# U.S. Navy

In *A Design for Maintaining Maritime Superiority*, issued in January 2016, Chief of Naval Operations Admiral John M. Richardson describes the U.S. Navy's mission as follows:

> The United States Navy will be ready to conduct prompt and sustained combat incident to operations at sea. Our Navy will protect America from attack and preserve America's strategic influence in key regions of the world. U.S. naval forces and operations—from the sea floor to space, from deep water to the littorals, and in the information domain—will deter aggression and enable peaceful resolution of crises on terms acceptable to the United States and our allies and partners. If deterrence fails, the Navy will conduct decisive combat operations to defeat any enemy.[1]

The basis for understanding the key functions necessary to accomplish this mission was provided in the March 2015 update to *A Cooperative Strategy for 21st Century Seapower*.

For much of the post–Cold War period, the Navy, Marine Corps, and Coast Guard (known collectively as the sea services) have enabled the U.S. to project power across the oceans, control activities on the seas when and where needed, provide for the security of coastlines and shipping in maritime areas of interest, and thereby enhance America's deterrent capability without opposition from competitors. However, the ability of competitors to contest U.S actions has improved, forcing the sea services to revisit their assumptions about gaining access to key regions. Together, these functional areas—power projection, sea control, maritime security, deterrence, and domain access—constitute the basis for the Navy's strategy. Achieving and sustaining the ability to excel in these functions drives Navy thinking and programmatic efforts.[2]

As the military's primary maritime arm, the U.S. Navy provides the enduring forward global presence that enables the United States to respond quickly to crises around the world. Unlike land forces (or even, to a large extent, air forces), which are tethered to a set of fixed, larger-scale support bases requiring consent from host nations, the U.S. Navy can operate freely across the globe and shift its presence wherever needed without any other nation's permission. As a result, naval forces are often the first U.S. forces to respond to a crisis and, through their routine forward deployments, continue to preserve U.S. security interests long after conflict formally ends. In addition to the ability to project combat power rapidly anywhere in the world, the Navy's peacetime forward presence supports missions that include securing sea lines of communication (SLOC) for the free flow of goods and services, assuring U.S. allies and friends, deterring adversaries, and providing a timely response to crises short of war.

A few key documents inform the Navy's day-to-day fleet requirements:

- The 2012 Defense Strategic Guidance (DSG);[3]
- The Global Force Management Allocation Plan (GFMAP);[4]
- The 2015 update to *A Cooperative Strategy for 21st Century Seapower*; and

- The *Design for Maintaining Maritime Superiority*.

The 2012 DSG issued by the Secretary of Defense describes 10 primary missions for the Navy and the other branches of the U.S. military. In addition, the U.S. Navy must meet forward presence requirements laid out in the fiscal year (FY) 2017 GFMAP, which states the force presence needed around the world as determined by the combatant commanders (COCOMs) and the Secretary of Defense.

## Capacity

The Navy measures capacity by the number of ships rather than the number of sailors, and not all ships are counted equally. The Navy focuses mainly on the size of its "battle force," which is composed of ships it considers to be directly related to its combat missions.[5]

The Navy currently sails 276 vessels as part of its battle force fleet,[6] up from 274 in 2016[7] but still well below both the Navy's fleet goal and a level sufficient to uphold a two-MRC (major regional contingency) construct. The Navy requested procurement of nine ships in FY 2018,[8] 12 ships less than the number recommended for procurement in the Secretary of the Navy's February 2017 "United States Navy Accelerated Fleet Plan"[9] and in a Congressional Budget Office (CBO) assessment of the average annual ship procurement needed to achieve a 355-ship fleet by 2037.[10] The Accelerated Fleet Plan includes one additional guided missile destroyer (DDG 51), one Expeditionary Fast Transport (EPF), and one Expeditionary Mobile Base (ESB) in FY 2018.[11] The gap between actual and desired procurement is the result of a shortfall in funding.

