

Background

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Submarine Arms Race in the Pacific: The Chinese Challenge to U.S. Undersea Supremacy

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Abstract: *Since the end of the Cold War, China has dramatically expanded its navy, especially its submarine fleet, adding dozens of attack submarines since 1995. During the same period, the U.S. attack submarine fleet has shrunk to 53, and it is projected to fall to 41 in 2028. The U.S. fleet is already stretched thin by the demands of ongoing operations. Australia, India, and other Pacific countries have taken note of the shifting balance and have responded with their own naval buildups, particularly of their submarine fleets. Unless the U.S. stops—and reverses—the decline of its own fleet, U.S. military superiority in the Pacific will continue to wane, severely limiting the Navy’s ability to operate in the region, to protect U.S. interests, and to support U.S. friends and allies.*

In April 2009, Australia announced its “biggest military buildup since World War II” in response to the changing regional security environment, specifically citing declining U.S. supremacy in the Pacific Ocean and China’s rapidly growing navy.¹ This public announcement from a long-time, extremely loyal U.S. ally and friend should have been a loud wake-up call for the U.S. Congress, the U.S. Navy, and senior defense officials.

The People’s Republic of China (PRC) is rapidly emerging as a regional naval power and a potential global power, which “raises the prospect of intensifying security competition in East Asia both between the United States and China and between China and Japan.”² Other Pacific countries in the region have also taken note of the changing security environment

Talking Points

- Since the end of the Cold War, the People’s Republic of China has dramatically expanded and upgraded its navy, especially its submarine fleet, adding dozens of attack submarines since 1995.
- The U.S. has steadily reduced its submarine fleet from 87 attack submarines in 1991 to 56 in 2000. The current fleet of 53, which has been stretched thin by the demands of ongoing operations and missions, is projected to shrink to 41 in 2028.
- Australia and India have explicitly tied their planned naval buildups, at least in part, to China’s ongoing naval buildup and declining U.S. sea supremacy. South Korea, Indonesia, Vietnam, and Malaysia are also expanding their submarine fleets.
- To protect U.S. interests in East Asia and the Pacific and to support and reassure U.S. allies, the U.S. must halt and then reverse the decline of its submarine fleet and ASW capabilities.

This paper, in its entirety, can be found at:
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as evidenced in particular by their planned submarine acquisitions. Australia's military buildup includes doubling its submarine fleet from six submarines to 12 larger, more capable submarines.³ In addition, "India, Malaysia, Pakistan, Indonesia, Singapore, Bangladesh and South Korea are planning to acquire modern, conventional submarines."⁴ Both Australia and India have explicitly described their naval buildups as responses, at least in part, to China's naval buildup.

In contrast, the U.S. submarine fleet is projected to continue shrinking through 2028, further limiting the U.S. ability to shape and influence events in the Pacific. The U.S. attack submarine serves an important part in establishing sea control and supremacy, and it is not interchangeable with other assets. Its unique capabilities make it a force multiplier and allow it to "punch above its weight." To protect U.S. interests in East Asia and the Pacific, and to support and reassure U.S. allies, the U.S. must halt and then reverse the decline of its submarine fleet as a critical component of a broader policy to maintain the military balance in the Pacific.

Underwater Hide and Seek

Combining stealth with powerful weapon systems, submarines are uniquely suited to fulfill a wide range of missions, including strategic deterrence, sea control and denial, battlespace preparation, surveillance and intelligence gathering, special operations landings, and support for ground operations including land attack. Stealth is a primary

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ingredient to effective submarine operations. It enables a submarine to launch a sudden, devastating strike from an unexpected direction and to slip in and out of an area like a ghost. Stealth is also a submarine's primary defense because a submarine is extremely vulnerable to attack if discovered.

The four main types of submarines—diesel-electric attack submarines (SSs and SSKs), nuclear-powered attack submarines (SSNs), guided-missile submarines (SSGNs), and ballistic missile submarines (SSBNs)—are differentiated by their primary armaments and propulsion systems.

Armament. The primary mission of attack submarines is to achieve sea supremacy by finding and eliminating enemy surface ships and submarines. Most modern attack submarines can also launch cruise missiles, which give them the capability to strike land targets. SSGNs armed with cruise missiles can either conduct sea supremacy missions against surface targets or attack land targets.⁵ SSBNs armed with submarine-launched ballistic missiles (SLBMs) serve as part of the U.S., the Russian, and, soon, the Chinese nuclear deterrents.

Propulsion. The type of propulsion largely determines a submarine's capabilities, including

1. Patrick Walters, "Kevin Rudd to Announce Australia's Biggest Military Build-Up Since World War II," News.com.au, April 25, 2009, at <http://www.news.com.au/biggest-military-boost-since-wwii/story-0-1225703326267> (January 26, 2010), and Asia News International, "US Incapable of Protecting Australia Anymore, Says Rudd," *Thaindian News*, May 2, 2009, at http://www.thaindian.com/newsportal/world-news/us-incapable-of-protecting-australia-anymore-says-rudd_100187395.html (January 26, 2010).
2. Evan S. Medeiros, Keith Crane, Eric Heginbotham, Norman D. Levin, Julia F. Lowell, Angel Rabasa, and Somi Seong, *Pacific Currents: The Responses of U.S. Allies and Security Partners in East Asia to China's Rise*, RAND Corporation, 2008, p. iii, at http://www.rand.org/pubs/monographs/2008/RAND_MG736.pdf (August 22, 2009).
3. Mark Dodd, "Designs Open for \$25bn Future Sub Project," *The Australian*, August 7, 2009, at <http://www.theaustralian.com.au/news/designs-open-for-25bn-future-sub-project/story-e6fgr8yx-1225758790211> (January 26, 2010).
4. Asia News International, "Australia to Double Its Submarine Fleet to Counter Indian and Chinese Navies Threats: Ex-Defence Min," *Thaindian News*, December 29, 2007, at http://www.thaindian.com/newsportal/world-news/australia-to-double-its-submarine-fleet-to-counter-indian-and-chinese-navies-threats-ex-defence-min_10010564.html (January 26, 2010).
5. Soviet/Russian SSGNs are configured for sea supremacy missions. The four U.S. Ohio-class SSGNs are tasked primarily with the land-attack mission.

range, endurance, speed, agility, and how quietly it can move undetected into and out of harm's way.

