 2007 and was deployed as part of one of China's anti-piracy patrols off Somalia. The second ship in the class was launched (i.e., put into the water for the final phase of its construction) in November 2010 and began sea trials around September 2011.⁹⁵ The third and fourth ships in the class reportedly have been launched.⁹⁶

⁹⁵ *Jane's Fighting Ships 2011-2012*, p. 154, and the blog entry dated September 27, 2011 and available online at <http://www.informationdissemination.net/2011/09/latest-activity-at-hd-shipyard.html>.

⁹⁶ Sources: Blog entry dated September 27, 2011, and accessed online at <http://www.informationdissemination.net/2011/09/latest-activity-at-hd-shipyard.html>; and "Fourth Chinese Navy Type 071 LPD Launched at Shanghai Shipyard," January 28, 2012, accessed online at http://www.navyrecognition.com/index.php?option=com_content&task=view&id=301 (a similar item, also dated January 28, 2012, was accessed online at <http://nosint.blogspot.com/2012/01/fourth-chinese-navy-type-071-lpd.html>). See also David Lague, "New China Landing Vessels Point To Pacific Rivalry," *Reuters.com*, February 14, 2012. See also the blog entry entitled "Recent Activities Around Chinese Shipyards," April 22, 2012, accessed July 31, 2012, at <http://www.informationdissemination.net/2012/04/recent-activities-around-chinese.html>. (Note the spelling of "activities" in the URL.)

Figure 11. Yuzhao (Type 071) Class Amphibious Ship

With two Houbei (Type 022) fast attack craft behind



Source: Photograph provided to CRS by Navy Office of Legislative Affairs, December 2010.

The Type 071 design has an estimated displacement of 17,600 tons, compared with about 15,900 tons to 16,700 tons for the U.S. Navy's Whidbey Island/Harpers Ferry (LSD-41/49) class amphibious ships, which were commissioned into service between 1985 and 1998, and about 25,900 tons for the U.S. Navy's new San Antonio (LPD-17) class amphibious ships, the first of which was commissioned into service in 2006.

Reported Potential Type 081 Amphibious Ship

China reportedly might also begin (or might have already begun) building a larger amphibious ship, called the Type 081 LHD, that might displace about 20,000 tons.⁹⁷ Such a ship would be about half as large as U.S. Navy LHD/LHA-type amphibious assault ships, and about the same size as France's Mistral-class LHDs. Some observers believe China may build a total of three or more Type 081s. **Figure 12** shows an unconfirmed conceptual rendering of a possible design for the Type 081 LHD.

⁹⁷ *Jane's Fighting Ships 2011-2012*, p. 153.

Figure 12. Type 081 LHD (Unconfirmed Conceptual Rendering of a Possible Design)



Source: Global Times Forum, accessed July 31, 2012, at <http://forum.globaltimes.cn/forum/showthread.php?p=72083>.

A March 28, 2012, press report states:

China Shipbuilding Corporation (CSC) has revealed what may be a design for the Type 081 landing helicopter dock (LHD) amphibious assault ship.

The design was shown in model form at the Defense & Security 2012 exhibition in Bangkok in early March. It is unclear whether this is the Type 081 LHD design long expected to complement the People's Liberation Army (PLA) Navy's Type 071 land platform dock (LPD) vessels, the third of which was launched in September 2011. However, China did reveal a model of the Type 071 in 2004 ahead of the first-in-class vessel's launch in December 2006.

According to Taiwanese defence magazine *DTM*, which supplied images of the model to *IHS Jane's*, the proposed LHD has a length of 211 m [i.e., about 692.25 feet], [a] maximum speed of 23 kt and can embark eight helicopters with hangar space for four. Endurance is 25-30 days at sea and accommodation is provided for 1,068 embarked marines, officials said....

Any resemblance to the French Mistral [LHD] design may reflect comments by the late General/Admiral Liu Huaqing, the architect of the PLA's modernisation path, who in his memoirs confirmed co-operation with French naval design institutes.⁹⁸

Potential Roles for Type 071 and Type 081 Ships

Although larger amphibious ships such as the Type 071 and the Type 081 would be of value for conducting amphibious landings in Taiwan-related conflict scenarios, some observers believe that China is building such ships more for their value in conducting other kinds of operations that are more distant from China's shores. Larger amphibious ships can be used for conducting not only amphibious landings, but humanitarian assistance and disaster relief (HA/DR) operations, maritime security operations (such as anti-piracy operations), and non-combatant evacuation operations (NEOs). Some countries are acquiring larger amphibious ships as much, or more, for these kinds of operations as for conducting amphibious landings.⁹⁹ Politically, larger amphibious ships can also be used for naval diplomacy (i.e., port calls and engagement activities).

Reported Dual-Use Ferry and Cruise Ship

An August 31, 2012, blog entry stated that

China's newest addition to its military is ... a 36,000-ton pleasure boat capable of disgorging thousands of troops and hundreds of vehicles held inside its belly.

That would be the *Bahai Sea Green Pearl*, a 36,000-ton ferry and cruise ship commissioned in August at Yantai Port in China's northeastern Shandong Province. At heart a vessel for pleasure and civilian transport, the ship is intended to normally ferry cars and passengers across the Yellow Sea. But when needed by the People's Liberation Army, the Green Pearl can double as a troop carrier. During its launching ceremony and demonstration on Aug. 8, PLA troops could be seen loading dozens of tanks, artillery pieces and armored vehicles on board....

China also has three more of the vessels under construction, which Zhang Wei, chief of the PLA's Military Transportation Department under the PLA General Logistics Department, said is a "new leap in our military use of civilian vessels to improve the strategic projection." The Green Pearl reportedly has room for more than 2,000 people and 300 cars. It's even got a helicopter pad....

However, the *Green Pearl* is by no means a true amphibious assault ship. There's no indication of any landing craft, or any ability to launch them. The ship needs a proper dock to get its heavier equipment onto land. That mostly rules out launching an invasion of troops while sitting (relatively) safely off-shore. Instead, the ship is more accurately called something like an "amphibious augmentation" platform. It can base a helicopter, and it can follow up an amphibious assault with more troops—after a landing site is secure.

It's also not a new concept. Using civilian ships for double duty is "entirely in keeping with Chinese practices reaching back for centuries," Jim Holmes, an associate professor of

⁹⁸ Ted Parsons, "Chinese Shipbuilder Unveils Possible Type 081 LHD Design," *Jane's Defence Weekly*, March 28, 2012: 15. The article includes a photo of a model of a Type 081 design that appears similar to the design shown in **Figure 12**. See also "New Chinese Ship Causes Alarm," *Taipei Times*, May 31, 2012: 1.

⁹⁹ See, for example, Richard Scott, "Power Projectors," *Jane's Defence Weekly*, July 27, 2011: 21-24, 26-28.

strategy at the Navy War College, tells Danger Room. For Western navies, that practice dated up until the 18th century. And today, the U.S. uses mixed military and commercial ships to refuel at sea, Holmes says....

What's more likely is using the Green Pearl for "soft power" operations distant from China's shores. "Beijing seems rather comfortable with the situation in the Taiwan Strait and is clearly looking beyond Taiwan, as it has been for some time now," Holmes says. "Such a vessel could be a workhorse for any mission involving amphibious operations, meaning humanitarian relief."

That could mean delivering aid, transporting doctors and engineers to a country beset by an emergency. And there's always port calls. That is, making stops in countries friendly to China while carrying a contingent of visiting officers and diplomats on board.¹⁰⁰

Land-Based Aircraft and Unmanned Aerial Vehicles (UAVs)

Land-Based Aircraft

China has introduced modern land-based fighters and strike fighters into the PLA Air Force and PLA Naval Air Force. These include Russian-made Su-27s and Su-30s and indigenously produced J-10s and J-11s. At least some of the strike fighters are or will be armed with modern ASCMs. China's land-based naval aircraft inventory includes, among other things, 24 Russian-made Su-30 MKK 2 Flanker land-based fighters, whose delivery was completed in 2004. The Su-30 is a derivative of the Su-27. Some of the Su-30s might eventually be fitted with the Russian-made AS-17A/B ASCM. (China's air force operates at least 150 Su-27s; these aircraft could be used for fleet-defense operations.) China's navy also operates 100 ASCM-armed JH-7 land-based fighter-bombers that were delivered between 1998 and 2004, and older ASCM-armed land-based maritime bombers.

China in January 2011 reportedly began testing a stealthy, land-based, fighter-type aircraft, called the J-20. Some observers believe, based on the aircraft's size and design, that it might be intended as a land-based strike aircraft for attacking ships at sea.¹⁰¹

China in June 2012 reportedly reached agreement with Russia to license-produce long-range TU-22 Backfire bombers; the planned force of 36 Backfires would be armed with ASCMs.¹⁰²

¹⁰⁰ Robert Beckhusen, "China Now Using A Cruise Ship To Haul Troops And Tanks," *Danger Room (Wired.com)*, August 31, 2012.

¹⁰¹ See, Bill Sweetman, "Chinese J-20 Stealth Fighter In Taxi Tests," *AviationWeek.com*, January 3, 2011; Jeremy Page, "A Chinese Stealth Challenge," *Wall Street Journal*, January 5, 2011: 1; Phil Stewart, "U.S. Downplays Chinese Stealth Fighter Status," *Reuters.com*, January 5, 2011; Agence France-Presse, "US Downplays Concern Over Chinese Stealth Fighter," *DefenseNews.com*, January 6, 2011; Tony Capaccio, "China's J-20 Stealth Fighter Meant to Counter F-22, F-35, U.S. Navy Says," *Bloomberg.com*, January 6, 2011; David A. Fulgham, et al, "Stealth Slayer?" *Aviation Week & Space Technology*, January 17, 2011: 20-21, Andrew S. Erickson and Gabriel B. Collins, "China's New Project 718/J-20 Fighter: Development outlook and strategic implications," *China SignPost*, January 17, 2011, 13 pp.; Dave Majumdar, "U.S. Opinions Vary Over China's Stealthy J-20," *Defense News*, January 24, 2011: 16; Stephen Trimble, "J-20: China's Ultimate Aircraft Carrier-Killer?" *The DEW Line (www.flightglobal.com)*, February 9, 2011; Carlo Kopp, "An Initial Assessment of China's J-20 Stealth Fighter," *China Brief*, May 6, 2011: 9-11; David Axe, "Stealth Fighter or Bomber?" *The Diplomat* (<http://the-diplomat.com>), July 26, 2011; Bill Sweetman, "Chinese J-20 Stealth Fighter Advances," *Aviation Week Defense Technology International*, January 31, 2012.

¹⁰² Norman Friedman, "Back(fire) to the Future," *U.S. Naval Institute Proceedings*, August 2012: 90-91.

UAVs

DOD states that “acquisition and development of longer-range UAVs and UCAVs [Unmanned Combat Aerial Vehicles, i.e., armed UAVs] will expand China’s options for long-range reconnaissance and strike.”¹⁰³ The August 2009 ONI report states that “China is developing UAVs that have the potential to bring multimission capabilities to the maritime environment. In recent years, Chinese officials have openly touted the benefits of UAVs, such as low manufacturing costs, lack of personnel casualties, and inherent ‘stealth-like’ characteristics.”¹⁰⁴

Nuclear and Electromagnetic Pulse (EMP) Weapons

A July 22, 2011, press report states that “China’s military is developing electromagnetic pulse weapons that Beijing plans to use against U.S. aircraft carriers in any future conflict over Taiwan, according to an intelligence report made public on Thursday [July 21]. . . . The report, produced in 2005 and once labeled ‘secret,’ stated that Chinese military writings have discussed building low-yield EMP warheads, but ‘it is not known whether [the Chinese] have actually done so.’”¹⁰⁵

Maritime Surveillance and Targeting Systems

China reportedly is developing and deploying maritime surveillance and targeting systems that can detect U.S. ships and submarines and provide targeting information for Chinese ASBMs and other Chinese military units. These systems reportedly include land-based over-the-horizon backscatter (OTH-B) radars, land-based over-the-horizon surface wave (OTH-SW) radars, electro-optical satellites, radar satellites, and seabed sonar networks.¹⁰⁶ DOD states that

The PLA Navy is improving its long-range surveillance capability with sky-wave and surface-wave over-the-horizon (OTH) radars. In combination with early-warning aircraft, unmanned aerial vehicles (UAVs), and other surveillance and reconnaissance equipment, the radars allow China to carry out surveillance and reconnaissance over the western Pacific. These radars can be used in conjunction with reconnaissance satellites to locate targets at great distances from China, thereby supporting long-range precision strikes, including employment of ASBMs.¹⁰⁷

¹⁰³ 2011 DOD CMSD, p. 32. See also Ian M. Easton and L.C. Russell Hsiao, *The Chinese People’s Liberation Army’s Unmanned Aerial Vehicle Project: Organizational Capacities and Operational Capabilities*, Project 2049 Institute, March 11, 2013, 28 pp.; Bill Gertz, “Game of Drones,” *Washington Free Beacon*, March 26, 2013.

¹⁰⁴ 2009 ONI Report, pp. 28-29. See also Eloise Lee and Robert Johnson, “The Chinese Navy Is Betting Big On Its New Submarine Hunting Drones,” *Business Insider* (<http://articles.businessinsider.com>), April 12, 2012; Wendell Minnick, “China’s Silver Hawk UAV Program Advances,” *DefenseNews.com*, July 14, 2011; Kenji Minemura, “China Developing Unmanned Aircraft To Counter U.S. Forces,” *Asahi Shimbun* (Japan), January 25, 2012.

¹⁰⁵ Bill Gertz, “Beijing Develops Pulse Weapons,” *Washington Times*, July 22, 2011: 1. Except for “[July 21],” materials in brackets as in original.

¹⁰⁶ See 2011 DOD CMSD, pp. 3 and 38; Ben Blanchard, “China Ramps Up Military Use of Space With New Satellites – Report,” *Reuters*, July 11, 2011; Andrew Erickson, “Satellites Support Growing PLA Maritime Monitoring and Targeting Capabilities,” *China Brief*, February 10, 2011: 13-18; Torbjorg Hemmingsen, “Enter the Dragon: Inside China’s New Model Navy,” *Jane’s Navy International*, May 2011: 14-16, 18, 20, 22, particularly the section on target tracking on pages 15-16; Simon Rabinovitch, “China’s Satellites Cast Shadow Over US Pacific Operations,” *Financial Times*, July 12, 2011; Andrew S. Erickson, “Eyes in the Sky,” *U.S. Naval Institute Proceedings*, April 2010: 36-41.

¹⁰⁷ 2012 DOD CMSD, pp. 22-23.

Chinese Naval Operations Away from Home Waters

Chinese navy ships in recent years have begun to conduct operations away from China's home waters. Although many of these operations have been for making diplomatic port calls, some of them have been for other purposes, including in particular anti-piracy operations in waters off Somalia. DOD states that "the PLA Navy has demonstrated the capability to conduct limited deployments of modern surface platforms outside the second island chain, including nine separate deployments to the Gulf of Aden to support sustained counter-piracy operations from 2009 through mid-2011. The PLA Navy also has acquired new classes of ships to support conventional military operations as well as humanitarian assistance and disaster relief missions, including the Type 071 amphibious transport dock and the hospital ship, which the Chinese call the 'Peace Ark.'"¹⁰⁸ DOD also states that "outside of foreign 'goodwill cruises,' [China's anti-piracy operation] represents the PLA Navy's only series of operational deployments beyond the immediate western Pacific region."¹⁰⁹

¹⁰⁸ 2011 DOD CMSD, pp. 32-33. See also pp. 17, 65 and 67, and Peter W. Mackenzie, *Red Crosses, Blue Water[:]* Hospital Ships and China's Expanding Naval Presence, CNA, September 2011, 24 pp.

¹⁰⁹ 2011 DOD CMSD, p. 7. The report similarly states on page 3 that "outside of peacetime counter-piracy missions, for example, China's Navy has little operational experience beyond regional waters." One group of observers, reviewing out-of-area Chinese naval operations, concluded the following:

The PLAN still has some ways to go before it can operate effectively out of area. At present, it can effectively replenish at sea, conduct intra-task force resupply, perform long-distance navigation, conduct formation-keeping with competent seamanship, and operate in all weather conditions. The PLAN cannot currently conduct a full-scale joint forcible entry operation, maintain maritime superiority out of area, conduct multicarrier or carrier strike group operations, or provide comprehensive protection against threats to an out of area task force (antiaircraft warfare, ASW, and antisurface warfare).

The PLAN appears to be expanding its out of area operations incrementally. This will allow the United States, its allies, and other countries time to work out (with each other and with the Chinese) how to respond to opportunities for greater cooperation and potential challenges posed by a more capable PLAN.

China has an even longer way to go before it can be considered a global military power. In particular, it has no network of facilities and bases to maintain and repair its ships. The possession or absence of such a network may ultimately be the best indication of China's future intentions. If China lacks such a support network, it will have great difficulty engaging in major combat operations (MCOs) far from its shores.

Experience gained through out of area operations will help make the PLAN somewhat more effective (in areas such as navigation and seamanship) in some of its other operations. However, most of the tasks performed and lessons gained from out of area operations are not directly transferrable to either a Taiwan contingency or a notional out of area MCO. This implies that time spent on conducting nontraditional out of area deployments for a PLAN unit is time away from combat training for a Taiwan contingency or preparing for MCOs out of area.

A more capable and active PLAN will present new challenges for U.S. policy. On the one hand, the United States wants China to "become a responsible stake holder" in support of international security objectives, which implies a need for greater naval capability to operate out of area. On the other hand, improved PLAN operational capabilities potentially pose a greater military threat to the United States and its allies, especially Asia. The United States has to reassure its allies that it will remain present in the region as a hedge even as Chinese military capabilities improve.

(Christopher D. Yung et al, *China's Out of Area Naval Operations: Case Studies, Trajectories, Obstacles, and Potential Solutions*, Washington, National Defense University Press, December 2010. [Institute for National Strategic Studies, China Strategic Perspectives, No. 3.] 65 pp.)

See also Andrew Erickson and Austin Strange, "'Selfish Superpower' No Longer? China's Anti-Piracy Activities and 21st-Century Global Maritime Governance," *Harvard Asia Quarterly*, Spring/Summer 2012: 92-102.

Some observers believe that China may want to eventually build a series of naval and other military bases in the Indian Ocean—a so-called “string of pearls”—so as to support Chinese naval operations along the sea line of communication linking China to Persian Gulf oil sources.¹¹⁰ Other observers argue that although China has built or is building commercial port facilities in the Indian Ocean, China to date has not established any naval bases in the Indian Ocean and instead appears to be pursuing what U.S. officials refer to as a “places not bases” strategy (meaning a collection of places for Chinese navy ships to occasionally visit for purposes of refueling and restocking supplies, but not bases).¹¹¹

In May 2011, Pakistan’s foreign minister reportedly stated that China had agreed to take over operation of Pakistan’s port of Gwadar from the Singaporean government firm that has been managing the port, and that Pakistan wants to have China build a naval base at Gwadar for the Pakistani navy.¹¹² Shortly thereafter, however, a spokeswoman for China’s foreign ministry stated that operation of the port Gwadar was neither offered by Pakistan nor accepted by China.¹¹³

In December 2011, the Seychelles reportedly offered to support Chinese anti-piracy operations in the Indian Ocean by having Chinese navy ships stop at its port facilities for resupply and crew rest. China reportedly stated that it was considering the offer; that the arrangement, if accepted, would not involve basing Chinese navy ships in the Seychelles; and that Chinese navy ships already stop at ports in Yemen, Oman, and Djibouti for resupply and crew rest.¹¹⁴

¹¹⁰ Bill Gertz, “China Builds Up Strategic Sea Lanes,” *Washington Times*, January 18, 2005, p.1. See also Daniel J. Kostecka, “The Chinese Navy’s Emerging Support Network in the Indian Ocean,” *China Brief*, July 22, 2010: 3-5; Edward Cody, “China Builds A Smaller, Stronger Military,” *Washington Post*, April 12, 2005, p. 1; Indrani Bagchi, “China Eyeing Base in Bay of Bengal?” *Times of India*, August 9, 2008, posted online at http://timesofindia.indiatimes.com/China_eyeing_base_in_Bay_of_Bengal/articleshow/3343799.cms; Eric Ellis, “Pearls for the Orient,” *Sydney Morning Herald*, July 9, 2010.

¹¹¹ Daniel J. Kostecka, “A Bogus Asian Pearl,” *U.S. Naval Institute Proceedings*, April 2011: 48-52; Daniel J. Kostecka, “Places and Bases: The Chinese Navy’s Emerging Support Network in the Indian Ocean,” *Naval War College Review*, Winter 2011: 59-78; Daniel J. Kostecka, “Hambantota, Chittagong, and the Maldives – Unlikely Pearls for the Chinese Navy,” *China Brief*, November 19, 2010: 8-11; Daniel J. Kostecka, “The Chinese Navy’s Emerging Support Network in the Indian Ocean,” *China Brief*, July 22, 2010: 5.

¹¹² See, for example, Jeremy Page, “Beijing Agrees To Operate A Key Port, Pakistan Says,” *New York Times*, May 23, 2011: 17; Agence France-Presse, “Pakistan Asks China to Build Naval Base in Nation,” *DefenseNews.com*, May 22, 2011; Farhan Bokhari and Kathrin Hille, “Pakistan Turns to China for Naval Base,” *Financial Times (www.ft.com)*, May 22, 2011.

¹¹³ See, for example, Michael Wines, “Pakistan And China: Two Friends Hit A Bump,” *New York Times*, May 27, 2011: 4. DOD states that

China has invested in several civilian port projects throughout Asia and along the Indian Ocean. Although such investments may improve peacetime logistical support options for the PLA Navy, not to mention enhancing PRC soft power in the region, they are not a substitute for military bases. Without overseas military bases, China will be constrained in its ability to project and sustain power beyond the immediate region. A decision in Beijing to abandon its longstanding and self-imposed policy against overseas basing would signal that China seeks a greater blue water combat capability.

(2011 DOD CMSD, p. 33.)

The August 2009 ONI report contains additional discussion of operations away from home waters; see 2009 ONI Report, p. 40. See also Dean Chang, “The Chinese Navy’s Budding Overseas Presence,” Heritage Foundation Web Memo, No. 2752, January 11, 2010, 3 pp; and Wendell Minnick, “Chinese Expeditions Boost Naval Expertise,” *DefenseNews.com*, January 11, 2010.