Many countries have deployed diesel-electric submarines, which are powered by a diesel engine when running on the surface and by electric batteries when submerged. When submerged, this type of submarine can be extremely quiet. Russia's *Kilo*-class submarines have earned the nickname "Black Hole" for their ability to evade detection.⁶ However, this impressive stealth comes at the cost of limited range and speed and the need to return frequently—at least every few days—to periscope depth or the surface to recharge its batteries.

Several countries have deployed non-nuclear, air-independent propulsion (AIP) submarines (SSPs), which are similar in stealth and speed to traditional diesel-electric submarines, but can remain submerged for weeks at a time.⁷ Clearly, this ability to remain submerged for protracted periods makes them less vulnerable to detection.

The major advantage of nuclear-powered submarines is their almost unlimited power reserves, which allow higher operating speeds, virtually unlimited range, and the ability to remain submerged for months at a time—limited only by their space to store provisions for the crew and the crew's endurance. Their major disadvantage is that nuclear reactors are inherently noisier than electric motors running on battery power, but this can be mitigated by materials and designs that reduce the submarine's acoustic signature. Nuclear-powered submarines have also become a source of international prestige. Few countries outside the five permanent members of the U.N. Security Council have nuclear submarines.

Anti-Submarine Warfare. Anti-submarine warfare (ASW) is the use of ships, aircraft, submarines, and other platforms to detect, track, and destroy

enemy submarines. Submarines are arguably the best ASW platforms because they are designed to operate in the same environment as their targets and have similar strengths and vulnerabilities. However, ASW helicopters and maritime patrol aircraft have advantages in range and speed, and they are almost invulnerable to the submarines they hunt.⁸ Surface ships can be tremendously capable ASW platforms, but are more susceptible to submarine attack.

Destroying an enemy submarine—or at least forcing it to retire from the battlespace—first requires detection, usually by sonar. Active sonar—the pings popularly portrayed in movies of World War II—can give the precise location of a sonar contact (e.g., the submarine), but it also reveals the location (or at least the bearing) of the sonar emitter and warns the enemy submarine that someone is looking for something. Passive sonar relies on "listening" to sonic and ultrasonic waves for the distinctive sounds of a submarine (or other ship). Modern passive sonar systems use computers to filter and interpret the sounds detected by sonar arrays towed by ships, sonar buoys, and other underwater sensors. Ideally, they identify the bearing, location, and type of the sonar contact.

Aircraft or satellites can also detect submarines just below the water surface, and satellites have successfully detected submerged submarines by identifying the effects of their movement through the water on the surface pattern of waves, although this capability is limited by "noise" from other sources, especially in turbulent seas.⁹ Modern ASW is a challenging and costly endeavor that requires highly skilled experts, extensive training, and advanced equipment.

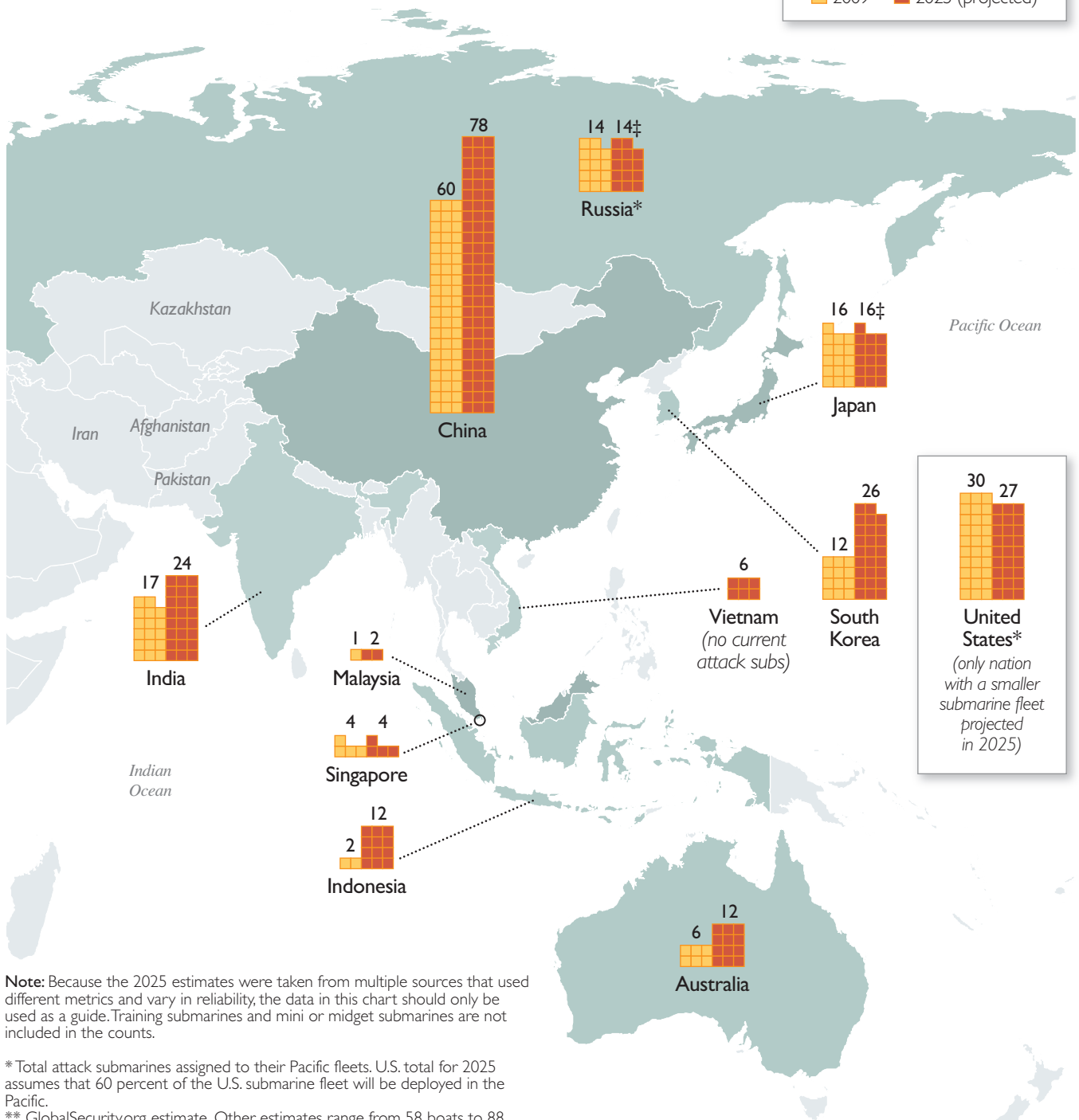
Submarine Fleets in the Pacific Ocean

Submarine fleets and deployments have changed dramatically since the end of the Cold War.¹⁰ Dur-

6. RIA Novosti, "Russia to Build Kilo-Class Diesel Submarines for Vietnam," *Defence Talk*, April 28, 2009, at <http://www.defencetalk.com/russia-to-build-kilo-class-diesel-submarines-for-vietnam-18232> (January 26, 2010).
7. For example, see Kockums, "The Södermanland Class Submarine—a World-Class Upgrade," updated January 20, 2010, at <http://www.kockums.se/en/products-services/submarines-systems/littoral-submarines/a17-sodermanland> (January 26, 2010).
8. The U.S. Navy tested a submarine-launched anti-aircraft missile in 2006. NAVSEA Newswire, "AIM-9X Land Launch Demo Advances Sub Payload Capability," *SS News Daily*, January 5, 2006, at http://www.adjunct.diodon349.com/DNSO/ss_news_daily_for_06jan06.htm#AIM-9X_Land_Launch_Demo_Advances_Sub_Payload_Capability_ (January 26, 2010).
9. Mark Denny, *Blip, Ping & Buzz: Making Sense of Radar and Sonar* (Baltimore: Johns Hopkins University Press, 2007), p. 117.

Attack Submarine Deployments in the Pacific

Number of Attack Submarines
■ 2009 ■ 2025 (projected)



Note: Because the 2025 estimates were taken from multiple sources that used different metrics and vary in reliability, the data in this chart should only be used as a guide. Training submarines and mini or midsize submarines are not included in the counts.

* Total attack submarines assigned to their Pacific fleets. U.S. total for 2025 assumes that 60 percent of the U.S. submarine fleet will be deployed in the Pacific.

** GlobalSecurity.org estimate. Other estimates range from 58 boats to 88 boats.

‡ Force levels were assumed to remain constant.

Sources: International Institute for Strategic Studies, *The Military Balance 2009* (Abingdon, U.K.: Routledge Journals, 2009); Nuclear Threat Initiative, "Submarine Proliferation," at <http://www.nti.org/db/submarines> (January 12, 2010); and GlobalSecurity.org, "World Military Guide," at <http://www.globalsecurity.org/military/world> (January 12, 2010). The 2025 projections are based on publicly reported orders and procurement plans. The complete list of sources is available upon request.

ing the 1990s, Russia withdrew most its submarines from service, and the U.S. steadily drew down its submarine force. While the number of U.S. submarines continues to decline, China is rapidly expanding and upgrading its submarine fleet. In response to a shifting military balance, other countries in the Pacific are also expanding and modernizing their fleets.

United States. The U.S. force of attack submarines fell from 102 boats in 1987 to 53 in 2009.¹¹ The decline has followed repeated revisions of the Navy's force structure plans since the Reagan-era 600-ship Navy called for 100 SSNs. The 1991 plan of George H. W. Bush called for 80, the Joint Chiefs of Staff (JCS) force-level study of 1992 reduced the goal to 55, and the 1997 Quadrennial Defense Review (QDR) lowered the bar further to 50 SSNs.¹² The 2001 QDR reinstated the goal of maintaining 55 SSNs.¹³ The 2006 QDR stated the goals of increasing production to two submarines per year by 2012 and deploying 60 percent of the U.S. submarine fleet to the Pacific to protect U.S. interests in that region.¹⁴ The Navy's current proposal for a 313-ship fleet includes 48 SSNs, although some informed observers have questioned whether this number is sufficient to meet U.S. needs.¹⁵

The 1999 JCS Submarine Force Structure Study concluded that the optimal number of attack submarines to serve all of the military's and intelligence community's operational and collection requirements would be 68 SSNs in 2015 and 76 in 2025. A force of 55 SSNs in 2015 and 62 in 2025 was deemed a moderate security risk.¹⁶ However, the current fleet of 53 nuclear-powered attack submarines¹⁷ is smaller than even the moderate risk force proposed before September 11, 2001. The fleet is already overstretched, yet under the Navy's long-range procurement plan, the number of SSNs will fall below 48 boats between 2022 and 2033, bottoming out at 41 in 2028 and 2029.¹⁸ (See Chart 1.)

To mitigate the projected "sub gap," the Navy is considering reducing *Virginia*-class construction time to 60 months, extending the service life of some *Los Angeles*-class subs by up to two years, and lengthening some deployments from six months to seven months. If successful, all of these measures combined would result in the force bottoming out at 44 or 45 submarines.¹⁹ Yet these stopgap efforts will merely succeed in maintaining a force more appropriate to the pre-9/11 moderate risk scenario.

10. Training submarines and mini-submarines are not considered in this paper and are not included in the tallies.

11. U.S. Navy, "Active Ship Force Levels 1917–Present," at <http://www.history.navy.mil/branches/org9-4.htm#1986> (January 26, 2010).

12. U.S. Department of Defense, *Quadrennial Defense Review*, May 1997, at <http://www.fas.org/man/docs/qdr> (January 26, 2010).

13. U.S. Department of Defense, *Quadrennial Defense Review Report*, September 30, 2001, p. 22, at <http://www.defenselink.mil/pubs/pdfs/qdr2001.pdf> (January 26, 2010).

14. U.S. Department of Defense, *Quadrennial Defense Review Report*, February 6, 2006, p. 48, at <http://www.defenselink.mil/qdr/report/Report20060203.pdf> (January 26, 2010).

15. Ronald O'Rourke, "Navy Force Structure and Shipbuilding Plans: Background and Issues for Congress," Congressional Research Service *Report for Congress*, December 22, 2009, p. 2, Table 1, and p. 34, at <http://fas.org/sgp/crs/weapons/RL32665.pdf> (January 26, 2010).