¹¹⁴ Agence France-Presse, “Seychelles Invites China to Set Up Anti-Piracy Base,” *DefenseNews.com*, December 2, 2011; Associated Press, “China Says It Is Mulling Offer From Seychelles To Be Naval Resupply and Recreation Base,” *Washington Post* (<http://www.washingtonpost.com>), December 12, 2011; Jeremy Page and Tom Wright, “Chinese (continued...)”

Numbers of Chinese Ships and Aircraft; Comparisons to U.S. Navy

Numbers Chinese Navy Ships and Naval Aircraft

Numbers Provided by Office of Naval Intelligence (ONI)

Table 4 shows Office of Naval Intelligence (ONI) figures on numbers of Chinese navy ships and aircraft from 1990 to 2009, and projected figures for 2015 and 2020. *The figures in the table lump older and less capable ships together with newer and more capable ships discussed above.* The modern attack submarines, destroyers, and frigates shown in **Table 1**, **Table 2**, and **Table 3** for 2009 account for about half of the attack submarines, about half of the destroyers, and about 42% of the frigates shown in **Table 4** for 2009. DOD states that the percentage of modern units within China's submarine force has increased from less than 10% in 2000 and 2004 to 50% in 2008 and about 56% in 2010, and that the percentage of modern units within China's force of surface combatants has increased from less than 10% in 2000 and 2004 to about 25% in 2008 and 26% in 2010.¹¹⁵

As can be seen in the table, ONI projects that, between 2009 and 2020, the total number of submarines will increase, a small number of aircraft carriers and major amphibious ships will be added to the fleet, the total number destroyers will remain more or less unchanged, and the total number of frigates will decline slightly. The total number of larger combat ships in China's navy (defined here as submarines, aircraft carriers, destroyers, and frigates) is projected to increase somewhat, mostly because of the projected increase in attack submarines. As these changes take place, the overall capability of China's navy will increase as newer and more capable units replace older and less capable ones. The August 2009 ONI report states that "as newer and more capable platforms replace aging platforms, the PLA(N)'s total order of battle may remain relatively steady, particularly in regard to the surface force."¹¹⁶

As can also be seen in the table, ONI projects that the numbers of land-based maritime strike aircraft, carrier-based fighters, and helicopters, will almost triple between 2009 and 2020, and that most of this increase will occur between 2009 and 2015.

(...continued)

Military Considers New Indian Ocean Presence," Wall Street Journal, December 14, 2011: 12; Li Xiaokun and Li Lianxing, "Navy Looks at Offer From Seychelles," *China Daily*, December 12, 2011; Ananth Krishnan, "No Indian Ocean Military Base: China," *The Hindu*, December 12, 2011; Aude Genet (Agence France-Presse), "China Beefing Up Military Presence In Indian Ocean," *Yahoo.com*, December 20, 2011.

¹¹⁵ 2011 DOD CMSD, p. 43 (figure).

¹¹⁶ 2009 ONI Report, p. 46.

Table 4. Numbers of PLA Navy Ships and Aircraft Provided by Office of Naval Intelligence (ONI)

(Figures include both older and less capable units and newer and more capable units)

	1990	1995	2000	2005	2009	Projection for 2015	Projection for 2020
Ships							
Ballistic missile submarines	1	1	1	2	3	4 or 5?	4 or 5?
Attack submarines (SSNs and SSs)	80	82	65	58	59	~70	~72
SSNs	5	5	5	6	6	n/a	n/a
SSs	75	77	60	52	53	n/a	n/a
Aircraft carriers	0	0	0	0	0	1?	2?
Destroyers	14	18	21	25	26	~26	~26
Frigates	35	35	37	42	48	~45	~42
Subtotal above ships	130	136	124	127	136	~146 or ~147?	~146 or ~147?
Missile-armed attack craft	200	165	100	75	80+	n/a	n/a
Amphibious ships	65	70	60	56	58	n/a	n/a
<i>Large ships (LPDs/LHDs)</i>	0	0	0	0	1	~6?	~6?
<i>Smaller ships</i>	65	70	60	56	57	n/a	n/a
Mine warfare ships	n/a	n/a	n/a	n/a	40	n/a	n/a
Major auxiliary ships	n/a	n/a	n/a	n/a	50	n/a	n/a
Minor auxiliary ships and support craft	n/a	n/a	n/a	n/a	250+	n/a	n/a
Aircraft							
Land-based maritime strike aircraft	n/a	n/a	n/a	n/a	~145	~255	~258
Carrier-based fighters	0	0	0	0	0	~60	~90
Helicopters	n/a	n/a	n/a	n/a	~34	~153	~157
Subtotal above aircraft	n/a	n/a	n/a	n/a	~179	~468	~505

Source: Prepared by CRS. Source for 2009, 2015, and 2020: *2009 ONI report*, page 18 (text and table), page 21 (text), and (for figures not available on pages 18 or 21), page 45 (CRS estimates based on visual inspection of ONI graph entitled “Estimated PLA[N] Force Levels”). Source for 1990, 1995, 2000, and 2005: Navy data provided to CRS by Navy Office of Legislative Affairs, July 9, 2010.

Notes: n/a is not available. The use of question marks for the projected figures for ballistic missile submarines, aircraft, carriers, and major amphibious ships (LPDs and LHDs) for 2015 and 2020 reflects the difficulty of resolving these numbers visually from the graph on page 45 of the ONI report. The graph shows more major amphibious ships than ballistic missile submarines, and more ballistic missile submarines than aircraft carriers. Figures in this table for aircraft carriers include the *Liaoning*. The ONI report states on page 19 that China “will likely have an operational, domestically produced carrier sometime after 2015.” Such a ship, plus the *Liaoning*, would give China a force of 2 operational carriers sometime after 2015.

The graph on page 45 shows a combined total of amphibious ships and landing craft of about 244 in 2009, about 261 projected for 2015, and about 253 projected for 2015.

Since the graph on page 45 of the ONI report is entitled “Estimated PLA[N] Force Levels,” aircraft numbers shown in the table presumably do not include Chinese air force (PLAAF) aircraft that may be capable of attacking ships or conducting other maritime operations.

Numbers Presented in Annual DOD Reports to Congress

DOD states that “The PLA Navy possesses some 75 principal surface combatants, more than 60 submarines, 55 medium and large amphibious ships, and roughly 85 missile-equipped small combatants.”¹¹⁷ **Table 5** shows numbers of Chinese navy ships as presented in annual DOD reports to Congress on military and security developments involving China (previously known as the annual report on China military power). *As with Table 4, the figures in Table 5 lump older and less capable ships together with newer and more capable ships discussed above.* The modern attack submarines, destroyers, and frigates shown in **Table 1**, **Table 2**, and **Table 3** for 2009 account for about half of the attack submarines, about half of the destroyers, and about 42% of the frigates shown in **Table 5** for 2009. As mentioned earlier, DOD states that the percentage of modern units within China’s submarine force has increased from less than 10% in 2000 and 2004 to about 47% in 2008 and 50% in 2009, and that the percentage of modern units within China’s force of surface combatants has increased from less than 10% in 2000 and 2004 to about 25% in 2008 and 2009.¹¹⁸

Table 5. Numbers of PLA Navy Ships Presented in Annual DOD Reports to Congress

(Figures include both older and less capable units and newer and more capable units)

	2000	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Nuclear-powered attack submarines	5	5	~ 60	n/a	6	5	5	5	6	6	5	5
Diesel attack submarines	~60	~ 50	~ 60	n/a	51	50	53	54	54	54	49	48
Destroyers	~20	~ 60	> 60	n/a	21	25	25	29	27	25	26	26
Frigates	~40	~ 60	> 60	n/a	43	45	47	45	48	49	53	53
Missile-armed coastal patrol craft	n/a	~ 50	~ 50	n/a	51	45	41	45	70	85	86	86
Amphibious ships: LSTs and LPDs	almost 50	~ 40	> 40	n/a	20	25	25	26	27	27	27	28
Amphibious ships: LSMs	50	~ 40	> 40	n/a	23	25	25	28	28	28	28	23

Source: Table prepared by CRS based on data in 2002-2012 editions of annual DOD report to Congress on military and security developments involving China (known for 2009 and prior editions as the report on China military power).

Notes: n/a means data not available in report. **LST** means tank landing ship; **LPD** means transport dock ship; **LSM** means medium landing ship.

Comparing U.S. and Chinese Naval Capabilities

U.S. and Chinese naval capabilities are sometimes compared by showing comparative numbers of U.S. and Chinese ships. Although numbers of ships (or aggregate fleet tonnages) can be relatively easy to compile from published reference sources, they are highly problematic as a means of assessing relative U.S. and Chinese naval capabilities, for the following reasons:

- **A fleet’s total number of ships (or its aggregate tonnage) is only a partial metric of its capability.** In light of the many other significant contributors to

¹¹⁷ 2011 DOD CMSD, p. 3.

¹¹⁸ 2011 DOD CMSD, p. 43 (figure).

naval capability,¹¹⁹ navies with similar numbers of ships or similar aggregate tonnages can have significantly different capabilities, and navy-to-navy comparisons of numbers of ships or aggregate tonnages can provide a highly inaccurate sense of their relative capabilities. In recent years, the warfighting capabilities of navies have derived increasingly from the sophistication of their internal electronics and software. This factor can vary greatly from one navy to the next, and often cannot be easily assessed by outside observation. As the importance of internal electronics and software has grown, the idea of comparing the warfighting capabilities of navies principally on the basis of easily observed factors such as ship numbers and tonnages has become increasingly less valid, and today is highly problematic.

- **Total numbers of ships of a given type (such as submarines, destroyers, or frigates) can obscure potentially significant differences in the capabilities of those ships, both between navies and within one country's navy.**¹²⁰ The potential for obscuring differences in the capabilities of ships of a given type is particularly significant in assessing relative U.S. and Chinese capabilities, in part because China's navy includes significant numbers of older, obsolescent ships. Figures on total numbers of Chinese submarines, destroyers, frigates, and coastal patrol craft lump older, obsolescent ships together with more modern and more capable designs.¹²¹ As mentioned earlier, DOD states that the percentage of modern units within China's submarine force has increased from less than 10% in 2000 and 2004 to 50% in 2008 and about 56% in 2010, and that the percentage of modern units within China's force of surface combatants has increased from less than 10% in 2000 and 2004 to about 25% in 2008 and 26% in 2010.¹²² This CRS report shows numbers of more modern and more capable submarines, destroyers, and frigates in **Table 1**, **Table 2**, and **Table 3**, respectively.
- **A focus on total ship numbers reinforces the notion that increases in total numbers necessarily translate into increases in aggregate capability, and that decreases in total numbers necessarily translate into decreases in aggregate capability.** For a Navy like China's, which is modernizing in some ship categories by replacing larger numbers of older, obsolescent ships with smaller numbers of more modern and more capable ships, this is not necessarily the case. As shown in **Table 4**, for example, China's submarine force today has fewer boats than it did in the 1990, but has greater aggregate capability than it did in 1990, because larger numbers of older, obsolescent boats have been replaced by smaller numbers of more modern and more capable boats. A similar point might be made about China's force of missile-armed attack craft. DOD states that "Since the 1990s, the PLA Navy has rapidly transformed from a large fleet of

¹¹⁹ These include types (as opposed to numbers or aggregate tonnage) of ships; types and numbers of aircraft; the sophistication of sensors, weapons, C4ISR systems, and networking capabilities; supporting maintenance and logistics capabilities; doctrine and tactics; the quality, education, and training of personnel; and the realism and complexity of exercises.

¹²⁰ Differences in capabilities of ships of a given type can arise from a number of other factors, including sensors, weapons, C4ISR systems, networking capabilities, stealth features, damage-control features, cruising range, maximum speed, and reliability and maintainability (which can affect the amount of time the ship is available for operation).

¹²¹ For an article discussing this issue, see Joseph Carrigan, "Aging Tigers, Mighty Dragons: China's bifurcated Surface Fleet," *China Brief*, September 24, 2010: 2-6.

¹²² 2011 DOD CMSD, p. 43 (figure).

low-capability, single-mission platforms, to a leaner force equipped with more modern, multi-mission platforms.”¹²³ The August 2009 ONI report states that “even if [China’s] naval force sizes remain steady or even decrease, overall naval capabilities can be expected to increase as forces gain multimission capabilities.”¹²⁴ For assessing navies like China’s, it can be more useful to track the growth in numbers of more modern and more capable units. This CRS report shows numbers of more modern and more capable submarines, destroyers, and frigates in **Table 1**, **Table 2**, and **Table 3**, respectively.

- **Comparisons of numbers of ships (or aggregate tonnages) do not take into account maritime-relevant military capabilities that countries might have outside their navies**, such as land-based anti-ship ballistic missiles (ASBMs), land-based anti-ship cruise missiles (ASCMs), and land-based air force aircraft armed with ASCMs or other weapons. Given the significant maritime-relevant non-navy forces present in both the U.S. and Chinese militaries, this is a particularly important consideration in comparing U.S. and Chinese military capabilities for influencing events in the Western Pacific. Although a U.S.-China incident at sea might involve only navy units on both sides, a broader U.S.-China military conflict would more likely be a force-on-force engagement involving multiple branches of each country’s military.
- **The missions to be performed by one country’s navy can differ greatly from the missions to be performed by another country’s navy.** Consequently, navies are better measured against their respective missions than against one another. Although Navy A might have less capability than Navy B, Navy A might nevertheless be better able to perform Navy A’s intended missions than Navy B is to perform Navy B’s intended missions. This is another significant consideration in assessing U.S. and Chinese naval capabilities, because the missions of the two navies are quite different.

DOD Response to China Naval Modernization

Renewed DOD Emphasis on Asia-Pacific Region

Two DOD strategy and budget documents—one released on January 5, 2012, the other released on January 26, 2012—state that U.S. military strategy will place an increased emphasis on the Asia-Pacific region, and that as one result, there will be a renewed emphasis on air and naval forces in DOD plans. The release of these two documents followed statements by Administration officials beginning in the latter months of 2011 that identified the Asia-Pacific as a high-priority region for DOD in coming years. Administration officials have stated that notwithstanding reductions in planned levels of U.S. defense spending, the U.S. military presence in the Asia-Pacific region will be maintained and strengthened. Although Administration officials state that the renewed emphasis on the Asia-Pacific region is not directed at any single country, many observers believe it is in no small part intended as a response to China’s military modernization effort and its assertive behavior regarding its maritime territorial claims.

¹²³ 2011 DOD CMSD, p. 3.

¹²⁴ 2009 ONI Report, p. 46.

January 5, 2012, Strategic Guidance Document

On January 5, 2012, the Administration released a strategic guidance document that the Administration said would be used to guide decisions on the allocation of DOD resources in the FY2013 defense budget and future DOD budgets. In a cover letter to the document, President Obama stated that “as we end today’s wars, we will focus on a broader range of challenges and opportunities, including the security and prosperity of the Asia Pacific.” In another cover letter, Secretary of Defense Panetta stated that the U.S. military “will have global presence emphasizing the Asia-Pacific and the Middle East while still ensuring our ability to maintain our defense commitments to Europe, and strengthening alliances and partnerships across all regions.” The document itself states in part:

U.S. economic and security interests are inextricably linked to developments in the arc extending from the Western Pacific and East Asia into the Indian Ocean region and South Asia, creating a mix of evolving challenges and opportunities. Accordingly, while the U.S. military will continue to contribute to security globally, *we will of necessity rebalance toward the Asia-Pacific region.* Our relationships with Asian allies and key partners are critical to the future stability and growth of the region. We will emphasize our existing alliances, which provide a vital foundation for Asia-Pacific security. We will also expand our networks of cooperation with emerging partners throughout the Asia-Pacific to ensure collective capability and capacity for securing common interests....

The maintenance of peace, stability, the free flow of commerce, and of U.S. influence in this dynamic region will depend in part on an underlying balance of military capability and presence. Over the long term, China’s emergence as a regional power will have the potential to affect the U.S. economy and our security in a variety of ways. Our two countries have a strong stake in peace and stability in East Asia and an interest in building a cooperative bilateral relationship. However, the growth of China’s military power must be accompanied by greater clarity of its strategic intentions in order to avoid causing friction in the region. The United States will continue to make the necessary investments to ensure that we maintain regional access and the ability to operate freely in keeping with our treaty obligations and with international law. Working closely with our network of allies and partners, we will continue to promote a rules-based international order that ensures underlying stability and encourages the peaceful rise of new powers, economic dynamism, and constructive defense cooperation....

In order to credibly deter potential adversaries and to prevent them from achieving their objectives, the United States must maintain its ability to project power in areas in which our access and freedom to operate are challenged. In these areas, sophisticated adversaries will use asymmetric capabilities, to include electronic and cyber warfare, ballistic and cruise missiles, advanced air defenses, mining, and other methods, to complicate our operational calculus. States such as China and Iran will continue to pursue asymmetric means to counter our power projection capabilities, while the proliferation of sophisticated weapons and technology will extend to non-state actors as well. *Accordingly, the U.S. military will invest as required to ensure its ability to operate effectively in anti-access and area denial (A2/AD) environments.* This will include implementing the Joint Operational Access Concept, sustaining our undersea capabilities, developing a new stealth bomber, improving missile defenses, and continuing efforts to enhance the resiliency and effectiveness of critical space-based capabilities.¹²⁵

¹²⁵ Department of Defense, *Sustaining U.S. Global Leadership: Priorities for 21st Century Defense*, January 2012, cover letters and pp. 2, 4-5. Italics as in original. For further discussion of this document, see CRS Report R42146, *In* (continued...)

January 26, 2012, Document on Selected FY2013 Program Decisions

On January 26, 2012, DOD released a document outlining selected program decisions that will be included in DOD's proposed FY2013 budget. The January 26 document states that DOD's "leadership and subject matter experts assessed the potential strategic, military and programmatic risks associated with each budget decision in accordance with five major tenets within the President's strategic guidance [document of January 5, 2012]." The first of these five tenets, the document states, is: "Rebalance force structure and investments toward the Asia-Pacific and Middle East regions while sustaining key alliances and partnerships in other regions." The document states that

The focus on the Asia-Pacific region places a renewed emphasis on air and naval forces while sustaining ground force presence. The Middle East has been dominated by ground force operations over the last decade; however, as we gradually transition security in Afghanistan and reestablish peacetime ground force presence, this region will also become increasingly maritime. Therefore we: ...

- Maintained the aircraft carrier fleet at 11 ships and 10 [carrier] air wings
- Maintained the big-deck amphibious fleet ...¹²⁶
- Budgeted to forward station Littoral Combat Ships in Singapore and patrol craft in Bahrain
- Funded development of a new afloat forward staging base that can be dedicated to support missions in areas where ground-based access is not available, such as counter-mine operations

For these forces to remain capable, we had to invest in capabilities required to maintain our military's continued freedom of action in the face of new technologies designed to frustrate access advantages. Consequently, we increased or protected investment in capabilities that preserve the U.S. military's ability to project power in contested areas and strike quickly from over the horizon, including:...

- Design changes to increase cruise missile capacity of future Virginia-class submarines¹²⁷
- Design of a conventional prompt strike option from submarines¹²⁸
- Upgraded radars for tactical aircraft and ships

(...continued)

Brief: Assessing DOD's New Strategic Guidance, by Catherine Dale and Pat Towell.

¹²⁶ This is a reference to the Navy's inventory of LHA- and LHD-type amphibious assault ships. These ships, which resemble medium-sized aircraft carriers, are often referred to as big-deck or large-deck amphibious ships because their flight decks are much larger than those of the Navy's smaller (i.e., LPD- and LSD-type) amphibious ships.

¹²⁷ This appears to be a reference to a plan to build future Virginia (SSN-774) class attack submarines to a lengthened design that includes an additional mid-body section, called the Virginia Payload Module (VPM) containing four large-diameter vertical launch tubes for firing cruise missiles and other payloads. For more on the VPM, see CRS Report RL32418, *Navy Virginia (SSN-774) Class Attack Submarine Procurement: Background and Issues for Congress*, by Ronald O'Rourke.

¹²⁸ This appears to refer to a new, fast-flying weapon that would be launched from submarines.

To ensure sufficient resources to protect these strategic priorities, we will reduce the number of ships by slowing the pace of building new ships and by accelerating the retirement of some existing ships. These include:

- Retiring 7 cruisers early – 6 did not have ballistic missile defense (BMD) capability, and the seventh with BMD capability is in need of costly hull repairs¹²⁹
- Slipping a large deck amphibious ship (LHA) by 1 year¹³⁰
- Slipping 1 new Virginia class submarine outside the FYDP [Five Year Defense Plan]
- Reducing Littoral Combat Ships by 2 ships in the FYDP¹³¹
- Reducing Joint High Speed Vessels by 8 in the FYDP¹³²
- Retiring 2 smaller amphibious ships (LSD) early and moving their replacement outside the FYDP ...¹³³

This strategic precept puts a premium on self- and rapidly-deployable forces that can project power and perform multiple mission types. This reinforces the need to maintain existing numbers of aircraft carriers, large-deck amphibious ships, and bombers. Furthermore, as the Marine Corps withdraws from the ground in Afghanistan, it will return to afloat posture, with the capability to rapidly respond to crises as they emerge. These choices are consistent with our strategic emphasis on the Asia-Pacific region and the Middle East, but are applicable anywhere on the globe where U.S. national security or vital interests are threatened....

Our ability to project power is a key component of our strategic guidance. We protected... aircraft carriers, surface combatant modernization.... We also protected capabilities that allow us to project power in denied environments. In addition to those discussed earlier, such as... increasing the cruise missile capacity of future submarines, we protected anti-submarine warfare and counter-mine capabilities....¹³⁴

September 2011 Press Report About New Defense Planning Guidance

A September 29, 2011, press report stated that a new DOD Defense Planning Guidance (DPG) document¹³⁵ dated August 29, 2011, “advocat[es] increased investment in military capabilities designed for high-end war among major powers, according to sources familiar with the

¹²⁹ The Navy currently has 22 Ticonderoga (CG-47) class Aegis cruisers; retiring seven early would reduce the inventory of these ships to 15.

¹³⁰ Under the FY2012 budget submission, the next LHA-type ship was to be procured in FY2016; the deferral would thus appear to be FY2017.

¹³¹ This may be a deferral of the procurement of two LCSs, but not a reduction in the planned total LCS procurement of 55 ships.

¹³² This may reflect a reduction in the JHSV force-level goal from 21 ships to 10.

¹³³ The Navy currently operates 12 LSD-type amphibious ships; retiring two early would reduce the inventory to 10. The planned replacement for these LSDs is a new ship class called the LSD(X). The Navy had previously announced that the first LSD(X) was to be procured in FY2017; the new announcement here suggests that the procurement date for this ship has been deferred to a later year.