16. See GlobalSecurity.org, "Submarine Ship Building," at <http://www.globalsecurity.org/military/systems/ship/scn-sub.htm> (January 26, 2010).

17. The U.S. Navy has 45 *Los Angeles*-class, three *Seawolf*-class, and five *Virginia*-class boats. Of these, 30 are currently attached to the Pacific Fleet, including three based in Guam. U.S. Navy, "Attack Submarines—SSN," updated May 28, 2009, at http://www.navy.mil/navydata/fact_display.asp?cid=4100&tid=100&ct=4 (January 26, 2010).

18. Ronald O'Rourke, "Navy Attack Submarine Procurement: Background and Issues for Congress," Congressional Research Service *Report for Congress*, October 21, 2009, p. 20, at <http://www.fas.org/sgp/crs/weapons/RL32418.pdf> (January 26, 2010).

19. U.S. Department of the Navy, "SSN Force Structure, 2020–2030," briefing to Congressional Research Service and Congressional Budget Office, May 22, 2007, cited and discussed in O'Rourke, "Navy Attack Submarine Procurement," pp. 9–10.

Neglected ASW Capabilities. The declining SSN force poses a challenge not only to the Navy's ability to maintain effective underwater deterrence, but also to the Navy's ASW efforts, which are already suffering from declining numbers of other ASW platforms.²⁰ The Navy has 173 aging P-3C patrol

aircraft,²¹ and the P-8A (the P-3C's replacement) is not scheduled to begin entering service until 2013. The Navy is also retiring the S-3B Viking, its only long-range carrier-based ASW aircraft, and has no plans to replace it.²²

In addition, "[t]he Navy lacks a modern equivalent of the Sound Surveillance System (SOSUS), the theater-wide acoustic detection system developed in the 1950s to detect Soviet submarines."²³ This is emblematic of broader weaknesses. Many systems deployed during the Cold War are of limited usefulness in today's threat environment. For example, fixed sensors used during the Cold War are not located in areas where conflict is most likely to occur this century. Furthermore, more countries are deploying advanced submarines that could threaten U.S. aircraft carriers, raising the stakes of U.S. military intervention.

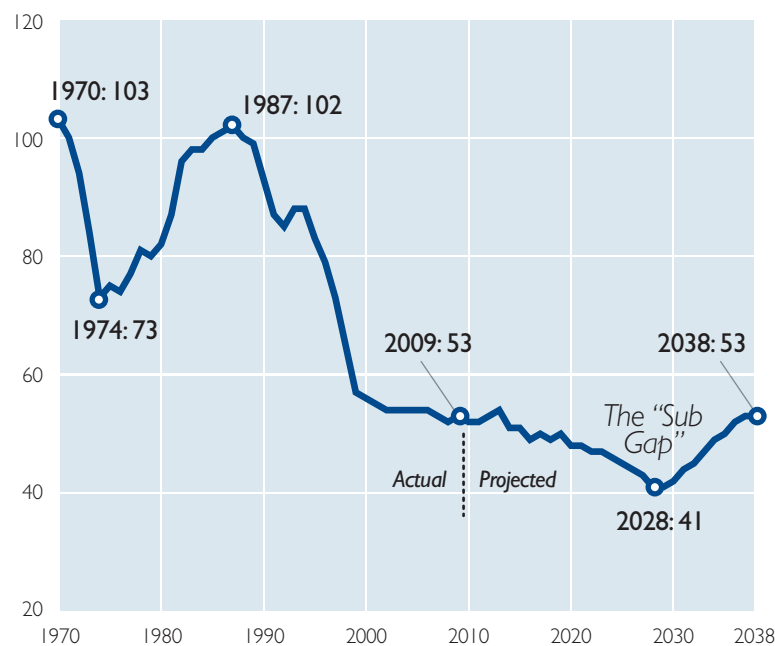
Navy force structure must adapt to this evolving underwater threat environment. In July 2008, Navy officials testified before Congress about prioritizing relevant naval combat capability and recent developments that significantly changed how they view current threats. Vice Admiral Barry McCullough described the Navy's new perception of the threat environment:

Rapidly evolving traditional and asymmetric threats continue to pose increasing challenges to Combatant Commanders.

The Shrinking U.S. Attack Submarine Fleet

In 2009, the U.S. had 53 attack submarines in its fleet. By 2028, that number is projected to drop to 41—a decline of nearly 23 percent—creating a “sub gap” in which the fleet falls below recommended levels.

Nuclear-Powered Attack Submarines



Sources: U.S. Navy, “Active Ship Force Levels 1917–Present,” at <http://www.history.navy.mil/branches/org9-4.htm#1986> (December 18, 2009), and Ronald O'Rourke, “Navy Attack Submarine Procurement: Background and Issues for Congress,” Congressional Research Service Report for Congress, May 20, 2009, p. 9, Table 3, at http://assets.opencrs.com/rpts/RL32418_20090520.pdf (July 25, 2009).

Chart 1 • B 2367 heritage.org

20. John R. Benedict, “The Unraveling and Revitalization of U.S. Navy Antisubmarine Warfare,” *Naval War College Review*, Vol. 58, No. 2 (Spring 2005), p. 105, Figure 3, at <http://www.usnwc.edu/getattachment/09df1b18-e0e9-4576-b9e1-2b0cfd27cb86/Unraveling-and-Revitalization-of-U-S--Navy-Antisub> (January 21, 2010).
21. International Institute for Strategic Studies, *The Military Balance 2009* (Abingdon, U.K.: Routledge Journals, 2009), p. 45, Table 8.
22. Milan Vego, “Patrolling the Deep,” *Armed Forces Journal*, September 2008, at <http://www.armedforcesjournal.com/2008/09/3654984> (January 26, 2010).
23. *Ibid.*

State actors and non-state actors who, in the past, have only posed limited threats in the littoral are expanding their reach beyond their own shores with improved capabilities in blue water submarine operations, advanced anti-ship cruise missiles and ballistic missiles. A number of countries who historically have only possessed regional military capabilities are investing in their Navy to extend their reach and influence as they compete in global markets. Our Navy will need to outpace other navies in the blue water ocean environment as they extend their reach. This will require us to continue to improve our blue water anti-submarine and anti-ballistic missile capabilities in order to counter improving anti-access strategies.²⁴

The Navy has acknowledged its atrophying ASW capabilities in the face of “a re-emerging undersea threat” and has set the goal of developing more advanced sensors and anti-submarine weapons in the coming years.²⁵ The U.S. Pacific Fleet has reportedly already increased ASW training.²⁶ These are critical efforts that must be sustained alongside a goal to increase the procurement of additional ASW platforms—primarily submarines and long-range maritime surveillance aircraft.