¹³⁴ Department of Defense, *Defense Budget: Priorities and Choices*, January 2012, pp. 4, 5, 6, 7, 9.

¹³⁵ The DPG is an internal DOD document that guides DOD’s preparation of its proposed budget.

document.” The report stated that the new DPG “signals a ‘new seriousness [in DOD planning] about major-power war,’ which could trigger a ‘flowering of air and naval power,’ said a former service official familiar with the guidance.” The report stated that DOD “is planning to reduce capability for conventional military operations and counterinsurgency, shrink the size of the military, maintain counterterrorism capability and invest more in countering high-end threats like long-range weapons being developed by China that could challenge U.S. power projection capabilities in the Western Pacific, said a military official familiar with Panetta’s guidance.” The report stated that “if the [DOD] budget [for FY2013 and beyond] comes out with the ‘one-third, one-third, one-third’ ratio intact, the comprehensive review ‘should be judged a complete failure,’ an administration official said. The Army’s [budget] topline will likely be cut harder than other services, the official said.”¹³⁶

October 3, 2012, Remarks by Deputy Secretary of Defense Carter

In an October 3, 2012, address on the U.S. strategic rebalancing to the Asia-Pacific, Deputy Secretary of Defense Ashton Carter stated in part:

[Observers] ask whether the United States has the ability to meet the objectives we’ve set for ourselves in the rebalance. It is fair question, given our fiscal realities. And today I want to tell you how it is that we do have the capacity to resource the rebalance and meet our commitments.

With our allies and partners, I think you’ll see, we are, in fact, across the Asia-Pacific region able to invest to sustain peace and prosperity. In other words, we are not just talking the talk, we are walking the walk. And I’d ask if you don’t believe us, to just watch our steps over coming months and years, and you’ll see us implement the rebalance.

And today I want to tell you a bit about those steps, at least the steps we in the Pentagon are taking as part of what is a broader government-wide rebalancing....

To those who ask whether we will be able to deliver on our security commitments under our rebalance, I am gonna give you five reasons why we will be able to do so.

The first is due to increased military capacity. With the war in Iraq now over, and as we transition security responsibilities to the government of Afghanistan, we will release much of our military capacity that has been tied up there for other missions, like fostering peace and strengthening partnerships in the Asia-Pacific. Naval assets that will be released from Afghanistan and the Middle East include surface combatants, amphibious ships, and, eventually, aircraft carriers.

From the Air Force, unmanned systems and intelligence, surveillance and reconnaissance assets, as well as bomber, cyber, and space forces, can all be redeployed and refocused on the Asia-Pacific region. In the Army and the Marine Corps, equipment and personnel previously committed to Iraq and Afghanistan are available for new missions in other regions.

¹³⁶ Christopher J. Castelli, “DOD Aims To Boost Investment In Capabilities For Major-Power War,” *Inside the Pentagon*, September 29, 2011. The phrase “one-third, one-third, one-third ratio” is a reference to the division of the DOD “base” budget (i.e., the DOD budget other than the part that funds operations in Afghanistan and Iraq) between the Army, the Navy and Marine Corps, and the Air Force. The current division of the DOD base budget not an exact one-third, one-third, one-third division, but the phrase has come into use as a shorthand way of referring to the current budget division, which has remained relatively unchanged in recent years.

Second, we are investing in new capabilities that will be especially relevant to the Asia-Pacific region. And we have carefully protected these capabilities, even in the face of the Budget Control Act. In the Navy, we are investing in the Virginia-class submarine and the Virginia payload module, which will allow our attack submarines to carry torpedo-sized weapons and over 60 cruise missiles.

We are investing in anti-submarine warfare capabilities to maintain our enormous undersea advantage, including P-8A maritime patrol aircraft, the M-60 helicopter, as well as ISR assets, like the Broad Area Maritime Sensor, BAMS, which is essentially a marinized version of the Global Hawk. And the Air Force is investing in the KC-46 refueling tanker, a new very stealthy bomber, and a host of ISR investments that will be relevant to the region.

One of the key tenets of our defense strategy is to protect our future-focused investments—the “seed corn” of the future force. President Obama was crystal clear—very insistent—about this himself during our strategy and budget deliberations last winter. And that’s what we’re doing as we budget. Our newest investments of course have the shallowest roots, so it’s easy to tear them away when budget cuts are made, but we can’t afford to do that, we can’t afford to lose our future technological edge, particularly as we look to the Asia-Pacific region. And so we’re protecting those investments.

We are investing in things like cyber, space, and electronic warfare; Unmanned Aerial Vehicles; the Long Range Strike family of systems, all of which are so important to the Asia-Pacific region. And we will continue our science and technology investments across the board.

The third reason why we can carry out the rebalance is that we are shifting our posture forward and into the Asia-Pacific region. That it, not what we have, but where we put it is also changing. By 2020, we will have shifted 60 percent of our naval assets to the Pacific.

That’s an historic change for the United States Navy. The Marine Corps will have up to 2,500 Marines on rotation in Australia, we will have four Littoral Combat Ships stationed forward in Singapore—new Littoral Combat Ships, I was just aboard both of the variants in San Diego last week—and will proceed fully to build-out our military presence on Guam and surrounding areas, which is an important strategic hub for the Western Pacific.

We will begin to rotate B-1 bombers into the region, augmenting the B-52 bombers already on continuous rotation. We have already deployed F-22s to Kadena Air Force Base in Japan, and we will deploy the F-35 Joint Strike Fighter to the region. Said differently, we are sending our newest assets to the Asia-Pacific region first.

Fourth, we are working closely with our allies and partners to build a peaceful Asia-Pacific where every state in the region may prosper, and we do that project together. The State Department of course leads our diplomatic engagement in the region, but our defense relationships play a big part as well....

Fifth, and last, the Defense Department is turning its formidable innovative power to the Asia-Pacific region. We are by no means abandoning counterinsurgency—that’s a core skill-set we’ve gotten very good at doing, and which we’re gonna keep. But as we come out of Iraq and Afghanistan, defense planners, analysts, scientists, and institutions across the country are devoting more and more of their time to thinking about the Asia-Pacific region.

We are developing new operational concepts for our forces. We are integrating operations and aligning the Air Force and Navy to maintain access in contested regions. We are reviewing our contingency plans to ensure we are prepared for any opportunity or challenge that may arise.

So the Pentagon leadership is focused intently on executing the rebalance....

So, in conclusion, we are not just talking the talk of rebalance—we are walking the walk. Even in a period of fiscal austerity, we can and will invest in a continued military presence and engagement for the Asia-Pacific region¹³⁷

Air-Sea Battle (ASB) Concept

DOD has been developing a new Air-Sea Battle (ASB) concept that is intended to increase the joint operating effectiveness U.S. naval and Air Force units, particularly in operations for countering anti-access forces. The ASB development effort was announced in the 2010 Quadrennial Defense Review. DOD has established an Air-Sea Battle Office to guide the implementation of the concept.¹³⁸ Although DOD officials state that the ASB concept is not directed at any particular adversary, many observers believe it is focused to a large degree, if not principally, on countering Chinese and Iranian anti-access forces.

For more on the ASB concept, see **Appendix A**.

Navy Response to China Naval Modernization

The U.S. Navy has taken a number of steps in recent years that appear intended, at least in part, at improving the U.S. Navy's ability to counter Chinese maritime anti-access capabilities, including but not limited to those discussed below. A November 14, 2012, article by Admiral Jonathan Greenert, the Chief of Naval Operations, provides an overview of Navy activities associated with the U.S. strategic rebalancing toward the Asia-Pacific (which administration officials state is not directed at any one state in particular); the text of the article is presented in **Appendix B**.

Force Posture and Basing Actions

The final report on the 2006 QDR directed the Navy “to adjust its force posture and basing to provide at least six operationally available and sustainable carriers and 60% of its submarines in the Pacific to support engagement, presence and deterrence.”¹³⁹ Additional force posture actions that appear intended, at least in part, at improving the U.S. Navy's ability to counter Chinese maritime anti-access capabilities, include the following:

- earlier actions (i.e., actions implemented over the past several years):
 - shifting three Pacific Fleet Los Angeles (SSN-688) class SSNs to Guam (the Navy announced in April 2013 that a fourth will be moved to Guam);
 - basing all three Seawolf (SSN-21) class submarines—the Navy's largest and most heavily armed SSNs—in the Pacific Fleet (at Kitsap-Bremerton, WA);

¹³⁷ Remarks by Deputy Secretary of Defense [Ashton] Carter at the Woodrow Wilson Center, October 3, 2012, accessed online October 17, 2012, at <http://www.defense.gov/transcripts/transcript.aspx?transcriptid=5130>.

¹³⁸ Christopher P. Cavas, “Air-Sea Battle Office Targets DoD Blind Spots,” *NavyTimes.com*, November 10, 2011; Gabe Starosta, “Pentagon Stands Up new AirSea Battle Office,” *Inside the Navy*, November 14, 2011; Ann Roosevelt, “DoD Office Created To Implement Air-Sea Battle Concept,” *Defense Daily*, November 14, 2011: 6; Michael Fabey, “Pentagon Acknowledges New Air-Sea Battle Office,” *Aerospace Daily & Defense Report*, November 14, 2011: 3.

¹³⁹ U.S. Department of Defense, *Quadrennial Defense Review Report*. Washington, 2006. (February 6, 2006) p. 47.

- basing two of the Navy's four converted Trident cruise missile/special operations forces submarines (SSGNs) in the Pacific (at Bangor, WA),¹⁴⁰
- assigning most of the Navy's ballistic missile defense (BMD)-capable Aegis cruisers and destroyers to the Pacific—and homeporting some of those ships at Yokosuka, Japan, and Pearl Harbor, HI;
- more recent actions:
 - announcing an intention to increase the share of the Navy's ships that are homeported in the Pacific from the current figure of 55% to 60% by 2020,¹⁴¹ and to increase by about 20% (from about 50 ships to about 60 ships) the number of Navy ships that will be stationed in or forward-deployed to the Pacific;
 - announcing an intention to station up to four Littoral Combat Ships (LCSs) at Singapore by 2017 (with the first sent there in March 2013 for an 8- to 10-month deployment);¹⁴²
 - announcing a plan to rotate Marines on six-month training deployments through Darwin, Australia; and
 - conducting talks with the Philippines about the possibility of rotating surveillance aircraft or perhaps Navy ships through Philippine bases.¹⁴³

Acquisition Programs

As mentioned earlier (see “Limitations and Weaknesses” in “Background”), China's navy exhibits limitations or weaknesses in several areas, including C4ISR systems, anti-air warfare (AAW), antisubmarine warfare (ASW), and mine countermeasures (MCM). Countering China's naval modernization might thus involve, among other things, actions to exploit these limitations and weaknesses, such as developing and procuring electronic warfare systems, antiship cruise missiles, Virginia (SSN-774) class attack submarines, torpedoes, unmanned underwater vehicles (UUVs), and mines.

Many of the Navy's programs for acquiring highly capable ships, aircraft, and weapon systems can be viewed as intended, at least in part, at improving the U.S. Navy's ability to counter Chinese maritime anti-access capabilities. Examples of highly capable ships now being acquired include Ford (CVN-78) class aircraft carriers,¹⁴⁴ Virginia (SSN-774) class attack submarines,¹⁴⁵

¹⁴⁰ For more on the SSGNs, see CRS Report RS21007, *Navy Trident Submarine Conversion (SSGN) Program: Background and Issues for Congress*, by Ronald O'Rourke.

¹⁴¹ See, for example, Mike McCarthy, “New Ships Will Account For Asia-Pacific Buildup, SECNAV Says,” *Defense Daily*, March 9, 2012: 4-6; Bill Bartel, “Changes Are Coming To Hampton Roads, Navy Says,” *Norfolk Virginian-Pilot*, March 6, 2012; U.S. Navy, *CNO's Position Report: 2012*, undated but released by the Navy in October 2012, p. 2; Jonathan Greenert, “Sea Change, The Navy Pivots to Asia,” *Foreign Policy* (www.foreignpolicy.com), November 14, 2012.

¹⁴² Jim Wolf, “U.S. Plans 10-Month Warship Deployment To Singapore,” *Reuters.com*, May 10, 2012; Jonathan Greenert, “Sea Change, The Navy Pivots to Asia,” *Foreign Policy* (www.foreignpolicy.com), November 14, 2012.

¹⁴³ See, for example, Manuel Mogato, “Philippines Study U.S. Offer to Deploy Spy Planes,” *Reuters.com*, January 27, 2012.

¹⁴⁴ For more on the CVN-78 program, see CRS Report RS20643, *Navy Ford (CVN-78) Class Aircraft Carrier Program: Background and Issues for Congress*, by Ronald O'Rourke.

and Arleigh Burke (DDG-51) class Aegis destroyers, including the new Flight III version of the DDG-51, which is to be equipped with a new radar for improved air and missile defense operations.¹⁴⁶ The procurement rate of Virginia-class submarines was increased to two per year in FY2011, and the Navy wants to start procuring the Flight III version of the DDG-51 in FY2016.

Examples of highly capable aircraft now being acquired by the Navy include F-35C carrier-based Joint Strike Fighters (JSFs),¹⁴⁷ F/A-18E/F Super Hornet strike fighters and EA-18G Growler electronic attack aircraft,¹⁴⁸ E-2D Hawkeye early warning and command and control aircraft, the P-8A Multi-mission Maritime Aircraft (MMA), the Navy carrier-based Unmanned Combat Air System (N-UCAS program) demonstrator program, and the follow-on Unmanned Carrier Launched Airborne Surveillance and Strike (UCLASS) system.¹⁴⁹ Some analysts, such as those at the Center for Strategic and Budgetary Assessments (CSBA), an independent defense study group, have emphasized the need for the Navy to develop and acquire a long-range unmanned aircraft such as UCLASS for use on Navy aircraft carriers. A September 29, 2011, press report on a new DOD Defense Planning Guidance (DPG) document stated:

“The Navy and Air Force are positioned to do well [in forthcoming DOD budgets]—but I imagine business as usual for them won’t be an option either,” [an administration official] said, noting unmanned aircraft will need to be a prominent feature for both. The Navy needs to “get serious” about unmanned combat air vehicles “if they want to keep carriers relevant” and the Air Force “needs to rethink whether the [service’s planned new] long-range bomber will be manned,” the official said.¹⁵⁰

The Navy is also developing a number of new sensor and weapon technologies that might be of value in countering Chinese maritime anti-access capabilities, such as an electromagnetic rail gun (EMRG) whose potential missions include air and missile defense, and high-power free electron lasers (FELs) and solid state lasers (SSLs), whose potential missions also include air and missile defense.¹⁵¹ A “CNO’s position report” document issued by the Navy in October 2012 stated that the Navy in 2012 “methodically continued investment in the capabilities needed to complete ‘kill chains’ of sensors, shooters and weapons that enable our forces to project power and assure access, particularly in the Asia-Pacific and Middle East.”¹⁵²

(...continued)

¹⁴⁵ For more on the Virginia-class program, see CRS Report RL32418, *Navy Virginia (SSN-774) Class Attack Submarine Procurement: Background and Issues for Congress*, by Ronald O'Rourke.

¹⁴⁶ For more on the DDG-51 program, including the planned Flight III version, see CRS Report RL32109, *Navy DDG-51 and DDG-1000 Destroyer Programs: Background and Issues for Congress*, by Ronald O'Rourke.

¹⁴⁷ For more on the F-35 program, see CRS Report RL30563, *F-35 Joint Strike Fighter (JSF) Program*, by Jeremiah Gertler.

¹⁴⁸ For more on the F/A-18E/F and EA-18G programs, see CRS Report RL30624, *Navy F/A-18E/F and EA-18G Aircraft Program*, by Jeremiah Gertler.

¹⁴⁹ The Navy is currently developing a stealthy, long-range, unmanned combat air system (UCAS) for use in the Navy’s carrier air wings. The demonstration program for the system is called UCAS-D. The subsequent production version of the aircraft is called N-UCAS, with the N standing for Navy.

¹⁵⁰ Christopher J. Castelli, “DOD Aims To Boos Investment In Capabilities For Major-Power War,” *Inside the Pentagon*, September 29, 2011.

¹⁵¹ For more on the Navy’s laser-development efforts, see CRS Report R41526, *Navy Shipboard Lasers for Surface, Air, and Missile Defense: Background and Issues for Congress*, by Ronald O'Rourke.

¹⁵² U.S. Navy, *CNO’s Position Report: 2012*, p. 2.

An October 10, 2011, press report states that Admiral Jonathan Greenert, the Chief of Naval Operations (CNO), in a memorandum dated September 23, 2011, “has launched a new review to identify warfighting investments that could counter Chinese military methods for disrupting key battlefield information systems.” According to the report, the memorandum “requests options for warfighting in ‘the complex electromagnetic environment’ and for countering ‘anti-access/area-denial’ threats—terms closely associated with China’s military.” The report quotes the memorandum as stating that “Today’s weapons rely on EM [electromagnetic] sensors, EM communications and EM seekers to complete their ‘kill chains,’ while defenders are increasingly turning to EM methods for protection,” and that “some kill chains never leave the EM environment at all, damaging an adversary’s military capability by affecting control systems alone—no bomb or missile required.” The report states that the memorandum “directs the group to ‘generate innovative concepts for [the] Navy to employ the EM environment as a primary line of operation in a 2025-2030 warfighting campaign.”¹⁵³

In a December 2011 journal article, Greenert stated that

regional powers in 2025 could use ballistic and cruise missiles, submarines, and guided rockets and artillery to prevent military forces or legitimate users from entering an area (“anti-access,” or A2) or operating effectively within an area (“area-denial,” or AD). Those capabilities can be characterized as defensive, reducing opposition to them, and they can be deployed from the country’s mainland territory, making attacks against them highly escalatory. Their intended purpose, however, is clear—intimidation of neighboring countries, including U.S. allies and partners. Aggressors can threaten to hold key maritime crossroads at risk, render territorial claims moot, and assert that intervention by the United States or others in these disputes can be delayed or prevented. The stated or unstated implication is that their neighbors should capitulate to the aggressor’s demands.

To help defend our allies and protect our interests, U.S. forces in 2025 will need to be able to operate and project power despite adversary A2/AD capabilities. Over the next decade naval and air forces will implement the new AirSea Battle Concept and put in place the tactics, procedures, and systems of this innovative approach to the A2/AD challenge....

Over the next decade, maintaining the Navy’s war-fighting edge and addressing fiscal constraints will require significant changes in how we develop the force. We will need to shift from a focus on platforms to instead focus on what the platform carries. We have experience in this model. Aircraft carriers, amphibious ships and the littoral combat ships are inherently reconfigurable, with sensor and weapon systems that can evolve over time for the expected mission. As we apply that same modular approach to each of our capabilities, the weapons, sensors, unmanned systems, and electronic-warfare systems that a platform deploys will increasingly become more important than the platform itself.

That paradigm shift will be prompted by three main factors. First, the large number, range of frequencies, and growing sophistication of sensors will increase the risk to ships and aircraft—even “stealthy” ones—when operating close to an adversary’s territory. Continuing to pursue ever-smaller signatures for manned platforms, however, will soon become unaffordable. Second, the unpredictable and rapid improvement of adversary A2/AD capabilities will require faster evolution of our own systems to maintain an advantage or asymmetrically gain the upper hand. This speed of evolution is more affordable and technically possible in weapons, sensors, and unmanned systems than in manned platforms.

¹⁵³ Christopher J. Castellil, “Memo: Navy Seeks To Counter China’s Battle-Disruption Capabilities,” *Inside the Navy*, October 10, 2011.

The third factor favoring a focus on payloads is the changing nature of war. Precision-guided munitions have reduced the number and size of weapons needed to achieve the same effect. At the same time, concerns for collateral damage have significantly lowered the number of targets that can be safely attacked in a given engagement. The net effect is fewer weapons are needed in today's conflicts.

Together, those trends make guided, precision stand-off weapons such as Tomahawk land-attack missiles, joint air-surface stand-off missiles, and their successors more viable and cost-effective alternatives to increasingly stealthy aircraft that close the target and drop bombs or shoot direct-attack missiles. To take full advantage of the paradigm shift from platform to payload, the Fleet of 2025 will incorporate faster, longer-range, and more sophisticated weapons from ships, aircraft, and submarines. In turn, today's platforms will evolve to be more capable of carrying a larger range of weapons and other payloads.

Those other payloads will include a growing number of unmanned systems. Budget limitations over the next 10 to 15 years may constrain the number of ships and aircraft the Navy can buy....

The future Fleet will deploy a larger and improved force of rotary wing unmanned aerial vehicles (UAVs) including today's Fire Scout and soon, the armed Fire-X. Those vehicles were invaluable in recent operations in Libya and in counterterrorism operations around the Central Command area of responsibility. Deploying from the deck of a littoral combat ship, a detachment of Fire Scouts can provide continuous surveillance more than 100 miles away. Those systems will expand the reach of the ship's sensors with optical and infrared capabilities, as well as support special operations forces in the littorals. Even more significant, the Fleet of 2025 will include UAVs deploying from aircraft carrier decks. What started a decade ago as the unmanned combat air system will be operating by 2025 as an integral element of some carrier air wings, providing surveillance and some strike capability at vastly increased ranges compared with today's strike fighters. Once that aircraft is fielded, it will likely take on additional missions such as logistics, electronic warfare, or tanking.

Submarines will deploy and operate in conjunction with a family of unmanned vehicles and sensors by 2025 to sustain the undersea dominance that is a clear U.S. asymmetric advantage. Large-displacement unmanned underwater vehicles (UUVs) will deploy from ships, shore, or Virginia-class submarine payload tubes to conduct surveillance missions. With their range and endurance, large UUVs could travel deep into an adversary's A2/AD envelope to deploy strike missiles, electronic warfare decoys, or mines. Smaller UUVs will be used by submarines to extend the reach of their organic sensors, and will operate in conjunction with unattended sensors that can be deployed from surface combatants, submarines, and P-8A patrol aircraft. The resulting undersea network will create a more complete and persistent "common operational picture" of the underwater environment when and where we need it. This will be essential to finding and engaging adversary submarines, potentially the most dangerous A2/AD capability.

The undersea picture is extremely important in terms of countering enemy mining. The most basic of A2/AD weapons, mines can render an area of ocean unusable for commercial shipping for weeks or months while we laboriously locate and neutralize them. Even the threat of mines is enough to severely restrict ship movements, significantly affecting trade and global economic stability if it happens in key choke points such as the Malacca or Hormuz straits. The mine countermeasure capabilities we are developing for littoral combat ships and MH-60 aircraft rely heavily on unmanned sensors to rapidly build the underwater picture, and unmanned neutralization systems to disable mines. By 2025 those systems will be fully fielded, and their portable nature could allow them to be another swappable payload on a range of combatants....

Electronic warfare (EW) and cyber operations are increasingly essential to defeating the sensors and command and control (C2) that underpin an opponent's A2/AD capabilities. If the adversary is blinded or unable to communicate, he cannot aim long-range ballistic and cruise missiles or cue submarines and aircraft. Today, Navy forces focus on deconflicting operations in the electromagnetic spectrum or cyber domains. By 2025, the Fleet will fully operationalize those domains, more seamlessly managing sensors, attacks, defense, and communications, and treating EW and cyber environments as "maneuver spaces" on par with surface, undersea, or air.

For example, an electronic jammer or decoy can defeat individual enemy radar, and thus an enemy C2 system using the radar's data. A cyber operation might be able to achieve a similar effect, allowing U.S. forces to avoid detection. This is akin to using smoke and "rubber-duck" decoys in World War II to obscure and confuse the operational picture for Japanese forces, allowing U.S. ships to maneuver to an advantageous position. The future Fleet will employ EW and cyber with that same sense of operational integration.¹⁵⁴

An April 3, 2012, press report stated:

Air Force and Navy planners were stunned by the lack of money and focus on EA/EW [electronic attack/electronic warfare] in the fiscal 2013 defense budget request. "Most of us expected to see that change of investment in the president's budget," says a veteran EW specialist. "It not only wasn't there, [funding] went in the opposite direction. We expected to see a much more aggressive shifting of priorities. Putting money behind something is what really indicates intent. I think it's a momentary hiccup. If it's not, this whole new Asia-Pacific strategy [which has electronic surveillance and attack at its heart] is a façade."¹⁵⁵

An August 20, 2012, press report stated that the Air-Sea Battle concept has prompted Navy officials to make significant shifts in the service's FY2014-FY2018 budget plan, including new investments in ASW, electronic attack and electronic warfare, cyber warfare, the F-35 Joint Strike Fighter (JSF), the P-8A maritime patrol aircraft, and the Broad Area Maritime Surveillance (BAMS) UAV (a maritime version of the Global Hawk UAV). The report quoted Chief of Naval Operations Jonathan Greenert as saying that the total value of the budget shifts was certainly in the hundreds of millions of dollars, and perhaps in the "low billions" of dollars.¹⁵⁶

Training and Forward-Deployed Operations

The Navy in recent years has increased antisubmarine warfare (ASW) training for Pacific Fleet forces and conducted various forward-deployed operations in the Western Pacific, including

¹⁵⁴ Jonathan Greenert, "Navy, 2025: Forward Warfighters," *U.S. Naval Institute Proceedings*, December 2011: 20. Greenert's statement about stationing several LCSs at Singapore followed statements by other Administration officials dating back to June 2011 about operating a small number of LCSs out of Singapore. See, for example, Wong Maye-E (Associated Press), "Gates Pledges Wider U.S. Military Presence in Asia," *USA Today*, June 4, 2011; and Dan de Luce (Agence France-Presse), "Gates: New Weapons For 'Robust' U.S. Role in Asia," *DefenseNews.com*, June 3, 2011.

¹⁵⁵ David A. Fulghum, "GAO Report On Electronic Attack Belabors The Obvious," *Aerospace Daily & Defense Report*, April 3, 2012: 5. The first instance of bracketed wording was inserted by CRS; the others are as in the original.

¹⁵⁶ Christopher J. Castelli, "CNO: Air-Sea Battle Driving Acceleration Of Key Programs In POM-14," *Inside the Navy*, August 20, 2012. POM-14 is the Program Objective Memorandum (an internal DOD budget-planning document) for the FY2014 DOD budget.

exercises and engagement operations with Pacific allied and partner navies, as well as operations that appear to have been aimed at monitoring Chinese military operations.¹⁵⁷

In a December 2011 journal article, Admiral Jonathan Greenert, the Chief of Naval Operations, stated:

Critical to shaping the environment is cooperation with partners and allies across the range of operations. At the high end [of operations], we will expand our combined efforts with allies in Japan, South Korea, and Australia to train and exercise in missions such as antisubmarine warfare and integrated air and missile defense. Over the next decade, we will also increase deployments of ships and aircraft for the cooperative missions our other allies and partners need most. Our ships [sic] in Singapore will conduct cooperative counterpiracy or countertrafficking operations around the South China Sea. Similarly, 2025 may see [land-based] P-8A Poseidon [maritime patrol] aircraft or unmanned broad area maritime surveillance aerial vehicles periodically deploy to the Philippines or Thailand to help those nations with maritime domain awareness....

As Secretary of State Hillary Clinton noted in a recent *Foreign Policy* article, the Asia-Pacific region will be emphasized in our forward posture.... We will continue our robust rotational deployments to the western Pacific, complemented with our forward-stationed navy and marine forces in Japan, Guam, Singapore, and Australia.¹⁵⁸

Statements of Confidence

Countering China's naval modernization effort can also involve stating publicly (while withholding classified details) the U.S. Navy's ability to counter improved Chinese maritime forces. Such public statements could help prevent Chinese overconfidence that might lead to incidents, while also reassuring regional allies, partners, and neutrals. Conversely, some observers might argue, having an ability to counter Chinese maritime military forces but not stating it publicly could invite Chinese overconfidence and thereby be destabilizing. A February 1, 2011, press report stated:

U.S. military commanders are expressing confidence that they can hold their own in the face of faster-than-expected advances by China's military, but looming cost cuts are adding to doubts about the future of American power in the Pacific....

In an interview from an office at the Washington Navy Yard, a military base in the nation's capital, the top Navy commander said the military had plans in place to cope with advances in China, and elsewhere. "We're not flat footed" in the response to China, Admiral Gary Roughead told Reuters.

"I would say that we are responding, or advancing, our capabilities in such a way that we're pacing the global developments that are taking place," he said.

¹⁵⁷ Incidents at sea in recent years between U.S. and Chinese ships and aircraft in China's Exclusive Economic Zone (EEZ) (see "China's View Regarding Right to Regulate Foreign Military Activities in EEZ" in "Background") appear to involve, on the U.S. side, ships and aircraft, such as TAGOS ocean surveillance ships and EP-3 electronic surveillance aircraft, whose primary apparent mission is to monitor foreign military operations.

¹⁵⁸ Jonathan Greenert, "Navy, 2025: Forward Warfighters," *U.S. Naval Institute Proceedings*, December 2011: 20.

“That includes Chinese advances, it includes developments that are taking place in other parts of the world as well.”¹⁵⁹

A December 2010 press report stated:

The man who would face the Chinese in battle, Adm. Patrick Walsh, the current commander of the U.S. Navy’s Pacific Fleet, sees preparation as a way to avoid a future fight. “When we look at these sorts of [Chinese military] developments, such as the ASBM, they are technological developments that we respect, but do not necessarily fear,” Walsh says. “The key element in any sort of deterrent strategy is to make it clear to those who would use a given piece of technology that we have the means to counter it, and to maintain a technological edge.”¹⁶⁰

One observer stated in 2009 that

It is time for the national security community to get a grip on itself. The AA/AD [anti-access/area-denial] threat is neither new nor all that daunting. The U.S. military has already faced down the mother of all AA/AD threats. It was the Soviet military. The Red Army was postured for the ultimate AA/AD operation, including a massive air and missile assault—employing chemical weapons—on all our forward bases and using hundreds of submarines and aircraft to sweep the seas of our ships. The AA/AD Cassandras are hyping today’s threat. Equally bad, they are forgetting recent history.

The U.S. military will employ a full sweep of technologies, tactics and techniques to counter the AA/AD threat. As my colleague Loren Thompson pointed out... a few weeks ago the U.S. Navy has ways of addressing the anti-shipping ballistic missile threat. Advanced organic mine warfare capabilities are being developed to counter sea mines. The Air Force will employ a combination of airfield defenses, electronic warfare, SEAD [suppression of enemy air defenses], unmanned systems, long-range precision weapons and most important, stealthy aircraft to defeat the AA/AD threat. There is an AA/AD threat, but it is not an apocalyptic danger.¹⁶¹

Issues for Congress

Future Size of U.S. Navy

One potential oversight issue for Congress, particularly in the context of reductions in planned levels of defense spending that are anticipated as a result of the Budget Control Act of 2011 (S. 365/P.L. 112-25 of August 2, 2011), concerns whether the U.S. Navy in coming years will be large enough to adequately counter improved Chinese maritime anti-access forces while also adequately performing other missions around the world of interest to U.S. policymakers. Some observers are concerned that a combination of growing Chinese naval capabilities and budget-driven reductions in the size of the U.S. Navy could encourage Chinese military overconfidence

¹⁵⁹ Phil Stewart, “U.S. Military Says Keeps Up With China; Is It Enough?” *Reuters.com*, February 1, 2011.

¹⁶⁰ Erik Sofge, “China’s Deadliest Game,” *Popular Mechanics*, December 2010: 83.

¹⁶¹ Daniel Goure, “The Overblown Anti-Access, Area Denial Threat,” Lexington Institute Early Warning Blog, October 23, 2009, accessed at <http://www.lexingtoninstitute.org/the-overblown-anti-access-area-denial-threat?a=1&c=1171>.

and demoralize U.S. allies and partners in the Pacific, and thereby destabilize or make it harder for the United States to defend its interests in the region.¹⁶²

Navy officials state that, to carry out Navy missions around the world in coming years, the Navy will need to achieve and maintain a fleet of 306 ships of various types and numbers. The Navy's FY2014 30-year (FY2014-FY2043) shipbuilding plan, however, does not include enough ships to fully support all elements of the Navy's 306-ship goal over the long run. The Navy projects that if the FY2014 30-year plan were implemented, there would be shortfalls in cruisers-destroyers, attack submarines, and amphibious ships at certain points during the 30-year period.¹⁶³ As cost-saving measures, the Navy's FY2014 budget proposes the early retirement in FY2015 of seven Aegis cruisers, the shifting into reduced operation status (ROS) of two amphibious ships, and the deferral of some planned ship procurements. A similar proposal made by the Navy in its FY2013 budget submission was not accepted by Congress.¹⁶⁴

The Navy's 306-ship goal reflects the defense strategic guidance document that the Administration presented in January 2012¹⁶⁵ and the associated projected levels of DOD spending shown in the FY2013 budget submission. DOD officials have stated that if planned levels of DOD spending are reduced below what is shown in the FY2013 budget submission, the defense strategy set forth in the January 2012 strategic guidance document might need to be changed. Such a change, Navy officials have indicated, could lead to the replacement of the 306-ship plan of January 2013 with a new plan.

On March 18, 2013, DOD announced that it had initiated a "Strategic Choices and Management Review" that is to be completed by May 31, 2013. A DOD statement on the review reportedly stated:

"Last week, Secretary Hagel directed senior leaders to conduct a review to examine the choices that underlie the Department of Defense's strategy, force posture, investments, and institutional management—including all past assumptions, systems, and practices. This Strategic Choices and Management Review will define the major decisions that must be made in the decade ahead to preserve and adapt our defense strategy, our force, and our institutions under a range of future budgetary scenarios," [DoD Press Secretary George] Little said.

The new strategy will "frame the Secretary's guidance for the Fiscal Year 2015 budget and will ultimately be the foundation for the Quadrennial Defense Review due to Congress in February 2014."

¹⁶² See, for example, Dan Blumenthal and Michael Mazza, "Asia Needs a Larger U.S. Defense Budget," *Wall Street Journal*, July 5, 2011; J. Randy Forbes, "Defence Cuts Imperil US Asia Role," *The Diplomat* (<http://the-diplomat.com>), October 26, 2011. See also Andrew Krepinevich, "Panetta's Challenge," *Washington Post*, July 15, 2011: 15; Dean Cheng, *Sea Power and the Chinese State: China's Maritime Ambitions*, Heritage Foundation Backgrounder No. 2576, July 11, 2011, p. 10.

¹⁶³ For additional discussion, see CRS Report RL32665, *Navy Force Structure and Shipbuilding Plans: Background and Issues for Congress*, by Ronald O'Rourke.

¹⁶⁴ For a discussion, see CRS Report RL32665, *Navy Force Structure and Shipbuilding Plans: Background and Issues for Congress*, by Ronald O'Rourke.

¹⁶⁵ For more on this document, see CRS Report R42146, *In Brief: Assessing DOD's New Strategic Guidance*, by Catherine Dale and Pat Towell.

Deputy Secretary Ash Carter, Dempsey and the Joint Chiefs will conduct the review, which is to be completed by May 31.¹⁶⁶

DOD officials have stated that notwithstanding reductions in planned levels of U.S. defense spending, the U.S. strategic rebalancing toward the Asia-Pacific region will remain on track.¹⁶⁷ Admiral Jonathan Greenert, the Chief of Naval Operations, has stated that the planned shift of Navy assets to the Pacific will take place regardless of reductions to Navy spending resulting from sequestration.¹⁶⁸

Potential oversight questions for Congress include the following:

- Under the Administration's plans, will the Navy in coming years be large enough to adequately counter improved Chinese maritime anti-access forces while also adequately performing other missions around the world of interest to U.S. policymakers?
- What might be the political and security implications in the Asia-Pacific region of a combination of growing Chinese naval capabilities and budget-driven reductions in the size of the U.S. Navy?
- How might the planned size of the Navy, the Navy's share of DOD resources, and the U.S. strategic rebalancing toward the Asia-Pacific region be affected by the Strategic Choices and Management Review?
- If the Navy is reduced in size, and priority in the allocation of deployed Navy ships is given to maintaining Navy forces in the Pacific, what will be the impact on Navy force levels in other parts of the world, such as the Persian Gulf/Indian Ocean region or the Mediterranean Sea, and consequently on the Navy's ability to adequately perform its missions in those parts of the world?
- To what extent could the operational impacts of a reduction in Navy ship numbers be mitigated through increased use of forward homeporting, multiple crewing, and long-duration deployments with crew rotation (i.e., "Sea Swap")? How feasible are these options, and what would be their potential costs and benefits?
- Particularly in a situation of constrained DOD resources, if enough funding is allocated to the Navy to permit the Navy in coming years to maintain a fleet of about 306 ships of the types and numbers set forth in the Navy's 306-ship goal, how much would other DOD programs need to be reduced, and what would be the operational implications of those program reductions in terms of DOD's

¹⁶⁶ As quoted in Colin Clark, "CJCS Gen. Dempsey Signals Strategy Change; Cites Sequestration, Decline Of State Power, Technology Spread," AOL Defense (<http://defense.aol.com>), March 18, 2013, accessed March 21, 2013, at <http://defense.aol.com/2013/03/18/cjcs-gen-dempsey-signals-strategy-change-touts-decline-of-stat/>. See also Jim Garamone, "Hagel Tasks Civilian, Military Leaders to Examine Strategy," DOD News, March 18, 2013, accessed March 21, 2013 at <http://www.defense.gov/news/newsarticle.aspx?id=119557>; and Marcus Weisgerber, "DoD Reviewing Strategy in Wake of Budget Cuts," *NavyTimes.com*, March 18, 2013, accessed March 21, 2013, at <http://www.navytimes.com/news/2013/03/ap-chuck-hagel-orders-review-defense-strategy-031813/>.

¹⁶⁷ See, for example, Paul Eckert, "Asia Rebalance Remains U.S. Priority Amid Fiscal Woes: Pentagon," *Reuters.com*, February 27, 2013, which quotes Mark Lippert, Assistant Secretary of Defense for Asian and Pacific Security Affairs.

¹⁶⁸ See, for example, Megan Eckstein, "Greenert: Pacific Shift Will Take Place Regardless Of Sequestration," *Inside the Navy*, February 25, 2013.

overall ability to counter improved Chinese military forces and perform other missions?

Air-Sea Battle Concept

Another potential oversight issue for Congress concerns the Air-Sea Battle concept. In a November 7, 2011, letter to Secretary of Defense Panetta, Representative J. Randy Forbes, the chairman of the Readiness subcommittee of the House Armed Services Committee, stated in part:

Despite reports throughout 2011 that AirSea Battle had been completed in an executive summary form, to my knowledge Members of Congress have yet to be briefed on its conclusions or in any way made a part of the process. This support will be critical if this concept is to be both properly resourced and enduring....

... I believe the development of this operational concept, like AirLand Battle during the late 1970s and early 1980s, will require the support of Congress if it is to be both successful and enduring. As you will recall, after AirLand Battle was finalized in 1980 the Army worked to build a consensus around the effort, first within the Department and then with Members of Congress through a series of briefings. These briefings described the doctrine and the weapons coming into production that would form the basis of this major doctrinal transition. With Congress' support, AirLand Battle received the proper resources that led to a revolution in the way America's Army and Air Force conducted joint operations. If AirSea Battle is to have similar success, the Congress will have to be made a full partner of this effort.

As AirSea Battle moves from the development stage to implementation, I am eager to understand how you plan to make Congress part of this process. More specifically, what is the overall fiscal program required to support the basic concept? In the short term, I would also appreciate a brief to better understand the findings of the Department's two-year effort to comprehend the challenges created by sophisticated A2/AD [anti-access/area-denial] environments and the operational and tactical demands that will be required to sustain our freedom of action in these theaters.¹⁶⁹

Navy's Ability to Counter China's ASBMs

Another potential oversight issue for Congress concerns the Navy's ability to counter China's ASBMs. Although China's projected ASBM, as a new type of weapon, might be considered a "game changer," that does not mean it cannot be countered. There are several potential approaches for countering an ASBM that can be imagined, and these approaches could be used in combination. The ASBM is not the first "game changer" that the Navy has confronted; the Navy in the past has developed counters for other new types of weapons, such as ASCMs, and is likely exploring various approaches for countering ASBMs.

¹⁶⁹ Letter dated November 7, 2011, from Representative J. Randy Forbes to the Honorable Leon Panetta, accessed November 30, 2011, at http://forbes.house.gov/UploadedFiles/Panetta_ASB.pdf. The letter was also posted at *InsideDefense.com* (subscription required) on November 18, 2011. See also Megan Eckstein, "Forbes Asks Pentagon For Details On New AirSea Battle Office," *Inside the Navy*, November 21, 2011.

Breaking the ASBM's Kill Chain

Countering China's projected ASBMs could involve employing a combination of active (i.e., "hard-kill") measures, such as shooting down ASBMs with interceptor missiles, and passive (i.e., "soft-kill") measures, such as those for masking the exact location of Navy ships or confusing ASBM reentry vehicles. Employing a combination of active and passive measures would attack various points in the ASBM "kill chain"—the sequence of events that needs to be completed to carry out a successful ASBM attack. This sequence includes detection, identification, and localization of the target ship, transmission of that data to the ASBM launcher, firing the ASBM, and having the ASBM reentry vehicle find the target ship.

Attacking various points in an opponent's kill chain is an established method for countering an opponent's military capability. A September 30, 2011, press report, for example, quotes Lieutenant General Herbert Carlisle, the Air Force's deputy chief of staff for operations, plans, and requirements, as stating in regard to Air Force planning that "We've taken [China's] kill chains apart to the 'nth' degree."¹⁷⁰ In an interview published on January 14, 2013, Admiral Jonathan Greenert, the Chief of Naval Operations, stated:

In order for one to conduct any kind of attack, whether it is a ballistic missile or cruise missile, you have got to find somebody. Then, you have got to make sure it is somebody you want to shoot. Then, you've got to track it, you've got to hold that track. Then, you deliver the missile. We often talk about what I would call hard kill—knocking it down, a bullet on a bullet—or soft kill; there is jamming, spoofing, confusing; and we look at that whole spectrum of operations.

And frankly, it is cheaper in the left-hand side of that spectrum.¹⁷¹

To attack the ASBM kill chain, Navy surface ships, for example, could operate in ways (such as controlling electromagnetic emissions or using deception emitters) that make it more difficult for China to detect, identify, and track those ships.¹⁷² The Navy could acquire weapons and systems for disabling or jamming China's long-range maritime surveillance and targeting systems, for attacking ASBM launchers, for destroying ASBMs in various stages of flight, and for decoying and confusing ASBMs as they approach their intended targets. Options for destroying ASBMs in flight include developing and procuring improved versions of the SM-3 BMD interceptor missile (including the planned Block IIA version of the SM-3), accelerating the acquisition of the Sea-Based Terminal (SBT) interceptor (the planned successor to the SM-2 Block IV terminal-phase BMD interceptor),¹⁷³ accelerating development and deployment of the electromagnetic rail gun

¹⁷⁰ David A. Fulghum, "USAF: Slash And Burn Defense Cuts Will Cost Missions, Capabilities," *Aerospace Daily & Defense Report*, September 30, 2011: 6.

¹⁷¹ "Interview: Adm. Jon Greenert," *Defense News*, January 14, 2013: 30. The reference to "the left-hand side of that spectrum" might be a reference to soft kill measures.

¹⁷² For a journal article discussing actions by the Navy during the period 1956-1972 to conceal the exact locations of Navy ships, see Robert G. Angevine, "Hiding in Plain Sight, The U.S. Navy and Dispersed Operations Under EMCON, 1956-1972," *Naval War College Review*, Spring 2011: 79-95. See also Jonathan F. Sullivan, *Defending the Fleet From China's Anti-Ship Ballistic Missile: Naval Deception's Roles in Sea-Based Missile Defense*, A Thesis submitted to the Faculty of the Graduate School of Arts and Sciences of Georgetown University in partial fulfillment of the requirements for the degree of Master of Arts in Security Studies, April 15, 2011, accessed August 10, 2011 at <http://gradworks.umi.com/1491548.pdf>.

¹⁷³ For more on the SM-3, including the Block IIA version, and the SBT, see CRS Report RL33745, *Navy Aegis Ballistic Missile Defense (BMD) Program: Background and Issues for Congress*, by Ronald O'Rourke.

(EMRG), and accelerating the development and deployment of shipboard high-power free electron lasers (FELs) and solid state lasers (SSLs). Options for decoying and confusing ASBMs as they approach their intended targets include equipping ships with systems, such as electronic warfare systems or systems for generating radar-opaque smoke clouds, that could confuse an ASBM's terminal-guidance radar.¹⁷⁴ One observer has argued that active defenses alone are unlikely to succeed, and that the U.S. Navy should place stronger emphasis on passive defenses.¹⁷⁵

AAW and BMD Capability of Flight III DDG-51 Destroyer

In assessing the Navy's ability to counter China's ASBMs, a potentially important question that Congress may consider is whether the Flight III version of the DDG-51 destroyer—the version that the Navy wants to procure starting in FY2016—would have sufficient AAW and BMD capability to perform projected air and missile defense missions against Chinese forces, including ASBMs.