“China commissioned thirty-one new submarines between 1995 and 2005.”

China. Since the end of the Cold War, the People’s Liberation Army Navy (PLAN) of the People’s Republic of China has dramatically expanded and upgraded its navy, especially its submarine fleet, which is “now considered the PLAN’s most ‘potent strength.’”²⁷ According to the Pentagon, China has the largest naval force in Asia,²⁸ including 60 attack submarines (six SSNs and 54 diesel attack submarines).²⁹ More than half of its diesel submarines are the more modern *Kilo*-class, *Song*-class, and *Yuan*-class submarines.³⁰ One observer has noted that “China now has more submarines than Russia, and the speed [at which] they are building them is amazing.”³¹

Submarine Fleet Expansion. China is well on its way to achieving its goal of building a credible blue-water navy that can project power well beyond its shores:

In order to grasp the energy that China is now committing to undersea warfare, consider that during 2002–2004 China’s navy launched thirteen submarines while simultaneously undertaking the purchase of sub-

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24. Vice Admiral Barry McCullough and Allison Stiller, “Surface Combatant Requirements and Acquisition Structures,” statement before the Subcommittee on Seapower and Expeditionary Forces, Committee on Armed Services, U.S. House of Representatives, July 31, 2008, p. 3, at http://www.armedservices.house.gov/pdfs/SPEF073108/McCullough_Stiller_Testimony073108.pdf (January 26, 2010).
 25. Otto Kreisher, “As Underwater Threat Re-emerges, Navy Renews Emphasis on ASW,” Navy League of the United States, October 2004, at http://www.navyleague.org/sea_power/oct_04_15.php (January 26, 2010).
 26. Ronald O’Rourke, “China Naval Modernization: Implications for U.S. Navy Capabilities—Background and Issues for Congress,” Congressional Research Service Report for Congress, July 17, 2009, p. 23, at http://assets.opencrs.com/rpts/RL33153_20090717.pdf (January 26, 2010).
 27. U.S.–China Economic and Security Review Commission, *2006 Report to Congress*, November 2006, p. 135, at http://www.uscc.gov/annual_report/2006/annual_report_full_06.pdf (January 26, 2010).
 28. U.S. Department of Defense, “Military Power of the People’s Republic of China, 2009,” p. 64, at http://www.defenselink.mil/pubs/pdfs/China_Military_Power_Report_2009.pdf (January 1, 2010).
 29. International Institute for Strategic Studies, *The Military Balance 2009*, p. 384.
 30. GlobalSecurity.org, “Chinese Warships,” modified December 24, 2008, at <http://www.globalsecurity.org/military/world/china/navy.htm> (January 26, 2010).
 31. Andrei Chang quoted in David Lague, “Chinese Submarine Fleet Is Growing, Analysts Say,” *The New York Times*, December 5, 2008, at <http://www.nytimes.com/2008/02/25/world/asia/25iht-25submarine.10349022.html> (January 26, 2010).

marines from Russia on an unprecedented scale. Indeed, China commissioned thirty-one new submarines between 1995 and 2005. Given this rapid evolution, appraisals of China's capability to field competent and lethal diesel submarines in the littorals have slowly changed from ridicule to grudging respect of late. China's potential for complex technological development is finally being taken seriously abroad.³²

Estimates of the future size of China's attack submarine fleet vary widely from 58 boats to 88 boats,³³ depending on how quickly older submarines are retired from service, whether building more expensive SSNs will reduce total submarine production, and additional purchases of foreign-built submarines. In recent years, China has introduced four new classes of domestically designed and built submarines: *Jin* or Type 094 (SSBN), *Shang* or Type 093 (SSN), *Yuan* or Type 041/039A (SSP), and *Song* or Type 039/039G (SSK). A successor to the *Shang*-class is reportedly in development.³⁴ This degree of sustained investment in submarine development and building suggests that the upper end of the range (possibly 70 or more) is a more realistic estimate of PLAN force structure in the coming decades.

Increased Patrols. The Chinese attack submarine fleet has noticeably increased its patrol rate from two patrols in 2006 to six in 2007 to 12 in 2008.³⁵ This suggests a new focus on training and a desire to

demonstrate to other actors, particularly the United States, that China is a maritime power in the Pacific. Two recent incidents highlight this trend. On October 26, 2006, a Chinese *Song*-class submarine surfaced within five miles of the aircraft carrier USS *Kitty Hawk*—inside its screen of escorts—which was operating near Okinawa.³⁶ On June 11, 2009, a Chinese submarine collided with the USS *John S. McCain*'s towed sonar array off the Philippines.³⁷ Whatever these incidents may or may not reveal about the limitations of U.S. ASW capabilities and the competence of Chinese submariners³⁸—the most useful information is almost certainly classified—they clearly demonstrate that China's submarines are ranging farther afield and operating more aggressively than in the past.

Objectives. A number of considerations and objectives could help to explain China's rapid expansion of its attack submarine fleet: basic Chinese defense needs, limiting the U.S. ability to "interfere" in China-Taiwan relations, challenging U.S. dominance in the Pacific, protecting the Chinese SSBN nuclear deterrent, and winning greater international prestige.

First, the bulk of China's wealth and population is concentrated on its east coast, which gives China a compelling reason to deploy a robust naval deterrent along that coast.

Alternatively, many security experts argue that "China's main objective in upgrading its submarine fleet is the ability to delay or deter a United States

32. Andrew S. Erickson and Lyle J. Goldstein, "China's Future Nuclear Submarine Force: Insights from Chinese Writings," *Naval War College Review*, Vol. 60, No. 1 (Winter 2007), p. 55.