The Flight III DDG-51 would have more AAW and BMD capability than the current DDG-51 design, but less AAW and BMD capability than was envisioned for the CG(X) cruiser (a ship acquisition program that the Navy eventually canceled), in large part because the Flight III DDG-51 would be equipped with a 14-foot-diameter version of the AMDR that would have more sensitivity than the SPY-1 radar on Flight IIA DDG-51s, but less sensitivity than the substantially larger version of the AMDR that was envisioned for the CG(X). The CG(X) also may have had more missile-launch tubes than the Flight III DDG-51.

The Navy argues that while the version of the AMDR on the Flight III DDG-51 will have less sensitivity than the larger version of the AMDR envisioned for the CG(X), the version of the AMDR on the Flight III DDG-51 will provide sufficient AAW and BMD capability to address future air and missile threats. A March 2013 Government Accountability Office (GAO) report assessing selected DOD acquisition programs stated:

The Navy plans to install a 14-foot variant of AMDR on Flight III DDG 51s starting in 2019. According to draft AMDR documents, a 14-foot radar is needed to meet threshold requirements, but an over 20-foot radar is required to fully meet the Navy's desired integrated air and missile defense needs. However, the shipyards and the Navy have determined that a 14-foot active radar is the largest that can be accommodated within the existing DDG 51 deckhouse. Navy officials stated that AMDR is being developed as a scalable design but a new ship would be required to host a larger version of AMDR....

¹⁷⁴ Regarding the option of systems for generating radar-opaque smoke clouds, Thomas J. Culora, "The Strategic Implications of Obscurants," *Naval War College Review*, Summer 2010: 73-84; Scott Tait, "Make Smoke!" *U.S. Naval Institute Proceedings*, June 2011: 58-63.

¹⁷⁵ Marshall Hoyler, "China's 'Antiaccess' Ballistic Missiles and U.S. Active Defense," *Naval War College Review*, Autumn 2010: 84-105.

For additional discussions of options for countering ASBMs, see Sam J. Tangredi, "No Game Changer for China," *U.S. Naval Institute Proceedings*, February 2010: 24-29; and Loren B. Thompson, "China's New 'Carrier-Killing' Missile Is Overrated," Lexington Institute (Early Warning Blog), August 9, 2010 (available online at <http://www.lexingtoninstitute.org/chinas-new-carrier-killing-missile-is-overrated?a=1&c=1171>). See also Craig Hooper and Christopher Albon, "Get Off the Fainting Couch," *U.S. Naval Institute Proceedings*, April 2010: 42-47; and Duncan Lennox, "China's ASBM Project: Keep Calm and Carry On," *Jane's Defence Weekly*, February 16, 2011: 23.

The X-band portion of AMDR will be comprised of an upgraded version of an existing rotating radar (SPQ-9B), instead of the new design initially planned. The new radar will instead be developed as a separate program at a later date and integrated with the 13th AMDR unit. According to the Navy, the SPQ-9B radar fits better within the Flight III DDG 51's sea frame and expected power and cooling. While program officials state that the upgraded SPQ-9B radar will have capabilities equal to the new design for current anti-air warfare threats, it will not perform as well against future threats.¹⁷⁶

Endo-Atmospheric Target for Simulating DF-21D ASBM

A December 2011 report from DOD's Director, Operational Test and Evaluation (DOT&E)—the DOT&E office's annual report for FY2011—states the following in its section on test and evaluation resources:

Anti-Ship Ballistic Missile Target

A threat representative Anti-Ship Ballistic Missile (ASBM) target for operational open-air testing has become an immediate test resource need. China is fielding the DF-21D ASBM, which threatens U.S. and allied surface warships in the Western Pacific. While the Missile Defense Agency has exo-atmospheric targets in development, no program currently exists for an endo-atmospheric target. The endo-atmospheric ASBM target is the Navy's responsibility, but it is not currently budgeted. The Missile Defense Agency estimates the non-recurring expense to develop the exo-atmospheric target was \$30 million with each target costing an additional \$30 million; the endo-atmospheric target will be more expensive to produce according to missile defense analysts. Numerous Navy acquisition programs will require an ASBM surrogate in the coming years, although a limited number of targets (3-5) may be sufficient to validate analytical models.¹⁷⁷

A February 28, 2012, press report stated:

"Numerous programs will require" a test missile to stand in for the Chinese DF-21D, "including self-defense systems used on our carriers and larger amphibious ships to counter anti-ship ballistic missiles," [Michael Gilmore, the Pentagon's director of operational test and evaluation] said in an e-mailed statement....

"No Navy target program exists that adequately represents an anti-ship ballistic missile's trajectory," Gilmore said in the e-mail. The Navy "has not budgeted for any study, development, acquisition or production" of a DF-21D target, he said.

Lieutenant Alana Garas, a Navy spokeswoman, said in an e-mail that the service "acknowledges this is a valid concern and is assessing options to address it. We are unable to provide additional details."...

Gilmore, the testing chief, said his office first warned the Navy and Pentagon officials in 2008 about the lack of an adequate target. The warnings continued through this year, when the testing office for the first time singled out the DF-21D in its annual public report....

¹⁷⁶ Government Accountability Office, *Defense Acquisitions[:] Assessments of Selected Weapon Programs*, GAO-13-294SP, March 2013, p. 46.

¹⁷⁷ Department of Defense, Director, Operational Test and Evaluation, *FY 2011 Annual Report*, December 2011, p. 294.

The Navy “can test some, but not necessarily all, potential means of negating anti-ship ballistic missiles,” without a test target, Gilmore said.¹⁷⁸

The December 2012 report from DOT&E (i.e., DOT&E’s annual report for FY2012) did not further discuss this issue; a January 21, 2013, press report stated that this is because the details of the issue are classified.¹⁷⁹

Press Reports

A March 16, 2012, blog entry states:

China has developed a missile that would turn an aircraft carrier into a 2-billion-dollar hulk of twisted metal, flame, and dead sailors. Publicly, the U.S. Navy downplays its importance. Privately, the sailors are working out several different options to kill it before it kills them.

Adm. Jonathan Greenert, the Navy’s top officer, explained to reporters during a Friday [March 16] breakfast meeting that the Navy has ways of exploiting some of the DF-21D missile’s formidable technical capabilities, even before opening fire and praying.

As Greenert sees it, there’s a menu of options. Some involve convincing the DF-21D that the carrier is in a different place. Others involve masking the electronic emissions of the carrier. Still others are more traditional—like blasting the missile out of the salty air.

“You want to spoof them, preclude detection, jam them, shoot them down if possible, get them to termination, confuse it,” Greenert said. “The concept is end-to-end, and the capabilities therein [are] what we’re pursuing”

First up: the missile’s guidance systems. This is where Greenert wants the Navy’s investment in jamming and electronic warfare generally to pay off.

“If whatever is launched has a seeker, can you jam it?” Greenert mused. “Yes, no, maybe so? What would it take to jam it?” For now, that’s a job for the flying, jamming Growlers which messed with Moammar Gadhafi’s anti-aircraft systems in Libya last year. Later on, the Navy will have a next-generation jammer, also built onto some of its jets, which it wants to use to infect enemy systems with malware. Alternatively or in supplement, the strike group would go radio silent, to stop the missile from homing in on its electronic emissions.

Then comes the “more popular” part, Greenert said: shooting the missile down. The Aegis missile-defense cruisers included in an aircraft carrier strike group would be tasked with that over the next decade. Afterward, the Navy wants to use giant shipboard lasers to burn through incoming missiles. But it’s by no means clear the Navy really can clear all the technological obstacles to oceanic laser warfare by its mid-2020s deadline.

And shooting down this new missile isn’t a guaranteed proposition. “When do you have to engage it? On the way up? Mid-course? Terminal?” Greenert said.

¹⁷⁸ Tony Capaccio, “Navy Lacks Targets To Test U.S. Defenses Against China Missile,” *Bloomberg Government* (*bgov.com*), February 28, 2012. See also Christopher J. Castelli, “DOD IG Questions Realism Of Targets Used To Simulate Enemy Missiles,” *Inside Missile Defense*, March 21, 2012.

¹⁷⁹ Christopher J. Castelli, “DOD Testing Chief Drops Public Discussion Of ASBM Target Shortfall,” *Inside the Navy*, January 21, 2013.

His answer: all of the above. “We call it links of a chain,” Greenert said. “We want to break as many links as possible.” Navy weapons have to be ready to disable the DF-21D—either through jamming it or shooting it—during “all” phases of its trajectory.

There’s also something that Greenert didn’t mention: he has time on his side.

The Navy conceded in December 2010 that the DF-21D had reached “initial operating capability.” But its intelligence chief quickly added that blowing up a carrier is still past China’s means. Hitting a moving object is difficult. Testing the thing at sea is too. Then China needs to integrate the missile into its general surface warfare plans. And after all that come the countermeasures Greenert outlined. Solving all that takes time.

And while China works on that, the Navy will continue its own development. If Greenert is freaked out by a weapon that can punch through one of the most potent symbols of American power, he’s doing a good job of hiding it in public.¹⁸⁰

In a December 2011 journal article, Major General Timothy Hanifen, the Director of Expeditionary Warfare (N85) in the office of the Chief of Naval Operations, stated:

Logistically, in order to sustain the Fleet’s capability to fight near-continuously across vast distances, a game-changing technology-development effort is needed in the area of rapid at-sea vertical-launch system (VLS)¹⁸¹ replenishment and reloading. Current pier-side VLS reload requirements force a disruption of Fleet combat tempo and increase the probability of warship engagement in port, when it is most vulnerable. With rapid at-sea replenishment and an adequate combat reload inventory, the fleet could continue to leverage the vastness of the seas to complicate targeting and lower effective engagement probabilities, while simultaneously maintaining a very high and sustained combat tempo during both force closure and across the joint campaign. Without that ability, battle-force operations increase in risk as they become more tied to naval-base replenishment and thereby more predictable, sequential, and vulnerable....

At present, the Navy is developing very capable and elegant anti-ballistic intercept missiles that allow its ships to defensively engage with precision at long ranges. The Fleet also has less-elegant, close-in missile- and weapons-capabilities. What is potentially missing is an intermediate-range naval gun capability that increases engagement opportunities and adds both density and depth to layered defenses. Within the Navy, there are a total of 106 MK 45 5-inch 54/62-caliber guns that can be linked via warship sensors for shared battle-network awareness and cooperative-engagement capability—one that is currently unused.

The existing guns, if outfitted with common, modular, long-range 5-inch rounds, could provide both an individual warship and the overall Fleet with a greater engagement range and weapons-effects density through the massing of fires. That massing of fire could be accomplished against over-the-horizon high and low targets at long ranges, then gradually shifted in successive engagement opportunities to direct line-of-sight fires within the radar envelope. It could effectively create a wall of shrapnel pellets and fragments into which in-bound aircraft and missiles would fly and be destroyed—not unlike the old 3-inch/50 variable time and radio-frequency fuse weapons effects of World War II. A 5-inch

¹⁸⁰ Spencer Ackerman, “How To Kill China’s ‘Carrier-Killer’ Missile: Jam, Spoof And Shoot,” *Danger Room* (*Wired.com*), March 16, 2012, accessed online at <http://www.wired.com/dangerroom/2012/03/killing-chinas-carrier-killer/>. The word “[are],” in brackets, as in original.

¹⁸¹ A ship’s battery of vertical tubes for storing and launching missiles is referred to as a VLS. At present, VLS tubes cannot be rapidly reloaded at sea.

pellet/flechette round would have equally blinding and devastating effects on adversary surface and land-based radars and electronic systems, swarming small boats, command-and-control ships, and sites ashore—with a value-added naval surface fire support application against ground forces.

Developing a near-term, long-range naval gunfire engagement capability for air, missile, and surface defense is feasible, achievable, and affordable. Recently, the Zumwalt-class destroyers' advance gun system 6-inch/155-mm long-range land attack projectile round was successfully and accurately fired to a distance of about 62 nautical miles. Advances in its technical maturity and adaptability have made it possible to develop and produce a smaller, common 5-inch long-range variant. For the equivalent research-and-development cost of procuring fewer SM3/SM6 missiles, the Fleet could potentially design, develop, and field a modular 5-inch long-range round to be used in both the MK 45 and EMRG gun mounts when the latter enter service in the mid-2020s. The common 5-inch round is conceptually, technologically, fiscally, and developmentally feasible and achievable. It should be pursued and fielded at flank speed.¹⁸²

A November 9, 2011, press report stated that Vice Admiral Scott Swift, the commander of the U.S. Navy's 7th Fleet (the fleet responsible for the Western Pacific),

downplayed concerns about China's development of a ballistic missile, dubbed the DF-21D, that could theoretically be capable of sinking American aircraft carriers at great distance. If true, it's the kind of game changer that some fear could, during a crisis, force the U.S. away from strategic areas such as the Taiwan Strait, the waters around Korea, and the South China Sea.

"The capability is significant. Whether any given system will live up to its design is arguable," Adm. Swift said. He said it's unwise to figure any single weapon could be a "holy grail" for a particular fighting force and emphasized the totality of a fighting force's options.

"You have to look at those systems holistically and what the overall impact is. I will tell you based on what I see, I don't envision changing any of my operation based on one specific system," Adm. Swift said.¹⁸³

An August 29/September 5, 2011, press report states:

Each possible [Chinese] source of ISR [intelligence, surveillance and reconnaissance targeting data] for the DF-21 looks vulnerable in its own way, helping to explain why the U.S. Navy says it can break the kill chain for the missile. Yet it seems that in many links [in the kill chain], information [on the location of U.S. Navy ships] could be collected redundantly, so breaking one [link] does not mean breaking the chain....

In all cases, the data needs to flow back to China from the [ISR] sensor, and the system's control center presumably needs to send commands to the sensor platform—more links in the kill chain that would have to be protected [by the Chinese]. If the DF-21D needs targeting updates as it flies, then that data feed would also be at risk.

¹⁸² Timothy C. Hanifen, "At the Point of Inflection," *U.S. Naval Institute Proceedings*, December 2011: 26 and 31.

¹⁸³ Alex Frangos, "U.S. Navy Commander Calls for Greater Dialogue," *Wall Street Journal* (<http://blogs.wsj.com/chinarealtime>), November 9, 2011.

If the missile is designed for an air burst—to spread destruction across a carrier’s deck rather than lunging into the hangar, machinery and command spaces—then its fuse could also be a target of countermeasures.¹⁸⁴

The then-Chief of Naval Operations, Admiral Gary Roughead, stated the following in an interview published on April 4, 2011:

Question: China reportedly has deployed a so-called aircraft carrier killer. Does such a weapon upset the balance of power insofar as the Navy is concerned?

Roughead: No. You have to look at the total employment of the weapon. You have to look at the nature of being able to first locate, then target, and then engage a moving sea-borne target at range. I’m always struck at how captivated people have gotten about the carrier killer. Nobody’s talking about the precision with which every fixed airfield in the region could be targeted. I really do think that it is not the game-changer people have played it up to be.¹⁸⁵

A March 16, 2011, press report states:

“There has been a lot of discussion about the Dong Feng 21 missile,” [Admiral Gary] Roughead acknowledged. “But the DF 21 is no more an anti-access weapon than a submarine is. I would argue that you can put a ship out of action faster by putting a hole in the bottom [with a torpedo] than by putting a hole in the top [with a weapon like the DF-21].”

Noting the superiority of the Navy’s Virginia-class attack submarines over the several types China is building, Roughead declared that “even though the DF 21 has become a newsworthy weapon, the fact is our aircraft carriers can maneuver, and we have systems that can counter weapons like that.”

“My objective,” in regards to the Chinese, Roughead said, “is to not be denied ocean areas where can operate, or not be restricted in our ability to operate.”¹⁸⁶

A February 15, 2011, press report states:

A new “carrier killer” missile that has become a symbol of China’s rising military might will not force the U.S. Navy to change the way it operates in the Pacific, a senior Navy commander told The Associated Press.

Defense analysts say the Dong Feng 21D missile could upend the balance of power in Asia, where U.S. aircraft carrier battle groups have ruled the waves since the end of World War II.

However, Vice Adm. Scott van Buskirk, commander of the U.S. 7th Fleet, told the AP in an interview that the Navy does not see the much-feared weapon as creating any insurmountable vulnerability for the U.S. carriers - the Navy’s crown jewels.

¹⁸⁴ Bradley Perrett, “Pacific Projections,” *Aviation Week & Space Technology*, August 29/September 5, 2011: 67-68.

¹⁸⁵ “‘We’re Not Gambling,’” *Aviation Week & Space Technology*, April 4, 2011: 66.

¹⁸⁶ Christopher P. Cavas, “Roughead Says Russian, Chinese Navies Growing,” *NavyTimes.com*, March 16, 2011.

“It’s not the Achilles heel of our aircraft carriers or our Navy - it is one weapons system, one technology that is out there,” Van Buskirk said in an interview this week on the bridge of the USS George Washington, the only carrier that is home-based in the western Pacific....

Van Buskirk, whose fleet is responsible for most of the Pacific and Indian oceans, with 60-70 ships and 40,000 sailors and Marines under its command, said the capabilities of the Chinese missile are as yet unproven. But he acknowledged it does raise special concerns.

“Any new capability is something that we try to monitor,” he said.

“If there wasn’t this to point to as a game changer, there would be something else,” he said. “That term has been bandied about for many things. I think it really depends in how you define the game, whether it really changes it or not. It’s a very specific scenario for a very specific capability - some things can be very impactful.”...

Still, van Buskirk said the Navy has no intention of altering its mission because of the new threat and will continue to operate in the seas around Japan, Korea, the Philippines and anywhere else it deems necessary.

“We won’t change these operations because of this specific technology that might be out there,” he told The AP while the USS George Washington was in its home port just south of Tokyo for repairs last week. “But we will carefully monitor and adapt to it.”¹⁸⁷

Admiral Roughead stated the following in a January 14, 2011, interview:

Question: As you say, you don’t jump with the revelation of another capability, particularly as you might have known it was coming. But excitable headline writers like to talk about the ASBM as a game-changer. Is that accurate?

Roughead: I think it is a bit of an overstatement. I find it very interesting when you talk about the ballistic missile capability and the fixation on the ASBM, the fact of the matter is that with regard to the other military capabilities that are land-based, you could have the coordinates of every 20 feet of airstrip preprogrammed and you know it is not going to move. I would submit the beauty of naval forces is their flexibility, and the challenges of finding, targeting and then hitting them. It is a new capability and a new application of a ballistic missile, but at the same time, I look at it and say let’s move forward with this.

Question: Do you have any idea about timetables for deployment? Admiral Willard has talked about this.

Roughead: He talked about the initial operational capability, which is a term we use. It would not surprise me that in the next couple of years that that capability will be in play.

Question: But have you been preparing for some time your own structure to incorporate that?

Roughead: I think across the board I am always looking at developments and at how do we keep our options open relative to those developments. For me personally, the PLAN has been an area of interest since I was first exposed to it in a very personal way starting in 1994. Through a series of assignments I have been able to watch it. I have had a focused

¹⁸⁷ Eric Talmadge, “3-Star: Anti-Carrier Missile Won’t Stop Navy,” *NavyTimes.com*, February 15, 2011.

professional interest in it. So I watch and do the things that I have to do to make sure that my navy is ready.¹⁸⁸

Vice Admiral David J. Dorsett, the Deputy Chief of Naval Operations for Information Dominance, stated the following at a January 5, 2011, meeting with defense reporters:

Question: What are the resourcing requirements implications of the Chinese missile given you said it's got capability [inaudible]? Are there major improvements in the Aegis air defense system that you're recommending or [inaudible] the edges? What are the defensive implications for the Navy and resources in the next four or five years?

Dorsett: First of all, Tony, going into any level of detail would be a classified answer, and I'll tell you, like any advanced technology that's developed for military use around the globe, the U.S. Navy needs to develop counters. We need to be innovative in that approach. I think that's one of the things that with creation of information dominance, we've been able to look at a variety of kinetic and non-kinetic solution sets to counter advancing capabilities. And relative to advanced missile systems, we're doing that as well. It's a vague answer for you, but it's the best I can do.

Question: Can you give a sense of whether the Aegis system is roughly capable of handling this threat?

Dorsett: Because of the – I'd prefer not to answer the question.¹⁸⁹

Navy's Ability to Counter China's Submarines

Another potential oversight issue for Congress concerns the Navy's ability to counter China's submarines. Some observers raised questions about the Navy's ability to counter Chinese submarines following an incident on October 26, 2006, when a Chinese Song-class submarine reportedly surfaced five miles away from the Japan-homeported U.S. Navy aircraft carrier *Kitty Hawk* (CV-63), which reportedly was operating at the time with its strike group in international waters in the East China Sea, near Okinawa. According to press reports, the carrier strike group at the time was not actively searching for submarines, and the Song-class boat remained undetected by the strike group until it surfaced and was observed by one of the strike group's aircraft.¹⁹⁰ The Chinese government denied that the submarine was following the strike group.¹⁹¹

¹⁸⁸ Source: Transcript of interview, as appended to Richard McGregor, "US Fleet Chief Voices Doubts On Chinese Navy," *Financial Times*, January 18, 2011.

¹⁸⁹ Source: Transcript of Defense Writers Group roundtable with Vice Admiral David J. Dorsett, Deputy CNO for Information Warfare. Material in brackets as in the transcript.

¹⁹⁰ Bill Gertz, "China Sub Secretly Stalked U.S. Fleet," *Washington Times*, November 13, 2006: 13; Philip Creed, "Navy Confirms Chinese Sub Spotted Near Carrier," *NavyTimes.com*, November 13, 2006; Bill Gertz, "Defenses On [sic] Subs To Be Reviewed," *Washington Times*, November 14, 2006; En-Lai Yeoh, "Fallon Confirms Chinese Stalked Carrier," *NavyTimes.com*, November 14, 2006; Bill Gertz, "Admiral Says Sub Risked A Shootout," *Washington Times*, November 15, 2006; Jeff Schogol, "Admiral Disputes Report That Kitty Hawk, Chinese Sub Could Have Clashed," *Mideast Starts and Stripes*, November 17, 2006.