33. O'Rourke, "China Naval Modernization," pp. 12–15, and GlobalSecurity.org, "Chinese Warships."

34. O'Rourke, "China Naval Modernization," p. 5, note 10.

35. Hans M. Kristensen, "Chinese Submarine Patrols Doubled in 2008," Federation of American Scientists Strategic Security Blog, February 3, 2009, at <http://www.fas.org/blog/ssp/2009/02/patrols.php> (January 26, 2010).

36. Bill Gertz, "China Sub Secretly Stalked U.S. Fleet," *The Washington Times*, November 13, 2006, and Joel Kennedy, "USS Kitty Hawk and the Chinese Sub," *The Stupid Shall Be Punished*, November 12, 2006, at <http://bubbleheads.blogspot.com/2006/11/uss-kitty-hawk-and-chinese-sub.html> (January 26, 2010).

37. Barbara Starr, "Sub Collides with Sonar Array Towed by U.S. Navy Ship," CNN, June 12, 2009, at <http://www.cnn.com/2009/US/06/12/china.submarine/index.html> (January 26, 2010), and Joel Kennedy, "Chinese Submarine Hits U.S. Towed Array," *The Stupid Shall Be Punished*, June 12, 2009, at <http://bubbleheads.blogspot.com/2009/06/chinese-submarine-hits-us-towed-array.html> (January 26, 2010).

38. For two perspectives, see Vice Admiral (ret.) Bernard "Bud" Kauderer and Admiral William Fallon, in Jonathan Howland, "Iran, China Intent on Countering Navies," Jewish Institute for National Security Affairs, August 22, 2009, at <http://www.jinsa.org/node/550> (January 26, 2010).

intervention on behalf of Taiwan.”³⁹ China has been bedeviled by the “renegade province” of Taiwan and by U.S. meddling (from China’s perspective) in cross-strait relations since 1949. When relations across the Taiwan Strait became particularly tense in 1996, the U.S. sent two carrier battle groups to the area to deter Chinese aggression against Taiwan. Unsurprisingly, China has since placed a high priority on developing sea denial capabilities that could discourage and, if necessary, delay or prevent U.S. military intervention in a future cross-strait dispute.⁴⁰ The U.S. Department of Defense has concluded that, “Acquisition and development of the *Kilo*, *Song*, *Shang*, and *Yuan*-class submarines illustrates the importance the PLA places on undersea warfare for sea denial.”⁴¹

The PLAN may also be emulating Soviet naval strategy, which “rapidly overcame the [Soviet Union’s] unfavorable geostrategic situation” by using nuclear submarines to give it “an ocean-going navy with offensive capability.”⁴² A similar strategy would help the PLAN to break the “island chain blockade” of mainland China. The new naval base on Hainan Island adds an additional wrinkle, giving the PLAN “direct access to vital international sea lanes, and offer[ing] the potential for stealthy deployment of submarines into the deep waters of the South China Sea.”⁴³

As part of its nuclear deterrent, China is expected to build as many as five *Jin*-class SSBN submarines, each armed with 12 SLBMs capable of reaching U.S. territory from positions off the Chinese coast. This would constitute a credible sea-based nuclear deterrent.⁴⁴ China may want to use some of its SSNs to escort SSBN deterrence patrols.⁴⁵

Finally, it seems clear that China intends to become a global power, and “it appears to be conventional wisdom in the PRC that nuclear submarines represent one of China’s clearest claims to status as a great power.”⁴⁶ A strong attack submarine fleet would also help to protect Chinese shipping around the world. The *Yin He* incident in 1993 helped to solidify this concern among PRC leaders, who were “extremely furious, but had no recourse” when the U.S. insisted on inspecting a Chinese freighter suspected of carrying ingredients of chemical weapons to Iran.⁴⁷

Australia. Australia has six diesel-electric submarines and has announced plans to replace them as part of a broader naval modernization program with 12 modern conventional submarines armed with cruise missiles.⁴⁸ The Australian government has explicitly tied this expansion to the rise of China as a naval power and weakening U.S. naval supremacy,⁴⁹ which Australia believes has “played a stabilizing role across the world and especially so in the Asia–Pacific region.”⁵⁰

39. Lague, “Chinese Submarine Fleet Is Growing.”

40. “Disabling U.S. aircraft carriers has been a constant theme of articles in Chinese military journals and the public press for a decade.” Paul H. Godwin, “China’s Emerging Military Doctrine: A Role for Nuclear Submarines?” in Andrew S. Erickson, Lyle J. Goldstein, Andrew R. Wilson, and William S. Murray, eds., *China’s Future Nuclear Submarine Force* (Annapolis, Md.: Naval Institute Press, 2007), p. 58, note 36.

41. U.S. Department of Defense, “Military Power of the People’s Republic of China 2009,” pp. 21–22 (capitalization and italicization of submarine class names adjusted for style consistency).

42. Erickson and Goldstein, “China’s Future Nuclear Submarine Force: Insights from Chinese Writings,” pp. 61–62.

43. U.S. Department of Defense, “Military Power of the People’s Republic of China 2009,” p. 49.

44. *Ibid.*, pp. vii and 48.

45. For a more detailed discussion, see Toshi Yoshihara and James R. Holmes, “China’s New Undersea Nuclear Deterrent: Strategy, Doctrine, and Capabilities,” *Joint Forces Quarterly*, No. 50 (3rd Quarter, 2008), pp. 31–38, at http://www.ndu.edu/inss/Press/jfq_pages/editions/i50/11.pdf (January 26, 2010).

46. Erickson and Goldstein, “China’s Future Nuclear Submarine Force: Insights from Chinese Writings,” p. 63.

47. *Ibid.*, p. 57. The inspection found no such cargo.

48. Dodd, “Designs Open for \$25bn Future Sub Project.”

49. Asia News National, “US Incapable of Protecting Australia Anymore, Says Rudd.”

India. While geographically not a Pacific country, India exercises growing influence in Southeast Asia and the western Pacific. India has 16 diesel-powered attack submarines and recently launched its first SSN, which is based on the Russian *Akula*-class. India will lease a second *Akula*-class submarine from Russia and is building six *Scorpena*-class diesel submarines.⁵¹

India's planned expansion and upgrade of its submarine fleet is part of a larger effort to add more than 100 warships to the Indian navy over 10 years. The Indian Ministry of Defense explains the ship-building program as a "strategic necessity" of national defense, largely in terms of countering the Chinese naval buildup: "China is developing its navy at a great rate. Its ambitions in the Indian Ocean are quite clear."⁵² India also aspires to become a great power, and submarines are seen as an integral part of any major power's fleet.