¹⁹¹ Associated Press, "China Denies Reports That Sub Followed Kitty Hawk," *NavyTimes.com*, November 16, 2006. A shorter version of the same story was published as Associated Press, "China Denies Sub Followed A Group Of U.S. Warships," *Asian Wall Street Journal*, November 17, 2006: 11.

Improving the Navy's ability to counter China's submarines could involve procuring platforms (i.e., ships and aircraft) with ASW capabilities, and/or developing technologies for achieving a new approach to ASW that is distributed and sensor-intensive (as opposed to platform-intensive). Navy officials in 2004-2005 spoke of their plans for achieving distributed, sensor-intensive ASW architecture.¹⁹² Such an approach might involve the use of networked sensor fields, unmanned vehicles, and standoff weapons. Implementing such an approach to ASW reportedly would require overcoming some technical challenges, particularly for linking together large numbers of distributed sensors, some of which might be sonobuoys as small as soda cans.¹⁹³

Countering wake-homing torpedoes more effectively could require completing development work on the Navy's new anti-torpedo torpedo (ATT) and putting the weapon into procurement.¹⁹⁴ A July 21, 2011, press report states that DOD

is seeking congressional permission to immediately boost funding for a high-priority Navy effort to give aircraft carriers and other high-value ships the ability to defend against torpedo attacks, something they lack today. Pentagon comptroller Robert Hale, in a May 8 reprogramming request not made public by the Defense Department, told lawmakers DOD wants to shift \$8 million into Navy research-and-development accounts to support rapid prototyping of the Anti-Torpedo Torpedo Defense System (ATTDS).¹⁹⁵

Navy's Fleet Architecture

Another potential oversight issue for Congress concerns the Navy's fleet architecture. Some observers, viewing the anti-access aspects of China's naval modernization effort, including ASBMs, ASCMs, and other anti-ship weapons, have raised the question of whether the U.S. Navy should respond by shifting over time to a more highly distributed fleet architecture featuring a reduced reliance on carriers and other large ships and an increased reliance on smaller ships. Supporters of this option argue that such an architecture could generate comparable aggregate fleet capability at lower cost and be more effective at confounding Chinese maritime anti-access

¹⁹² See, for example, Otto Kreisher, "As Underwater Threat Re-Emerges, Navy Renews Emphasis On ASW," *Seapower*, October 2004, p. 15, and Jason Ma, "ASW Concept Of Operations Sees 'Sensor-Rich' Way Of Fighting Subs," *Inside the Navy*, February 7, 2005.

¹⁹³ Jason Ma, "Autonomous ASW Sensor Field Seen As High-Risk Technical Hurdle," *Inside the Navy*, June 6, 2005. See also Jason Ma, "Navy's Surface Warfare Chief Cites Progress In ASW Development," *Inside the Navy*, January 17, 2005. More recent press reports discuss research on ASW concepts involving bottom-based sensors, sensor networks, and unmanned vehicles; see Richard Scott, "GLINT In the Eye: NURC Explores Novel Autonomous Concepts For Future ASW," *Jane's International Defence Review*, January 2010: 34-35; Richard Scott, "DARPA Goes Deep With ASW Sensor Network," *Jane's International Defence Review*, March 2010: 13; Richard Scott, "Ghost In The Machine: DARPA Sets Course Towards Future Unmanned ASW Trail Ship," *Jane's Navy International*, April 2010: 10-11; Norman Friedman, "The Robots Arrive," *Naval Forces*, No. IV, 2010: 40-42, 44, 46; Bill Sweetman, "Darpa Funds Unmanned Boat For Submarine Stalking," *Aerospace Daily & Defense Report*, January 6, 2011: 5; Richard Scott, "Networked Concepts Look to Square the ASW Circle," *Jane's International Defence Review*, January 2011: 42-47; Richard Scott, "DARPA's Unmanned ASW Sloop Concept Casts Lines," *Jane's Navy International*, January/February 2011: 5.

¹⁹⁴ For articles discussing torpedo defense systems, including ATTs, see Richard Scott, "Ships Shore Up," *Jane's Defence Weekly*, September 1, 2010: 22-23, 25, 27; Mike McCarthy, "NAVSEA Seeks Industry Thoughts On Torpedo Defense Systems," *Defense Daily*, November 29, 2011: 4-5.

¹⁹⁵ Jason Sherman, "Navy Seeks Funding To Develop First Anti-Torpedo Capability For Carriers," *Inside the Navy*, July 18, 2011.

capabilities. Skeptics, including supporters of the currently planned fleet architecture, question both of these arguments.¹⁹⁶

Another question bearing on fleet architecture concerns the future role of Navy unmanned vehicles in countering Chinese anti-access forces. A July 16, 2012, press report states:

The Navy is eyeing potential investments in revolutionary unmanned systems with greater autonomy than today's drones to counter advanced Chinese weapons capable of threatening U.S. warships, according to draft guidance for a new assessment.

Although Defense Department and naval leaders have previously called for drones with greater levels of autonomy, the "specific pathways" for the introduction of enabling technologies have not yet been identified, states the draft terms of reference for the Naval Research Advisory Committee's planned review.¹⁹⁷

Legislative Activity for FY2014

The Navy's proposed budget was submitted on April 10, 2013.

¹⁹⁶ The question of whether the U.S. Navy concentrates too much of its combat capability in a relatively small number of high-value units, and whether it should shift over time to a more highly distributed fleet architecture, has been debated at various times over the years, in various contexts. Much of the discussion concerns whether the Navy should start procuring smaller aircraft carriers as complements or replacements for its current large aircraft carriers.

Supporters of shifting to a more highly distributed fleet architecture argue that the Navy's current architecture, including its force of 11 large aircraft carriers, in effect puts too many of the Navy's combat-capability eggs into a relatively small number of baskets on which an adversary can concentrate its surveillance and targeting systems and its anti-ship weapons. They argue that although a large Navy aircraft carrier can absorb hits from multiple conventional weapons without sinking, a smaller number of enemy weapons might cause damage sufficient to stop the carrier's aviation operations, thus eliminating the ship's primary combat capability and providing the attacker with what is known as a "mission kill." A more highly distributed fleet architecture, they argue, would make it more difficult for China to target the Navy and reduce the possibility of the Navy experiencing a significant reduction in combat capability due to the loss in battle of a relatively small number of high-value units.

Opponents of shifting to a more highly distributed fleet architecture argue that large carriers and other large ships are not only more capable, but proportionately more capable, than smaller ships, that larger ships are capable of fielding highly capable systems for defending themselves, and that they are much better able than smaller ships to withstand the effects of enemy weapons, due to their larger size, extensive armoring and interior compartmentalization, and extensive damage-control systems. A more highly distributed fleet architecture, they argue, would be less capable or more expensive than today's fleet architecture. Opponents of shifting to a more highly distributed fleet architecture argue could also argue that the Navy has already taken an important (but not excessive) step toward fielding a more distributed fleet architecture through its plan to acquire 55 Littoral Combat Ships (LCSs), which are small, fast surface combatants with modular, "plug-and-flight" mission payloads. (For more on the LCS program, see CRS Report RL33741, *Navy Littoral Combat Ship (LCS) Program: Background and Issues for Congress*, by Ronald O'Rourke

The issue of Navy fleet architecture, including the question of whether the Navy should shift over time to a more highly distributed fleet architecture, was examined in a report by DOD's Office of Force Transformation (OFT) that was submitted to Congress in 2005. OFT's report, along with two other reports on Navy fleet architecture that were submitted to Congress in 2005, are discussed at length in CRS Report RL33955, *Navy Force Structure: Alternative Force Structure Studies of 2005—Background for Congress*, by Ronald O'Rourke. The functions carried out by OFT have since been redistributed to other DOD offices. See also Wayne P. Hughes, Jr., *The New Navy Fighting Machine: A Study of the Connections Between Contemporary Policy, Strategy, Sea Power, Naval Operations, and the Composition of the United States Fleet*, Monterey (CA), Naval Postgraduate School, August 2009, 68 pp.; Timothy C. Hanifen, "At the Point of Inflection," *U.S. Naval Institute Proceedings*, December 2011: 24-31; and the blog entry available online at <http://www.informationdissemination.net/2011/06/navy-is-losing-narratives-battle.html>.

¹⁹⁷ Christopher J. Castelli, "Investments In Drone Autonomy Eyed To Counter China's A2/AD Weapons," *Inside the Navy*, July 16, 2012.

Appendix A. Background Information on Air-Sea Battle Concept

This appendix provides additional background information on the Air-Sea Battle Concept.

Statements from DOD Officials

On November 9, 2011, the Air-Sea Battle Office released the following statement on the ASB concept, which is printed here in its entirety:

Throughout the history of warfare, adversaries have endeavored to deny each other freedom of action and access to areas where operations could be mounted that threaten campaign objectives.

This fundamental of warfare was vividly highlighted during Operation DESERT STORM in 1991, when the access granted by allies and partners was exploited by the overwhelming capabilities of the U.S. military to quickly liberate Kuwait from Iraqi occupation. In the aftermath of DESERT STORM, it was apparent to many potential adversaries that it would be inadvisable to oppose the U.S. in a force-on-force conflict, and they explored how to disrupt U.S. power projection through means designed to complicate both movement to and maneuver within an area of mutual interest. These two elements of an adversary's comprehensive warfare strategy are referred to as "anti-access" and "area denial" or "A2/AD".

Over the past two decades, the development and proliferation of advanced weapons, targeting perceived U.S. vulnerabilities, have the potential to create an A2/AD environment that increasingly challenges U.S. military access to and freedom of action within potentially contested areas. These advanced systems encompass diverse capabilities that include ballistic and cruise missiles; sophisticated integrated air defense systems; anti-ship weapons ranging from high-tech missiles and submarines to low-tech mines and swarming boats; guided rockets, missiles, and artillery, an increasing number of 4th generation fighters; low-observable manned and unmanned combat aircraft; as well as space and cyber warfare capabilities specifically designed to disrupt U.S. communications and intelligence systems. In combination, these advanced technologies have the potential to diminish the advantages the U.S. military enjoys in the air, maritime, land, space, and cyberspace domains today. If these advances continue and are not addressed effectively, U.S. forces could soon face increasing risk in deploying to and operating within previously secure forward areas—and over time in rear areas and sanctuaries—ultimately affecting our ability to respond effectively to coercion and crises that directly threaten the strategic interests of the U.S., our allies, and partners.

Air-Sea Battle

Appreciating the need to address the growing challenge posed by the emerging A2/AD environment, the Secretary of Defense directed the Department of the Air Force and the Department of the Navy to develop an Air-Sea Battle Concept. In response, the services designed an operational concept, focused on the ways and means necessary to neutralize current and anticipated A2/AD threats, to ensure our Joint force maintains the ability to project power and protect U.S. national interests.

The Air-Sea Battle Concept centers on networked, integrated, attack-in-depth to disrupt, destroy and defeat (NIA-D3) A2/AD threats. This approach exploits and improves upon the advantage U.S. forces have across the air, maritime, land, space and cyberspace domains, and is essential to defeat increasingly capable intelligence gathering systems and sophisticated weapons systems used by adversaries employing A2/AD systems. Offensive and defensive tasks in Air-Sea Battle are tightly coordinated in real time by networks able to command and control air and naval forces in a contested environment. The air and naval forces are organized by mission and networked to conduct integrated operations across all domains.

The concept organizes these integrated tasks into three lines of effort, wherein air and naval forces attack-in-depth to disrupt the adversary's intelligence collection and command and control used to employ A2/AD weapons systems; destroy or neutralize A2/AD weapons systems within effective range of U.S. forces; and defeat an adversary's employed weapons to preserve essential U.S. Joint forces and their enablers. Through NIA-D3, air and naval forces achieve integrated effects across multiple domains, using multiple paths to increase the resilience, agility, speed and effectiveness of the force.

Air-Sea Battle is a limited operational concept designed to address an adversary's A2/AD capabilities. It is not a concept aimed at any particular potential adversary, nor a campaign plan designed to accomplish a specific national objective. Instead, it is a concept that will spark innovation and development of the means to support future operations. The Air-Sea Battle Concept identifies the actions needed to defeat A2/AD threats and the materiel and non-materiel solutions required to execute those actions.

Implementing the Air-Sea Battle Concept

There are three key components to implementation of the Air-Sea Battle Concept by the Department of Defense. The first is institutionalizing the concept. An enduring Air-Sea Battle Office, manned by representatives from all four services, has been established to facilitate further concept exploration, refinement and validation. The second component is service alignment, which will be achieved through adherence to the concept's operational design and description of how capabilities shall be integrated to defeat A2/AD threats. The final component of implementation is the completion of ASB Concept initiatives, comprised of Doctrine, Organization, Training, Materiel, Leadership & Education, Personnel, and Facilities (DOTMLPF) solutions that have been collaboratively developed. These carefully considered initiatives, once implemented, will provide capabilities which are complementary where appropriate, redundant when mandated by capacity requirements, and fielded with integrated acquisition strategies that seek efficiencies where they can be achieved.

While Air-Sea Battle is fiscally informed, the concept was not prompted by fiscal constraints. Prudent efficiencies are a consideration of Air-Sea Battle, but some redundancy and overmatch is necessary in specific areas to lower risk to mission and to forces conducting those missions. The Air Force and Navy Departments would likely have pursued Air-Sea Battle solutions independently, but the accelerating A2/AD threat to global stability demands a smarter, more integrated approach. Air-Sea Battle Concept solutions must and will be collaboratively implemented by the Air Force and Navy Departments.

Regardless of anticipated advancements in A2/AD threats, implementation of the Air-Sea Battle Concept will ensure the U.S. can gain access and project power in defense of U.S. interests and those of our allies and partners.¹⁹⁸

¹⁹⁸ "The Air-Sea Battle Concept Summary," accessed February 8, 2011, at <http://www.navy.mil/search/display.asp?> (continued...)

In a February 20, 2012, journal article, General Norton Schwartz, the Chief of Staff of the Air Force, and Admiral Jonathan Greenert, the Chief of Naval Operations, stated the following about the ASB concept:

When U.S. and coalition forces ejected Saddam Hussein's army from Kuwait in 1991, a new American era of military power projection began. During the Cold War, America's military became an increasingly static force, forward based around the world to deter warfare, dampen regional security competitions and contain Soviet expansion. With the collapse of the Soviet Union, and the end of its moderating grip on aggressive client states, U.S. forces made adjustments designed to maximize their ability to project power to "hot spots" where armed conflict could threaten allies and friends. The goal was to reassure allies and others concerning the safety and stability of an increasingly interconnected system of global trade and security. Today, these core expeditionary missions are increasingly jeopardized by the advancing military capabilities and strategic orientation of other states. In response, the Departments of the Air Force and Navy have developed the "Air-Sea Battle" concept to ensure that U.S. forces remain able to project power on behalf of American interests worldwide.

The transformation of U.S. power projection in the immediate aftermath of the Cold War was dramatic. Less than ten days after Iraqi military forces entered Kuwait, the U.S. military responded with five Air Force fighter squadrons, two aircraft carrier strike groups, dozens of airborne warning aircraft and two battleships. By the end of Operation Desert Storm about six months later, airlift had moved more than 500,000 troops and 540,000 tons of cargo into the theater, and sealift transported an additional 2.4 million tons of equipment. The magnitude of this accomplishment comes into better focus when we consider that it took the Allies nearly two years to position forces for the D-Day invasion during World War II.

Operations Desert Shield and Desert Storm not only heralded a new epoch in U.S. power projection; they also reflected the new post-Cold War security reality. A static focus on the Fulda Gap, or on any other fixed geographical location on land or at sea, was rendered obsolete. Since security challenges to core U.S. interests could now arise in any of several regions, including some in which prepositioned U.S. forces were not at hand, the U.S. military reduced its reliance on large, expensive, Cold War-era overseas garrisons, fleet stations and forward air bases, focusing instead on developing the means to rapidly deliver combat power whenever and wherever U.S. strategy required. This transformation delivered remarkable successes over the next two decades, as demonstrated in Operations Deliberate Force, Allied Force, Enduring Freedom, Iraqi Freedom and Odyssey Dawn.

Potential adversaries were clearly mindful of this transformation. They observed the inability of Soviet-era doctrine and weapons to blunt American power and reconsidered their approach to resisting U.S. military intervention. Competitors with the will and means gradually shifted from planning to fight American forces when they arrived and instead focused on denying U.S. access to the theater. The fruits of these modernization efforts, many of which incorporate technologies developed by the United States and allied countries, are now materializing. Today, the development, proliferation and networking of advanced weapon systems specifically built to circumvent U.S. defenses threaten America's freedom of action and its ability to project military power in strategically significant regions. This development could erode the credibility of U.S. security commitments to partners and allies, and with it their political stability and economic prosperity. Air-Sea Battle responds to this concern.

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After a decade of war in Afghanistan and Iraq, the United States finds itself at a strategic turning point not unlike that at the end of the Cold War. When Secretary of Defense Leon Panetta introduced the new strategic guidance for the Department of Defense, he stated that the “smaller and leaner” Joint Force of the future must be prepared, in conjunction with allies and partners, to confront and defeat aggressors anywhere in the world, “including those seeking to deny our power projection.” The new strategic guidance directs U.S. forces to maintain the “ability to project power in areas in which our access and freedom to operate is challenged” and to be “capable of deterring and defeating aggression by any potential adversary.” As service chiefs, we are responsible for organizing, training and equipping air and maritime forces so that current and future combatant commanders can effectively execute this power projection mandate in support of U.S. national strategy.

With Air-Sea Battle, we are reinvigorating the historic partnership between our two departments to protect the freedom of the commons and ensure operational access for the Joint Force. Air-Sea Battle provides the concepts, capabilities and investments needed to overcome the challenges posed by emerging threats to access like ballistic and cruise missiles, advanced submarines and fighters, electronic warfare and mines. By better countering these military threats, Air-Sea Battle will improve the credibility and effectiveness of the entire Joint force as a key element of Joint Operational Access Concept implementation directed in the new defense guidance. Air-Sea Battle relies on highly integrated and tightly coordinated operations across warfighting domains—for example, using cyber methodologies to defeat threats to aircraft, or using aircraft to defeat threats on and under the sea.

This level of integration requires that the Navy and the Air Force not only restore and institutionalize their close interdependence in the field but also support Joint efforts to better integrate the processes they use to develop, manage and prepare forces for deployment. Those processes, in turn, must translate into effective organizational, operational and acquisition strategies. Clearly, for U.S. military forces to continue protecting the freedom of international waters, skies and cyberspace we must build on our collective service histories and shared values to foster a more permanent and well-institutionalized partnership between the departments. Air-Sea Battle does exactly that.

Preserving U.S. global freedom of action is increasingly important; American interests remain expansive, even as American resources become more constrained. Autocratic states and groups seeking to subvert the prevailing political and economic order are already leveraging their geographic advantages to employ armed coercion and political action to counter American presence and power projection, as well as to disrupt free access to key areas in the air and maritime commons. As these revisionist strategies advance, America’s friends will increasingly seek the security and stability provided by comprehensive U.S. national power. If America appears unable or unwilling to counter an adversary’s anti-access military capabilities, its friends and allies may find U.S. security assurances less credible, leading some of them to seek accommodation with aggressors or alternate means of self-defense, including weapons of mass destruction. Either course of action could lead to dangerous regional security competitions. Meanwhile, downward pressure on U.S. national defense spending complicates defense planning and weapon system recapitalization. Through the Air-Sea Battle concept and its mandate for improved Air Force and Navy integration, we aim to help address these challenges.

We know that increasing integration between our two services will not be easy. In a challenging budget environment, the constituent parts of the defense establishment often focus on furthering institutional self-interest, reflexively defending service prerogatives based on traditional roles and missions. As service chiefs, we are dedicated to avoiding debilitating parochialism. We will support those within our services who appreciate the evolving international security dynamic and the necessity of Air-Sea Battle. Through greater

service integration and interoperability, Air-Sea Battle will benefit our services, the joint force, and more importantly, our country.

Service Integration in the Past

Air-Sea Battle does not mark the first time interservice integration was employed to solve a difficult operational problem for the U.S. military. Today, the challenge of finding, tracking and capturing or killing terrorists depends on increased integration between special operations forces and their air and naval components. During the Cold War, the Army and the Air Force partnered to develop NATO's Follow-On Forces Attack concept and the Army's AirLand Battle doctrine to counter Soviet bloc numerical advantages. Whereas the Red Army's threat to Europe demanded an air- and land-centric focus, today's paramount challenges place a premium on preserving freedom of action in the air, maritime, space and cyber domains.

Air and naval integration within the U.S. armed services has a long, albeit episodic, history. To retaliate against the December 1941 Japanese attack on Pearl Harbor at a time when the United States lacked forward military bases, Army Air Forces and naval aviators set aside their polarizing interwar rhetoric to conceive the entirely novel 1942 Doolittle Raid, which launched 16 B-25B medium bombers from the deck of the USS Hornet. Later that year, the Army Air Force again partnered with the Navy to use specially modified B-24 Liberator bombers to defend cargo-laden Allied ships from Kriegsmarine U-Boats lurking in the Atlantic.

The rise of Soviet naval power in the late 1970s and early 1980s motivated a new Air Force-Navy partnership, one that lasted for nearly a decade. Facing threats from Soviet "Backfire" bombers armed with anti-ship "Kitchen" cruise missiles, the Navy looked to Air Force F-15 fighters and E-3 airborne surveillance and control aircraft to augment aircraft carrier air defenses. The Air Force agreed to use long-range B-52 bombers to augment Navy sea-mining capacity, and, as part of the Busy Observer program, to perform maritime surveillance. The Navy also requested that the Air Force take a more active role in maritime surface warfare. The Air Force initially elected to rely on standard bombs rather than incorporating the Navy's new Harpoon anti-ship missile. But the rapid advancement of Soviet sea-based air defenses soon necessitated an anti-ship weapon that had longer range than the Air Force could provide. As a result, by 1982 the Air Force decided to incorporate the Harpoon, presenting an imposing threat to the Soviet navy. These efforts, however, were discontinued after the Soviet Union disbanded and the Cold War ended.

These examples typify past Air Force and Navy integration efforts, which tended to be episodic and ad hoc. Once the specific threat abated, the partnership dissolved almost as quickly as it had formed. Today, however, we face a range of increasingly complex threats that demand a more enduring, more deeply institutionalized approach. Air-Sea Battle mitigates access challenges by moving beyond simply de-conflicting operations in each warfighting domain, toward creating the level of domain integration necessary to defeat increasingly varied and sophisticated threats. As these historical examples illustrate, this integration needs to occur in the field—but it also needs to occur institutionally in our service efforts to organize, train and equip the current and future force.

Growing Challenges to Security and Prosperity

The imperative behind Air-Sea Battle, as we have argued, stems from the importance of our nation's military capacity for protecting allies and partners as well as ensuring freedom of access to key areas of international air, sea, space and cyberspace. Our military's power projection ability also allows U.S. statesmen to better manage the risks and uncertainties

associated with changes in the distribution of power, especially when those changes empower states who challenge important international norms.

Free access to the ungoverned “commons” of air, maritime, cyberspace and space is the foundation of the global marketplace. More than 2 billion passengers and more than 35 percent of international trade by value transit international airspace annually. Ninety percent of global trade by volume travels by sea, and 25 percent of that, approximately 50,000 vessels a year, travels through a 1.7-mile-wide sliver of ocean at the Strait of Malacca. Financial traders around the world conduct secure banking transactions involving more than \$4 trillion per day using intercontinental communications traveling through underwater cables and precise timing signals from the space-based Global Positioning System.

Interconnected systems of trade, finance, information and security enable global prosperity and have helped lift almost a billion people out of poverty since World War II. But this interconnectedness also makes the global economy more susceptible to disruption. The fragility of chokepoints in air, space, cyberspace and on the sea enable an increasing number of entities, states and non-state actors alike to disrupt the global economy with small numbers of well-placed, precise attacks. Today, for example, Iran regularly threatens transit access through the Strait of Hormuz in response to international sanctions.

Moreover, these strategies and the weapons that support them are also no longer the exclusive province of large states. Pirates, terrorists and insurgents are increasingly able to disrupt free transit in the air, on land and at sea. The United States must be prepared to respond to these contingencies, to defend U.S. interests abroad and to preserve the freedom and security of the global commons in this rapidly changing environment.

New Threats to American Power Projection

When the Soviet Union dissolved, so did the predictability that guided U.S. force development and force posture for decades. Our predecessors recognized, however, that new adversaries would inevitably rise to challenge our national interests. They developed an improved model of expeditionary warfare demonstrated in Desert Storm, one that capitalized on and sustained American freedom of action. Thanks to their foresight and effort, the U.S. military today can surge aircraft, ships, troops and supplies from locations within the United States and across the globe to any region of concern. If conflict erupts and if called on by the U.S. national leadership, the U.S. military can seize air, maritime and space superiority, and exploit that advantage in follow-on operations.

Over the past twenty years we have executed this power projection model with great skill and effectiveness—a fact not lost on states that once sought or now seek to challenge U.S. influence. The leaders of these states believe they have found weaknesses in American military strategy and are working to exploit them through an “anti-access and area-denial” strategy focused on preventing U.S. forces and other legitimate users from transiting international waters, skies, or space.¹

Anti-access and area-denial strategies are not new. The ancient Greeks exploited geographical advantages in the Strait of Salamis, scoring a decisive naval victory over the invading Persians in 480 BCE before they could land their huge army. At Pearl Harbor in 1941, the Empire of Japan attacked America’s power projection capabilities in the Pacific in an attempt to sever U.S. access to East Asia. And on the shores of France in 1944, Field Marshall Erwin Rommel and the German High Command attempted to deny Allied troops access to the European continent. Some of these strategies were more successful than others; each, however, complicated their opponent’s decision calculus and made their efforts considerably more costly in blood and treasure.

Anti-access and area-denial strategies are also not exclusively combat operations. The Soviet Army's blockade around Berlin in June of 1948 was an area-denial strategy designed to achieve its aim without combat. The Berlin Airlift, however, revealed the advantages of being able to exploit freedom of maneuver in the air. That model was repeated during the 1973 Arab-Israeli war in Operation Nickel Grass, when airlifted American supplies sustained isolated Israeli forces facing a two-front attack by Soviet-supplied Arab militaries. Threats from North African states constrained airspace along the southern Mediterranean, so with only a narrow corridor of international airspace to navigate, the Air Force turned to the Navy's Sixth Fleet for help. Breaking from traditional practices, the ships of the Sixth Fleet dispersed along the flight path, stationing one ship every 300 miles along the air route to aid in navigation, with an aircraft carrier every 600 miles to provide air defense for the stream of Air Force transports that helped keep Israel in the war.

As in the past, America's adversaries today are embracing a strategy of access denial to counter American power projection. Unlike the past, however, state and non-state competitors are increasingly able to combine geographic, political and military impediments into a congruent strategy that extends across all domains to counter American power projection. This comprehensive approach is empowered by the growing national power of countries with expanding economies, increasingly sophisticated long-range precision weapons, space and cyberspace attack capabilities, and the increasing vulnerability and fragility of the global economy.

Some rising powers that appear to be seeking regional hegemony hope to employ access denial strategies to isolate other regional actors from American military intervention, enabling them to more effectively intimidate and coerce neighboring states. As already suggested, absent credible U.S. security assurances, the victims of coercion, including historic American allies, may become unable or unwilling to resist an adversary's growing influence; or they might engage in a destabilizing arms race that could include weapons of mass destruction. If this process continues, U.S. political influence will recede, aggression against our allies and partners will become more likely, and U.S. national power will degrade as our alliances weaken.

Of particular concern is the sustained effort by certain states to develop, stockpile and proliferate advanced long-range precision weapons. These advanced weapons can be networked and integrated with sophisticated over-the-horizon surveillance systems. Long-range anti-ship ballistic missiles such as the Chinese DF-21D, long-range cruise missiles like the Chinese DH-10, and improved mobile ballistic and air defense missiles, including the Russian S-300/400/500 and Chinese HQ-9 variants, allow potential adversaries to threaten air and naval freedom of movement hundreds of miles from their shores. In maritime chokepoints such as the Straits of Hormuz and Malacca, adversaries could attempt to deny access with shorter-range missiles, integrated air defenses, fast attack boats and mines.

More sophisticated adversaries can further expand the range of the denied area with growing fleets of diesel submarines, improved fighter and bomber aircraft, and surface combatants with advanced air defense and electronic warfare systems. With this expanded anti-access envelope, adversaries can threaten U.S. aircraft, forward airfields and ports. Anticipated improvements in remote sensing and weapons guidance, maneuverable and terminally guided ballistic missile warheads, growing anti-satellite capabilities and cyber attack will amplify the military anti-access and area-denial challenge, further testing America's ability to sustain regional security.

States are not the only actors exploiting the proliferation of these weapon systems. Hezbollah's successful C-802 anti-ship cruise missile launch against an Israeli naval vessel in 2006 demonstrated that non-state actors can acquire advanced weapons and employ them against a capable military.

An American Response

Air-Sea Battle is designed to sustain America's freedom of action in the face of these developments. Although Air-Sea Battle aims to create a more credible fighting force, our vision should not be mistaken for a one-dimensional combat plan against specific adversaries. Air-Sea Battle's purpose is to guide our services' efforts to organize, train and equip our forces by describing how to ensure freedom of action for the entire Joint Force. Operational plans building on the Air-Sea Battle concept will not be developed in the Pentagon but by the combatant commanders themselves. Our focus is on how to provide combatant commanders the capabilities needed to gain and maintain access as part of their plans.

We will organize, train and equip, however, with increasingly constrained resources. We cannot expect to defeat modern anti-access threats by building larger numbers of more advanced, more expensive, less-integrated ships and aircraft. The emerging geopolitical environment, the rapid expansion and proliferation of anti-access and area-denial weapons capabilities, and looming domestic budgetary constraints dictate that we must improve our power projection capabilities in smarter, more cost-effective ways.

We will of course continue to develop superior technology, but we must also focus on improving the ability of existing platforms to operate or deliver effects in denied areas. This will include new, more integrated weapons, sensors, cyber and electronic warfare, and unmanned systems. These systems and payloads can evolve more quickly than their manned host platforms, allowing more rapid exploitation of new technologies. This is an essential element of Air Sea Battle capabilities.

We will also rely on a uniquely American capability that cannot be hacked or reverse-engineered: our skilled sailors and airmen, our long histories of success, and our shared values. We will foster a more permanent, well-institutionalized partnership, with corresponding organizational structure, operational concepts, training, readiness and acquisition strategies that will capitalize on our commonalities and maximize our collective ingenuity.

The first steps to implement Air-Sea Battle are already underway here at the Pentagon. In our FY 2012 and FY 2013 budgets we increased investment in the systems and capabilities we need to defeat access threats. We also established a new Air-Sea Battle Office to improve integration and inter-service communication. Institutionalizing these arrangements is a key to fostering persistent and sustainable progress in Air-Sea Battle implementation and to engender the "culture of change" highlighted in the new strategic guidance to the Department of Defense. Much as AirLand Battle and its "31 Initiatives" influenced a generation of airmen and soldiers, we want Air-Sea Battle to shape a new generation of airmen and sailors. Active collaboration between our services will reveal untapped synergies in key areas such as intelligence, surveillance and reconnaissance; electronic warfare; command and control; and building and sustaining fruitful international partnerships with U.S. allies, partners and friends.

Our future investment, doctrine development and innovation will be guided by employing tightly integrated, cross-domain operations to defeat anti-access and area-denial threats and restore our freedom of action. This central idea is embodied in the construct of "Networked, Integrated Attack-in-Depth." This construct is used to pursue three lines of effort to disrupt, destroy and defeat adversary anti-access and area-denial capabilities:

- "Networked": By establishing resilient communications networks and reinforcing the links between people and organizations, air and naval forces will maintain decision

advantage and effective cross-domain operations despite an adversary's anti-access and area-denial efforts.

- “Integrated”: Air and naval forces will tightly coordinate their operations across each domain to defeat anti-access and area-denial threats. This will require new models for command and control to allow, for example, cyber or undersea operations to defeat air defense systems or air attacks to eliminate submarine or mine threats. Air and naval force integration will also capitalize on multiple attack pathways to increase combat efficiency and hold targets at risk that would otherwise be immune from attack.
- “Attack-in-Depth”: In traditional attrition models of warfare, forces attack the outer layer of an enemy's defenses and deliberately fight their way in. In contrast, under Air-Sea Battle, forces will attack adversary systems wherever needed to gain access to contested areas needed to achieve operational objectives.

Using “Networked, Integrated Attack-in-Depth”, American air and naval forces will conduct operations along three main lines of effort:

- Disrupt. This category includes offensive operations to deceive or deny adversary battle networks, particularly intelligence, surveillance and reconnaissance (ISR) and command and control (C2) systems. This reduces the effective density of adversary anti-access systems by forcing attacks against false targets, causing adversary hesitation in the face of poor information, and preventing the cueing of adversary ships, missiles, electronic warfare systems and aircraft.
- Destroy. Offensive operations to neutralize adversary weapon delivery platforms such as ships, submarines, aircraft and missile launchers fall into this category. This also prevents the adversary from extending the range of the denied area, and reduces the density of anti-access and area-denial attacks.
- Defeat. Defensive operations to protect joint forces and their enablers from weapons launched by an adversary are important to the Air-Sea Battle concept. Our efforts to disrupt the enemy's C2 and ISR will reduce the density of attacks to enhance the effectiveness of our defensive systems.

The Air-Sea Battle operational concept will guide our efforts to train and prepare air and naval forces for combat. We already train together and share joint doctrine. Under Air-Sea Battle, we will take “jointness” to a new level, working together to establish more integrated exercises against more realistic threats. Our people will practice coordinated operations combining stealthy submarines, stealthy aircraft and remotely piloted vehicles. We will learn to deliver full-motion video directly from Air Force remotely piloted aircraft to Navy ships transiting high-threat regions. We will coordinate between Air Force and Navy operations centers to create seamless and resilient command and control networks. We will learn how to integrate naval forces into airfield defense, and we will train our Air Force aircrews to defend ships at sea. To identify and exploit these synergies, commanders will promulgate promising ideas across the services, and we will incorporate them into our budgeting, acquisition, and development of doctrine and tactics. These efforts will sustain American military credibility, enhance the expeditionary credibility of ground forces and bolster international trust in critical areas where U.S. power projection capabilities underpin regional stability and security.

We will also use Air-Sea Battle to guide collaborative efforts to develop and modernize our air and naval forces. We have historically built magnificent platforms and capabilities tailored to service-specific requirements, with the Air Force focusing on prevailing in the air

and space, and the Navy in the maritime domains. However, modern technology has blurred the historical distinction between the services' traditional realms. Having a strong Air Force no longer guarantees control of the air, and having a strong Navy no longer guarantees control of the seas. Our respective warfighting domains have become intertwined such that the ability to control and exploit one increasingly depends on control in the others. We have already begun this collaboration with our work on the Global Hawk and Broad Area Maritime Surveillance aircraft, the F-35 Lightning II, and a range of sensor, network and weapon systems.

Our services will strive to institutionalize the pursuit of commonality, interoperability and joint efficiencies through Air-Sea Battle. Rather than simply identifying gaps in service-specific capabilities, we will survey our combined forces, searching for strengths and shortfalls in our aggregate capability. There should be some appropriate redundancy between the services to capitalize on the benefits of competition and the imperative to confront the adversary with multiple challenges. But redundancies must result from conscious decisions to develop capacity in key areas rather than a failure to integrate.

We are all too aware that as the Air-Sea Battle concept gains traction within the defense establishment, it could fall victim to its own success. The concept could tempt military leaders to market every new program or initiative under the banner of Air-Sea Battle. Not every worthwhile innovation will be Air-Sea Battle related, nor should it be. There will be a simple test to determine an initiative's applicability: If an initiative does not promise any improvement in the integrated and combined ability of air and naval forces to project power in the face of anti-access and area-denial threats, then it's not Air-Sea Battle.

Even without Air-Sea Battle, the Air Force and Navy would surely have tried to answer the anti-access and area-denial challenge. But they would have done so through separate acquisition programs, tactics and procedure development, and organizational changes. Discrete Navy and Air Force partnerships might have formed, but the result would have been an array of competing efforts with little cohesion, pursued energetically but inefficiently. These traditional approaches will not work anymore. Constrained defense budgets, aging hardware and accelerating anti-access and area-denial threats demand a more effective model of developing and fielding capabilities. We cannot simply buy our way out of this predicament by investing in new technologies. To meet the demands of the President's strategic direction to the Department of Defense and respond to the evolving security environment, we must break bureaucratic chains, set aside parochialism and get down to the business of collaboratively developing power projection capabilities for this new era.

While pursuing Air-Sea Battle seems like common sense, the way ahead will be challenging. Some within the Pentagon may view our initiatives as existential threats to core service identities and beliefs, heritages and traditions. We do not see it that way. Rather than threatening service identities, we see Air-Sea Battle as strengthening them. Nobody does sea control like the U.S. Navy, and the Air Force should collaborate with the Navy to enhance American sea power. Similarly, no one does air and space control like the U.S. Air Force, and the Navy should partner with its sister service to enhance those capabilities; all within a larger joint and combined power projection context.

In a changing world that demands continued U.S. leadership, Air-Sea Battle is an essential part of sustaining America's military freedom of action and ability to project power. We will institutionalize our development of doctrine, organization, training, personnel, leadership and facilities, and ensure that Air-Sea Battle survives contact with the skeptics and entrenched bureaucracy. Air-Sea Battle is not a silver-bullet solution to our security challenges, but it is

a critical line of effort that we must pursue to sustain America's military advantage, and with it, our security and prosperity.¹⁹⁹

Press Reports

An August 20, 2012, press report stated that the ASB concept has prompted Navy officials to make significant shifts in the service's FY2014-FY2018 budget plan, including new investments in ASW, electronic attack and electronic warfare, cyber warfare, the F-35 Joint Strike Fighter (JSF), the P-8A maritime patrol aircraft, and the Broad Area Maritime Surveillance (BAMS) UAV (a maritime version of the Global Hawk UAV). The report quoted Chief of Naval Operations Jonathan Greenert as saying that the total value of the budget shifts was certainly in the hundreds of millions of dollars, and perhaps in the "low billions" of dollars.²⁰⁰

An August 2, 2012, press report on the ASB concept states:

When President Obama called on the U.S. military to shift its focus to Asia earlier this year, Andrew Marshall, a 91-year-old futurist, had a vision of what to do.

Marshall's small office in the Pentagon has spent the past two decades planning for a war against an angry, aggressive and heavily armed China.

No one had any idea how the war would start. But the American response, laid out in a concept that one of Marshall's longtime proteges dubbed "Air-Sea Battle," was clear.

Stealthy American bombers and submarines would knock out China's long-range surveillance radar and precision missile systems located deep inside the country. The initial "blinding campaign" would be followed by a larger air and naval assault.

The concept, the details of which are classified, has angered the Chinese military and has been pilloried by some Army and Marine Corps officers as excessively expensive. Some Asia analysts worry that conventional strikes aimed at China could spark a nuclear war.

Air-Sea Battle drew little attention when U.S. troops were fighting and dying in large numbers in Iraq and Afghanistan. Now the military's decade of battling insurgencies is ending, defense budgets are being cut, and top military officials, ordered to pivot toward Asia, are looking to Marshall's office for ideas.

In recent months, the Air Force and Navy have come up with more than 200 initiatives they say they need to realize Air-Sea Battle. The list emerged, in part, from war games conducted by Marshall's office and includes new weaponry and proposals to deepen cooperation between the Navy and the Air Force....

Even as it has embraced Air-Sea Battle, the Pentagon has struggled to explain it without inflaming already tense relations with China. The result has been an information vacuum that has sown confusion and controversy.

¹⁹⁹ Norton A. Schwartz and Jonathan W. Greenert, "Air-Sea Battle, Promoting Stability In An Era of Uncertainty," *The American Interest*, February 20, 2012, accessed online at <http://www.the-american-interest.com/article.cfm?piece=1212>.

²⁰⁰ Christopher J. Castelli, "CNO: Air-Sea Battle Driving Acceleration Of Key Programs In POM-14," *Inside the Navy*, August 20, 2012. POM-14 is the Program Objective Memorandum (an internal DOD budget-planning document) for the FY2014 DOD budget.

Senior Chinese military officials warn that the Pentagon's new effort could spark an arms race....

Privately, senior Pentagon officials concede that Air-Sea Battle's goal is to help U.S. forces weather an initial Chinese assault and counterattack to destroy sophisticated radar and missile systems built to keep U.S. ships away from China's coastline.

Their concern is fueled by the steady growth in China's defense spending, which has increased to as much as \$180 billion a year, or about one-third of the Pentagon's budget, and China's increasingly aggressive behavior in the South China Sea.

"We want to put enough uncertainty in the minds of Chinese military planners that they would not want to take us on," said a senior Navy official overseeing the service's modernization efforts. "Air-Sea Battle is all about convincing the Chinese that we will win this competition."

Inside the Pentagon, the Army and Marine Corps have mounted offensives against the concept, which could lead to less spending on ground combat.

An internal assessment, prepared for the Marine Corps commandant and obtained by The Washington Post, warns that "an Air-Sea Battle-focused Navy and Air Force would be preposterously expensive to build in peace time" and would result in "incalculable human and economic destruction" if ever used in a major war with China.

The concept, however, aligns with Obama's broader effort to shift the U.S. military's focus toward Asia and provides a framework for preserving some of the Pentagon's most sophisticated weapons programs, many of which have strong backing in Congress.²⁰¹

An April 2012 press report that provides a historical account of the ASB concept states: "In truth, the Air Sea Battle Concept is the culmination of a strategy fight that began nearly two decades ago inside the Pentagon and U.S. government at large over how to deal with a single actor: the People's Republic of China."²⁰² A November 10, 2011, press report states:

Military officials from the three services told reporters during a [November 9, 2011, DOD] background briefing that the concept is not directed at a single country. But they did not answer when asked what country other than China has developed advanced anti-access arms.

A senior Obama administration official was more blunt, saying the new concept is a significant milestone signaling a new Cold War-style approach to China.

"Air Sea Battle is to China what the [U.S. Navy's mid-1980s] maritime strategy was to the Soviet Union," the official said.

During the Cold War, U.S. naval forces around the world used a strategy of global presence and shows of force to deter Moscow's advances.

²⁰¹ Greg Jaffe, "Real Tensions Over A Theoretical War," *Washington Post*, August 2, 2012: 1.

²⁰² Bill Gertz, "China's High-Tech Military Threat and What We're Doing About It," *Commentary*, April 2012: 15-21. The quoted passage is from page 16. See also Yoichi Kato, "Japan's Response to New U.S. Defense Strategy: 'Welcome, But ...'" *Asahi Shimbun*, March 9, 2012, accessed online at http://ajw.asahi.com/article/behind_news/politics/AJ201203090025.

“It is a very forward-deployed, assertive strategy that says we will not sit back and be punished,” the senior official said. “We will initiate.”

The concept, according to defense officials, grew out of concerns that China’s new precision-strike weapons threaten freedom of navigation in strategic waterways and other global commons.

Defense officials familiar with the concept said among the ideas under consideration are:

- Building a new long-range bomber.
- Conducting joint submarine and stealth aircraft operations.
- New jointly operated, long-range unmanned strike aircraft with up to 1,000-mile ranges.
- Using Air Force forces to protect naval bases and deployed naval forces.
- Conducting joint Navy, Marine Corps and Air Force strikes inside China.
- Using Air Force aircraft to deploy sea mines.
- Joint Air Force and Navy attacks against Chinese anti-satellite missiles inside China.
- Increasing the mobility of satellites to make attacks more difficult.
- Launching joint Navy and Air Force cyber-attacks on Chinese anti-access forces.²⁰³

An October 12, 2011, press report states that

The Pentagon is engaged in a behind-the-scenes political fight over efforts to soften, or entirely block, a new military-approved program to bolster U.S. forces in Asia.

The program is called the Air Sea Battle concept and was developed in response to more than 100 war games since the 1990s that showed U.S. forces, mainly air and naval power, are not aligned to win a future war with China.

A senior defense official said Defense Secretary Leon E. Panetta is reviewing the new strategy.

“We want to do this right,” the official said. “The concept is on track and is being refined to ensure that we are able to implement it wherever we need to—including in the Asia-Pacific region, where American force projection is essential to our alliances and interests.”

The official noted that the program is “the product of unprecedented collaboration by the services.”

Pro-defense Members of Congress aware of the political fight are ready to investigate. One aide said Congress knows very little about the concept and is awaiting details.

Officially, the Pentagon has said the new strategy is not directed at China.

²⁰³ Bill Gertz, “Battle Concept Signals Cold War Posture On China,” *Washington Times*, November 10, 2011: 13.

But officials familiar with the classified details said it is designed to directly address the growing threat to the United States and allies in Asia posed by what the Pentagon calls China's "anti-access" and "area denial" weapons—high-technology arms that China has been building in secret for the past several decades....