Russia. The Russian (formerly Soviet) submarine fleet shrank by almost two-thirds after the collapse of the Soviet Union. In recent years, the Russian navy has emerged from its post-Soviet crisis, but still needs to decommission dozens of nuclear submarines left over from the Cold War. In 2009, Russia had 17 SSNs and 20 diesel submarines, of which five SSNs and nine diesel submarines were assigned to the Pacific fleet.⁵³ Despite massive budget increases in recent years, "the navy

is haunted by insufficient funding, which limits its ability to conduct regular overhauls of operational submarines and even to maintain them in a combat-ready state."⁵⁴

Japan. Japan maintains a modern submarine fleet of at least 16 boats, including at least one new *Soryu*-class AIP submarine.⁵⁵ Japan has historically replaced its submarines after about 16 years of service, much more quickly than other countries retire theirs.⁵⁶

South Korea. South Korea has 12 attack submarines and plans to increase its fleet to 27 by 2020.⁵⁷

North Korea. North Korea has 22 old conventional attack submarines (how many are serviceable is unknown) and numerous mini-submarines.⁵⁸ While its submarines could theoretically threaten merchant shipping and unsophisticated naval combatants,⁵⁹ North Korea's submarines are not viewed as serious contenders in sea control operations.

Taiwan. Taiwan operates two attack submarines and has explored numerous options to expand and upgrade its submarine fleet, including domestic construction. In 2001, the U.S. offered Taiwan an arms package that included eight diesel-electric submarines, but the U.S. does not own the rights to any current diesel submarine designs, and the proposal appears to be dead.⁶⁰

Southeast Asia. In the context of China and India deploying nuclear-powered submarines, most coun-

50. Australian Department of Defence, *Defending Australia in the Asia Pacific Century: Force 2030*, 2009, p. 30, at http://www.apo.org.au/sites/default/files/defence_white_paper_2009.pdf (January 26, 2010).

51. Nuclear Threat Initiative, "Submarine Proliferation: India Current Capabilities," December 2008, at <http://www.nti.org/db/submarines/india/index.html> (January 26, 2010), and Varun Sood and James Lamont, "India to Launch First Nuclear Submarine," *The Financial Times*, July 8, 2009, at <http://www.ft.com/cms/s/0/af9a4f8a-6bcc-11de-9320-00144feabdc0.html> (August 22, 2009).

52. James Lamont and Varun Sood, "India Plans to Build 100 Warships," *The Financial Times*, July 30, 2009.

53. International Institute for Strategic Studies, *The Military Balance 2009*, pp. 218–220.

54. Nuclear Threat Initiative, "Submarine Proliferation: Russia Current Capabilities," at <http://www.nti.org/db/submarines/russia/index.html> (January 26, 2010).

55. International Institute for Strategic Studies, *The Military Balance 2009*, p. 392, and GlobalSecurity.org, "SS-501 Soryu/16SS/SS 2,900 Ton Class," at <http://www.globalsecurity.org/military/world/japan/2900ton.htm> (January 26, 2010).

56. "Shipbuilders to Compete for MSDF Submarine Contract for First Time," *The Mainichi Daily News*, December 20, 2009.

57. International Institute for Strategic Studies, *The Military Balance 2009*, p. 397, and GlobalSecurity.org, "South Korea Navy," February 3, 2009, at <http://www.globalsecurity.org/military/world/rok/ship.htm> (January 26, 2010).

58. International Institute for Strategic Studies, *The Military Balance 2009*, p. 395.

59. GlobalSecurity.org, "Korean People's Army Navy," at <http://www.globalsecurity.org/military/world/dprk/navy.htm> (January 26, 2010).

tries in Southeast Asia are expanding or upgrading their existing submarine fleets. Indonesia has two submarines and has announced a plan to build 12 submarines by 2024.⁶¹ Vietnam has ordered six *Kilo*-class submarines from Russia.⁶² Singapore has recently acquired two *Archer*-class AIP submarines

In the context of China and India deploying nuclear-powered submarines, most countries in Southeast Asia are expanding or upgrading their existing submarine fleets.

to replace two of its four aging boats.⁶³ In October 2007, Malaysia received delivery of its first submarine, a *Scorpene*-class boat built in France. The second is scheduled for delivery in 2010.⁶⁴ Thailand has no submarines, but has expressed increasing interest in acquiring several.⁶⁵

Sustaining U.S. Undersea Supremacy

Over the past 16 years, China has rapidly expanded its submarine fleet while the U.S. has steadily drawn down its submarine forces even as combatant commanders have demanded more of their capabilities. U.S. allies and friends have expressed legitimate concerns about the shifting security environment in the Pacific.

The U.S. has acknowledged this shifting balance—at least in part—and has begun to address it.

The Navy appears to be on course to fulfilling the 2006 Quadrennial Defense Review directive to deploy 60 percent of the U.S. submarine fleet in the Pacific,⁶⁶ but deploying a higher percentage of a shrinking fleet will likely prove less effective than increasing the total number of submarines.

To halt and eventually reverse the erosion of U.S. undersea supremacy in the Pacific Ocean, to reassure and support U.S. allies, and to protect long-standing U.S. interests in the region, the U.S. should:

- **Build additional attack submarines more rapidly.** Congress should increase procurement of *Virginia*-class submarines to at least two per year with the objective of fielding a force of at least 60 fast attack submarines.⁶⁷ Yet by itself, procuring new boats at the rate of two per year will not replace the *Los Angeles*-class submarines as quickly as they are scheduled to be decommissioned.
- **Overhaul and modernize selected *Los Angeles*-class submarines to extend their service life.** While overhauling and modernizing submarines will require additional funding, extending the service life of older submarines that are still in good condition—instead of decommissioning them as planned—would help to close the “sub gap” over the short term at a lower cost than drastically increasing submarine construction.
- **Forward-base more submarines.** Basing more submarines in Guam, Hawaii, and possibly

60. Nuclear Threat Initiative, “Submarine Proliferation: Taiwan Current Capabilities,” January 2010, at <http://www.nti.org/db/submarines/taiwan/index.html> (January 26, 2010).