The U.S. response in the Air Sea Battle concept is said to be a comprehensive program to protect the "global commons" used by the United States and allies in Asia from Chinese military encroachment in places such as the South China Sea, western Pacific and areas of Northeast Asia.

The highly classified program, if approved in its current form, will call for new weapons and bases, along with non-military means. Plans for new weapons include a long-range bomber.

Other systems and elements of the program are not known....

However, defense officials said China's government was alerted to some aspects of the concept earlier this year when the Center for Strategic and Budgetary Assessments think tank presented its own concept for a new warfighting strategy against China.

Andrew Krepinevich, the center's director who recently left the Pentagon's Defense Policy Board, could not be reached for comment.

As a result of the disclosure, China launched a major propaganda and influence campaign to derail it. The concept was raised in several meetings between Chinese and U.S. officials, with the Chinese asserting that the concept is a sign the Pentagon does not favor military relations and views China as an enemy.

Officials in the Obama administration who fear upsetting China also are thought to have intervened, and their opposition led Mr. Panetta to hold up final approval.

The final directive in its current form would order the Air Force and the Navy to develop and implement specific programs as part of the concept. It also would include proposals for defense contractors to support the concept.²⁰⁴

An October 2011 magazine article stated:

AirSea Battle emerged from a memorandum between the air and sea services in 2009. The Air Force and Navy realized sophisticated threats involving high technology, networked air defenses, modern ballistic missile, and sea and air capabilities, and anti-space weapons required the services to marry up many of their respective strengths. The plan, which has received a great amount of attention since the 2010 Quadrennial Defense Review, mandated the creation of an operations concept to protect US and allied access to certain areas in the world while also protecting forward-based assets and bases....

Both services are said to be fully on board with the plan, and to weed out duplication, officers from each branch have been cleared to see "all the black programs," or classified projects, of the other service as the ASB plan has matured....

The plan had been vetted by both services by June [2011], and is awaiting blessing from the Office of the Secretary of Defense.... Service officials have been predicting a formal release of more information on the doctrine for months as well.

²⁰⁴ Bill Gertz, "Inside the Ring," *Washington Times*, October 12, 2011 (item entitled "Air Sea Battle Fight").

As early as Feb. 17 [2011], Lt. Gen. Herbert J. Carlisle, the Air Force's deputy chief of staff for operations, plans, and requirements, had said a public document explaining the outlines of ASB in detail would occur "possibly within two weeks." The now-retired Chief of Naval Operations Adm. Gary Roughead told reporters in Washington in March he expected to release details on ASB in "a few weeks," as the service Chiefs of the Marines Corps, USAF, and Navy were "basically done" with their work on the concept. The majority of the plan will remain classified, he added, "as it should be."²⁰⁵

A sidebar to this magazine article stated:

The AirSea Battle rollout was repeatedly delayed over the course of 2011. According to Office of the Secretary of Defense and Air Force officials, new Secretary of Defense Leon E. Panetta is reviewing the ASB plan—a sort of executive summary of the overall operations concept (which, as of early September, remains classified).

However, then-Vice Chief of Naval Operations Adm. Jonathan W. Greenert, now the CNO, told the House Armed Services Committee in late July he expected a release of unclassified portions of the plan soon.

The AirSea Battle concept was signed by the USAF, Navy, and Marine Corps service Chiefs, and the Air Force and Navy Secretaries on June 2 and "forwarded to the [Secretary of Defense] for approval," the Air Force said in a brief official statement Aug. 2.

Previous Defense Secretary Robert M. Gates, who departed July 1, had the document in his possession and had told senior Air Force officials he would sign it before his departure. In late July, however, Air Force and DOD officials privately indicated the concept was held up in OSD's policy shop, and Gates did not sign the document before leaving the Pentagon.

Air Force and defense officials have indicated both publicly and privately that there are strong international political considerations at play. Spin "concern" has likely contributed to the delay in officially rolling out the AirSea Battle concept. In late July, USAF officials privately indicated that there is a great deal of concern within OSD about how China will perceive and react to the concept.²⁰⁶

A September 29, 2011, press report on a reported new DOD Defense Planning Guidance (DPG) document (see "September 2011 Press Report About New Defense Planning Guidance" above) quoted "a senior defense official" as stating: "It seems clear that there will be increased emphasis on [the] AirSea Battle approach going forward."²⁰⁷

A July 26, 2011, press report, stated:

U.S. Defense Secretary Leon Panetta is reviewing an Air Force-Navy battle concept that was ordered by the Pentagon last year in response to China's military buildup and Iran's advanced weapons, Vice Chief of Naval Operations Admiral Jonathan Greenert said today.

The Navy and Air Force have submitted to Panetta the equivalent of an executive summary of the battle concept with the intent to release unclassified portions within weeks, depending

²⁰⁵ Marc V. Schanz, "AirSea Battle's Turbulent Year," *Air Force Magazine*, October 2011: 32-33.

²⁰⁶ "An ASB Summer," *Air Force Magazine*, October 2011: 33.

²⁰⁷ Christopher J. Castelli, "DOD Aims To Boos Investment In Capabilities For Major-Power War," *Inside the Pentagon*, September 29, 2011.

on Panetta's reaction, Greener told a House Armed Services readiness panel and a Bloomberg News reporter after the hearing.

The plan aims to combine the strengths of the Navy and Air Force to enable long-range strikes. It may employ a new generation of bombers, a new cruise missile and drones launched from aircraft carriers. The Navy also is increasing funding to develop new unmanned submarines.²⁰⁸

A June 10, 2011, press report stated that “while defense officials publicly insist that the military’s new AirSea Battle concept, a study meant to reshape the way the U.S. military fights future wars, is not focused on China, one Navy team is quietly contradicting their claims. The group, called the China Integration Team, is hard at work applying the lessons of the study to a potential conflict with China, say sources familiar with the effort.” The report also stated that “though sources familiar with the study have said that the first draft of the concept has been completed, those same sources highlighted that the project is ongoing—something that official spokesmen have stressed as well.”²⁰⁹ A January 10, 2011, press report stated that “the AirSea Battle concept study, meant to outline the future of Navy and Air Force operations in anti-access environments, is near completion and is being briefed to Navy Secretary Ray Mabus and Air Force Secretary Michael Donley this month, according to sources familiar with the study.”²¹⁰

²⁰⁸ Tony Capaccio, “Panetta Reviewing Air-Sea Battle Plan Summary, Greenert Says,” *Bloomberg News*, July 26, 2011.

²⁰⁹ Andrew Burt and Christopher J. Castelli, “Despite Improved Ties, China Weighs Heavily In Pentagon’s War Planning,” *Inside the Navy*, June 13, 2011.

²¹⁰ Andrew Burt, “Final AirSea Study Being Briefed To Mabus And Donley This Month,” *Inside the Navy*, January 10, 2011. See also David Fulghum, “Money Walks? Service Leaders Fight to Explain, Justify AirSea Battle Strategy,” *Aviation Week & Space Technology*, June 4/11, 2012: 71; Philip DuPree and Jordan Thomas, “Air-Sea Battle: Clearing the Fog,” *Armed Forces Journal*, June 2012.

Appendix B. Article by CNO Greenert on Navy's Rebalancing Toward Asia-Pacific

This appendix presents the text of a November 14, 2012, article by Admiral Jonathan Greenert that provides an overview of Navy activities associated with the U.S. strategic rebalancing toward the Asia-Pacific. The article states:

Our nation's security priorities, and our military, are in transition. In the Middle East, we ended the war in Iraq and are reducing ground troops in Afghanistan with the shift of security responsibilities to Kabul. At home we are reassessing our military's size and composition as we seek to align our spending with our resources. And around the world we face a range of new security challenges, from continued upheaval in the Arab world to the imperative of sustaining our leadership in the Asia-Pacific. These challenges place a premium on the flexibility and small ground footprint of naval forces, which are being deployed longer and more often to advance our nation's interests.

The Department of Defense's January 2012 strategic guidance, *Sustaining U.S. Global Leadership - Priorities for 21st Century Defense*, addressed this new environment and our security priorities in it. Overall, the strategy focuses on important regions and current readiness and agility, while accepting reduced capacity and level of effort in less critical missions. In particular, the strategy directed that our military rebalance toward the Asia-Pacific while continuing to support our partners in the Middle East. Naval forces will be at the heart of both efforts.

After two decades of ground conflict in the Middle East, our security concerns and ability to project power in the region both center on the sea. U.S. ground forces continue to draw down in Afghanistan and around the region, so our commanders increasingly rely on naval aircraft to support and protect troops. Meanwhile, Iranian leaders speak provocatively about impacting maritime traffic throughout the Arabian Gulf. In response, we turned to maritime forces, doubling our minesweeping forces in the Gulf and deploying an additional carrier strike group to the region.

The focus of our rebalance, the Asia-Pacific, is fundamentally a maritime region. Our friends there depend on the sea for their food and energy, while more than 90 percent of trade by volume makes its way through the region over the water. Maritime security for Pacific nations is a matter of economic survival. Militarily, the vast maritime distances in the region make access via the sea essential to deterring and defeating aggression. Our fleet deployed in the Asia-Pacific will exploit the mobility of being at sea to project power against aggressors and avoid attacks, while their reinforcements and supplies will arrive via the ocean from the United States or regional bases.

The importance of the Asia-Pacific, and the Navy's attention to it, is not new. Five of our seven treaty allies are in the region, as well as six of the world's top 20 economies. We have maintained an active and robust presence in the Asia-Pacific for more than 70 years and built deep and enduring relationships with allies and partners there. While we remain present and engaged in the Middle East to address today's challenges, the Navy will build on its longstanding Asia-Pacific focus by rebalancing in four main ways: deploying more forces to the Asia-Pacific; basing more ships and aircraft in the region; fielding new capabilities focused on Asia-Pacific challenges; and developing partnerships and intellectual capital across the region.

Deploying more forces to the Asia-Pacific

The most visible element of our rebalance toward the Asia-Pacific region will be an increase in day-to-day military presence. Although it is not the only way we are rebalancing, forces operating in the region show our commitment to the Asia-Pacific and provide a full-time capability to support our allies and partners. About half of the deployed fleet is in the Pacific—50 ships on any given day. These ships and their embarked Marines and aircraft train with our allies and partners, reinforce freedom of navigation, and deter conflict. They are also the “first responders” to large-scale crises such as the Great East Asian Earthquake and Tsunami in 2011.

The long distance between the continental United States and Asia makes it inefficient to rotate ships and aircraft overseas for six to nine months at a time. To avoid this transit time and build greater ties with our partners and allies, more than 90 percent of our forces in the Asia-Pacific are there permanently or semi-permanently. For example, about half of our 50 deployed ships are permanently home-ported in Japan and Guam along with their crews and families. Our logistics and support ships use rotating civilian or military crews to obtain more presence for the same number of ships.

Although we plan to reduce our future budgets, the Navy will continue to increase its presence in the Asia-Pacific region. The benchmark year of the Defense Strategic Guidance is 2020, and by then the Navy Fleet will grow to approximately 295 ships. This, combined with the impacts of our plans for operations and basing, will increase the day-to-day naval presence in the Asia-Pacific by about 20 percent, to 60 ships by 2020. In addition to growing the fleet, three factors will allow us to increase the number of ships in the Asia-Pacific by 2020:

First, we will permanently base four destroyers in Rota, Spain over the next several years to help defend our European allies from ballistic missiles. Today we do this mission with 10 destroyers that travel in rotation to the Mediterranean from the United States. The six destroyers freed up in the process will then be able to rotationally deploy to the Asia-Pacific.

Second, new Joint High Speed Vessels (JHSV) and Littoral Combat Ships (LCS) under construction today will enter the fleet and take on security cooperation and humanitarian assistance missions in South America and Africa, allowing the destroyers and amphibious ships we use today for those missions to deploy to the Asia-Pacific. These amphibious ships will begin deploying instead to the Asia-Pacific in the next few years to support Marine operations, including those from Darwin, Australia. Additionally, the new JHSV and LCS are also better suited to the needs of our partners in Africa and South America.

Third, we will field more ships that spend the majority of their time forward by using rotating civilian or military crews. These include the JHSV, LCS, and our new Mobile Landing Platforms and Afloat Forward Staging Bases (AFSB).

In addition to more ship presence in the Asia-Pacific, we will increase our deployments of aircraft there and expand cooperative air surveillance operations with regional partners. Today we fly cooperative missions from Australia, the Philippines, and Thailand, where we build our shared awareness of activities on the sea by either bringing partner personnel on board or sharing the surveillance information with them. We may expand these operations in the future to new partners concerned about threats from piracy, trafficking, and fisheries violations. To expand our surveillance capacity, the Navy version of the MQ-4 Global Hawk unmanned air vehicle will operate from Guam when it enters the fleet in the middle of this decade.

Basing more ships and aircraft in the region

To support our increased presence in the Asia-Pacific, we will grow the fraction of ships and aircraft based on the U.S. West Coast and in the Pacific from today's 55 percent to 60 percent by 2020. This distribution will allow us to continue to meet the needs of Europe, South America, and West Africa while more efficiently providing additional presence and capacity in the Asia-Pacific.

Each ship that operates from an overseas port provides full-time presence and engagement in the region and delivers more options for Combatant Commanders and political leaders. It also frees up ships that would otherwise be needed to support a rotational deployment. Today, we have about two dozen ships home-ported in Guam and Japan. In 2013, with the USS Freedom, we will begin operating Littoral Combat Ships from Singapore, eventually growing to four ships by 2017. The LCS will conduct maritime security operations with partner navies throughout Southeast Asia and instead of rotationally deploying to the region, the ships will stay overseas and their crews will rotate in from the United States, increasing the presence delivered by each ship.

Fielding new capabilities focused on Asia-Pacific challenges

We will also bolster the capabilities we send to the Asia-Pacific. Using the approach described in the Air-Sea Battle concept and in concert with the U.S. Air Force, we will sustain our ability to project power in the face of access challenges such as cruise and ballistic missiles, submarines, and sophisticated anti-air weapons. Air-Sea Battle's operations to disrupt, destroy, and defeat anti-access threats will be essential to maintain the credibility of our security commitments and ability to deter aggression around the world. Our improved capabilities will span the undersea, surface, and air environments.

Undersea

The Navy's dominance in the undersea domain provides the United States a significant advantage over potential adversaries. Our undersea capabilities enable strike and anti-surface warfare in otherwise denied areas and exploit the relative lack of capability of our potential adversaries at anti-submarine warfare. We will sustain our undersea advantage in part through continued improvements in our own anti-submarine warfare capability, such as replacing the 1960s-era P-3 Orion maritime patrol aircraft with the longer range and greatly improved sensors of the P-8A Poseidon.

We will also field improved platforms and systems that exploit the undersea domain for power projection and surveillance. In the coming years, newer, multi-mission Virginia-class submarines with dramatically improved sensors and combat systems will continue to replace aging Los Angeles-class submarines. With their conversion from Cold War-era ballistic missile submarines, our four Ohio-class guided missile submarines (SSGN) are now our most significant power projection platforms. During Operation Unified Protector, USS Florida launched over 100 Tomahawk missiles at Libyan air defenses to help establish a "no-fly" zone. When she and her counterparts retire in the mid 2020s, the Virginia-class submarine "payload module" will replace their striking capacity with the ability to carry up to 40 precision-strike cruise missiles, unmanned vehicles, or a mix of other payloads.

Improved sensors and new unmanned systems allow us to augment the reach and persistence of manned submarines, and are essential to our continued domination of the undersea environment. These unmanned vehicles will enhance the persistence of undersea sensing, and expand its reach into confined and shallow waters that are currently inaccessible to other systems. This will enable detection of threats, for example, to undersea infrastructure.

Surface

But undersea forces have limited effectiveness at visible, day-to-day missions such as security cooperation, humanitarian assistance, missile defense, and freedom of navigation. Surface ships will continue to conduct these operations and show our presence in the Asia-Pacific. Our surface fleet and embarked personnel will continue to be the most versatile element of the naval force, building partner capacity and improving security in peacetime and transitioning to sea control and power projection in conflict. Their credibility and their ability to execute these missions depends on their ability to defeat improving threats, especially anti-ship cruise missiles (ASCM) and anti-ship ballistic missiles (ASBM).

We will defeat ASCMs at long range using an integrated fire control system that combines the proven Aegis weapon system and upgraded airborne early warning aircraft with new long-range anti-air missiles on cruisers and destroyers. To defeat ASCMs at short range, the Navy is upgrading point-defense missiles and electronic warfare systems to destroy incoming missiles or cause them to miss by deceiving and jamming their seekers.

Navy forces will defeat ASBMs by countering each link in the operational chain of events required for an adversary to find, target, launch, and complete an attack on a ship with a ballistic missile. The Navy is fielding new systems that jam, decoy, or confuse the wide-area surveillance systems needed to find and target ships at long range. To shoot down an ASBM once launched, the fleet will employ the Aegis ballistic missile defense system and SM-3 missile. And, to prevent an ASBM from completing an attack, the Navy is fielding new missiles and electronic warfare systems over the next several years that will destroy, jam, or decoy the ASBM warhead as it approaches the ship.

To improve the ability of surface forces to project power, we will field new long-range surface-to-surface missiles aboard cruisers and destroyers in the next decade and improve our ability to send troops ashore as new San Antonio-class amphibious ships replace their smaller and less-capable 30-year-old predecessors over the next two years.

Air

The Navy and Air Force will improve their integrated ability to defeat air threats and project power in the face of improving surveillance and air defense systems. This evolution involves the blending of new and existing technology and the complementary use of electronic warfare, stealth, and improved, longer-range munitions. The carrier air wing in Japan recently finished upgrading to F/A-18 E/F Super Hornet strike fighters with improved jamming and sensor systems and the new E/A-18G Growler electronic attack aircraft. This air wing will also be the first to incorporate the F-35C Lightning II, which will enable new operational concepts that combine the F-35C's stealth and sensor capability with the payload capacity of the F/A-18 E/F to project power against the most capable air defense systems.

Developing partnerships and intellectual capital

Perhaps most importantly, rebalancing the Navy's emphasis toward the Asia-Pacific region includes efforts to expand and mature our partnerships and establish greater intellectual focus on Asia-Pacific security challenges.

First, we are increasing the depth and breadth of our alliances and partnerships in the Asia-Pacific. Our relationships in the region are the reason for our engagement there and are the foundation of our rebalanced national security efforts. Our connection with Asia-Pacific allies starts at the top. Our naval headquarters and command facilities are integrated with those of Japan and South Korea and we are increasing the integration of our operating forces by regularly conducting combined missions in areas including anti-submarine warfare and

ballistic missile defense. We are also establishing over the next year a headquarters in Singapore for our ships that will operate there.

We build our relationships with operational experience. The Navy conducts more than 170 exercises and 600 training events there every year with more than 20 allies and partners—and the number of events and partners continues to grow. Our 2012 Rim of the Pacific Exercise, or “RIMPAC,” was the world’s largest international maritime exercise, involving more than 40 ships and submarines, 200 aircraft, and more than 25,000 sailors from two dozen Asia-Pacific countries. This year RIMPAC included several new partners, such as Russia and India. It also incorporated naval officers from Canada, Australia, and Chile as leaders of exercise task forces. Like our other exercises, RIMPAC practices a range of operations, building partner capacity in missions such as maritime security and humanitarian assistance while enhancing interoperability with allies in sophisticated missions such as anti-submarine and surface warfare and missile defense.

Second, we are refocusing attention on the Asia-Pacific in developing and deploying our intellectual talent. The Naval War College is the nation’s premier academic center on the region and continues to grow its programs on Asian security, while the Naval Postgraduate School expanded its programs devoted to developing political and technical expertise relevant to the Asia-Pacific. We continue to carefully screen and send our most talented people to operate and command ships and squadrons in the Asia-Pacific.

Third, as described above, the Navy is sharpening its focus on military capabilities needed in the Asia-Pacific. Most important is the ability to assure access, given the distances involved in the region and our treaty alliances there. Having a credible ability to maintain operational access is critical to our security commitments in the region and the diplomatic and economic relationships those commitments underpin. We are developing the doctrine, training and know-how to defeat access threats such as submarines and cruise and ballistic missiles through our Air-Sea Battle concept. With Air-Sea Battle, we are pulling together the intellectual effort in needed areas, including intelligence and surveillance, cyber operations, anti-submarine warfare, ballistic missile defense, air defense, and electronic warfare. The Air-Sea Battle Office leads this effort with more than a dozen personnel representing each military service.

Our credibility in these missions rests on the proficiency our forces deployed every day in the Asia-Pacific. We increased our live-fire training in air defense and in surface and anti-submarine warfare by more than 50 percent, and expanded the number and sophistication of training events we conduct in theater with our partners and allies. For example, in RIMPAC 2012, U.S. allies and partners shot 26 torpedoes and more than 50 missiles from aircraft and ships against a range of targets and decommissioned ships.

A Global Fleet

Even as we rebalance to the Asia-Pacific, the Navy will remain engaged around the world. We will maintain our presence to deter and respond to aggression in support of our partners in the Middle East. In Europe we will build our alliance relationships. Our basing of ballistic missile defense destroyers to Spain is part of this effort, as an element of the overall European Phased Adaptive Approach. The home-porting of U.S. ships in Europe will yield greater opportunities for integration with European forces as well.

In South America and Africa we will shift, as the Defense Strategic Guidance directs, to “innovative, low-cost approaches,” including JHSV, AFSB, and LCS. In contrast to our approach today, which is to send the destroyers and amphibious ships we have when available, these new ships will be better suited to operations in these regions and will be available full-time thanks to their rotational crews.

The Asia-Pacific will become increasingly important to our national prosperity and security. It is home to the world's largest and most dynamic economies, growing reserves of natural resources, and emerging security concerns. Naval forces, with their mobility and relevance in peacetime and conflict, are uniquely poised to address these challenges and opportunities and sustain our leadership in the region. With our focus on partnerships and innovative approaches, including new ships, forward homeporting, and rotational crewing, the Navy can rebalance toward the Asia-Pacific while being judicious with the nation's resources. We will grow our fleet in the Asia-Pacific, rebalance our basing, improve our capabilities, and focus intellectually on the region. This will sustain our credibility to deter aggression, preserve freedom of maritime access, and protect the economic livelihood of America and our friends.²¹¹

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²¹¹ Jonathan Greenert, "Sea Change, The Navy Pivots to Asia," *Foreign Policy* (www.foreignpolicy.com), November 14, 2012.