61. Tim Shipman and Chad Bouchard, “China Is Accused of Fuelling Pacific Arms Race,” *Telegraph*, April 1, 2007, at <http://www.telegraph.co.uk/news/worldnews/1547296/China-is-accused-of-fuelling-Pacific-arms-race.html> (January 26, 2010).

62. RIA Novosti, “Russia to Build Kilo-Class Diesel Submarines for Vietnam.”

63. Singapore Ministry of Defense, “Singapore Navy Launches Its First Archer-Class Submarine,” June 16, 2009, at http://www.mindef.gov.sg/imindef/news_and_events/nr/2009/jun/16jun09_nr.html (January 26, 2010).

64. “KD Tun Razak to Arrive in Sepang Bay in June,” Yahoo News, January 12, 2010, at <http://malaysia.news.yahoo.com/bnm/20100112/tts-navy-submarine-bm-with-pix-993ba14.html> (January 26, 2010).

65. GlobalSecurity.org, “Royal Thai Navy,” April 27, 2005, at <http://www.globalsecurity.org/military/world/thailand/navy-intro.htm> (January 26, 2010).

66. U.S. Department of Defense, *Quadrennial Defense Review Report*, February 6, 2006, p. 47.

67. See Baker Spring and David D. Gentilli, “Congress Should Accelerate Submarine Procurement,” Heritage Foundation *WebMemo* No. 1084, May 17, 2006, at <http://www.heritage.org/Research/NationalSecurity/wm1084.cfm>, and Mackenzie Eaglen and Eric Sayers, “USA: A 21st Century Maritime Posture for an Uncertain Future,” *Defense Industry Daily*, March 23, 2009, at <http://www.defenseindustrydaily.com/USA-A-21st-Century-Maritime-Posture-for-an-Uncertain-Future-05342> (January 26, 2010).

Japan—in addition to the three SSNs already based in Guam—would place them closer to East Asia, where their services are most likely to be needed, and would allow them to maximize time on station and minimize travel time to and from their home ports.⁶⁸ The Navy should also consider acquiring additional submarine tenders, which would allow the creation of temporary forward bases where submarines could rotate crews and rearm.

- **Reevaluate the use of diesel submarines.** Congress should direct the Navy to study the utility of using AIP attack submarines to help to close the gap between regional commander requirements and the number of available U.S. submarines. In the short term, as domestic production capabilities develop, the U.S. could buy submarines from U.S. allies.⁶⁹ Developing a U.S. conventional submarine capability would also facilitate more robust ASW training and afford the U.S. the option to sell advanced diesel submarines to Taiwan.
- **Research, develop, and deploy undersea force multipliers.** Fielding unmanned undersea vehicles (UUVs) can enhance the range, capabilities, and lethality of existing undersea weapons, platforms, and sensors.⁷⁰ However, UUVs should not be viewed as replacements for attack submarines. The U.S. will need to continue deploying manned submarines for the foreseeable future while upgrading and enhancing their capabilities to counter developing and potential threats.
- **Enhance anti-submarine warfare capabilities.** Atrophied U.S. ASW capabilities are particularly worrisome because developing skilled ASW personnel requires years of intensive training. Congress should allocate sufficient and stable

funding to increase ASW capabilities both qualitatively and quantitatively. Specifically, Congress should increase the number of ASW platforms by expanding and accelerating the P-8 program and by building more ships with ASW capabilities, including more DDG-1000 destroyers or upgraded DDG-51s with towed sonar arrays.⁷¹

- **Work with the militaries of U.S. allies and friends to improve their submarine and ASW capabilities.** These efforts should include more frequent and intensive multilateral exercises and maneuvers, technology sharing, and joint planning. Strengthening the capacity and capabilities of friendly foreign navies would allow the U.S. to employ fewer of its own resources in certain contingencies and missions, thereby freeing up U.S. submarines for other pressing needs.
- **Encourage greater Chinese transparency in security matters through military-to-military channels.** Greater Chinese transparency about its military may resolve or ease some of the concerns about China's naval buildup. Greater understanding may also help to prevent or defuse future incidents involving the U.S. and Chinese militaries. China's failure to give prior notice to the U.S. military of its recent missile defense test—contrary to common international practice—weakens transparency efforts and leads to many unanswered questions.

Conclusion

The shifting security environment in the Pacific Ocean and East Asia has caused serious concern among U.S. allies and friends. Several have responded by launching aggressive naval buildups, and Australia has openly tied its defense buildup to the shifting China–U.S. balance in the Pacific.

68. See O'Rourke, "China Naval Modernization," p. 23.

69. Mike Burlison, "Restoring the USN Submarine Fleet," *New Wars*, January 11, 2010, at <http://newwars.wordpress.com/2010/01/11/restoring-the-usn-submarine-fleet> (January 12, 2010).

70. UUVs were used in Operation Iraqi Freedom to hunt mines. GlobalSecurity.org, "Unmanned Undersea Vehicles (UUV)," at <http://www.globalsecurity.org/intell/systems/uuv.htm> (September 11, 2009). For examples of planned UUVs, see U.S. Department of the Navy, "The Navy Unmanned Undersea Vehicle (UUV) Master Plan," November 9, 2004, at <http://www.navy.mil/navydata/technology/uuvmp.pdf> (September 11, 2009).

71. Mackenzie Eaglen, "Changing Course on Navy Shipbuilding: Questions Congress Should Ask Before Funding," *Heritage Foundation Background* No. 2193, October 7, 2008, at <http://www.heritage.org/Research/nationalsecurity/bg2193.cfm>.

The U.S. Navy is still the most powerful navy in the world, and it has the best-trained and most capable submarine force, but its declining numbers have been stretched thin by the demands of ongoing operations and other assigned missions. The continuing decline of the U.S. submarine fleet, in particular, threatens U.S. undersea supremacy in the Pacific and therefore could seriously undermine the Navy's ability to operate effectively in East Asia and the Pacific.

Unless the U.S. rebuilds its submarine fleet and enhances the Navy's ASW capabilities, U.S. military

superiority in the Pacific will continue to wane, leading to avoidable political and economic hazards for the U.S. and its friends and allies.

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