The largest proportional shortfall in the Navy fleet assessed in the *2018 Index* is the same as in past editions: small surface combatants (SSC).[12] This includes Littoral Combat Ships (LCS) and mine countermeasure (MCM) ships and previously included frigates. All *Oliver Hazard Perry*-class frigates were decommissioned by the end of 2015.[13] The fleet currently includes 11 MCM vessels and nine LCS vessels for a total of 20 SSC,[14] 32 below the objective requirement of 52 established by the Navy.[15]

The aircraft carrier force suffers a capacity shortfall of two hulls: 11 are currently in the fleet, and the two-MRC construct requires 13.[16] Current U.S. law requires the Navy to maintain a force of "not less than 11 operational aircraft carriers."[17] H.R. 941, introduced by Representative K. Michael Conaway (R–TX) in February 2017, would amend the National Defense Authorization Act for Fiscal Year 2016 to require that the U.S. Navy "expedite delivery of 12 aircraft carriers" and that "an aircraft carrier should be authorized every three years" to keep pace with the loss of carriers as they are retired.[18] The Congressional Research Service (CRS) has assessed that "[i]ncreasing aircraft carrier procurement from the current rate of one ship every five years to one ship every three years would achieve a 12-carrier force on a sustained basis by about 2030."[19] The Navy has said it needs to have two carriers deployed at all times while three are ready to reinforce on short notice, which is very hard to do with a fleet of only 11 carriers.

The carrier force fell to 10 from December 2012 until July 2017. During the first week of January 2017, no U.S. aircraft carriers were deployed, the first time this has occurred since World War II.[20] The USS *Gerald R. Ford* (CVN-78) was commissioned on July 22, 2017, returning the Navy's carrier force to a total of 11 ships. While the *Ford* is now part of the Fleet Battle Force, it will not be ready for routine flight operations until 2020 and will not be operationally deployed until 2022.[21]

In December 2016, the U.S. Navy released its latest study of forecasted fleet requirements. The Navy Force Structure Assessment (FSA) was developed to determine the correct balance of existing forces for "ever-evolving and increasingly complex maritime security threats."[22] The Navy concluded that a 653-ship force would be necessary to address all of the demands registered in the FY 2017 Global Force Management (GFM) system. A fleet of 459 ships, 200 fewer than the ideal fleet but thought still to be too expensive given current and projected limits on defense spending, would meet warfighting

FIGURE 7

## The Case for 13 Carriers

The U.S. Navy carrier fleet is a critical element of U.S. power projection and supports a constant presence in regions of the world where permanent basing is limited. To properly handle this large mission, the Heritage Foundation recommends a fleet of 13 carriers.


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requirements but accept risk in providing continual presence missions.[23] The Navy's final force objective of 355 ships, recommended by the FSA, was based on a minimum force structure that "complies with current defense planning guidance," "meets approved Day 0 and warfighting response timelines," and "delivers future steady state and warfighting requirements with an acceptable degree of risk."[24]

The final recommendation for a 355-ship force is an increase of 47 in the minimum number of ships from the previous requirement of 308. The most significant increases are:

- Aircraft carriers, from 11 to 12;
- Large surface combatants (guided missile destroyers (DDG) and cruisers (CG)), from 88 to 104 "to deliver increased air defense and expeditionary BMD [ballistic missile defense] capacity and provide escorts for the additional Aircraft Carrier";
- Attack submarines (SSNs), from 48 to 66 to "provide the global presence required to support national tasking and prompt warfighting response"; and
- Amphibious ships, from 34 to 38.[25]

"[O]ver the next 30 years," according to the CBO, "meeting the 355-ship objective would cost the Navy an average of about $26.6 billion (in 2017 dollars) annually for ship construction." This "is more than 60 percent above the average amount the Congress has appropriated each year for that purpose over the past 30 years and 40 percent more than the amount appropriated for 2016."[26] The Navy's SCN (Shipbuilding and Conversion, Navy) request for FY 2018 totaled approximately $19.9 billion,[27] well below the level the CBO has assessed is necessary to reach fleet goals. As noted, however, this includes funding for procurement of only nine battle force ships during

this fiscal year, which will make it difficult to increase the fleet size.

The seeming anomaly of increased funding for shipbuilding without a corresponding increase in fleet force structure is due in part to the fact that a large portion of this funding is dedicated to advanced procurement of the next-generation ballistic missile submarine program (SSBN(X) *Columbia*-class) as well as such non–battle force requirements as a training ship.[28] Also, the CRS has estimated that roughly 15,000 additional sailors would be needed to man the 47 additional ships.[29] Without significant funding increases to procure more vessels across ship types each year, it appears unlikely that the Navy will reach its 355-ship goal for the foreseeable future.[30]

The Navy has not updated its 30-year shipbuilding plan to reflect the revised 355-ship force objective. By definition, the current 30-year plan is structured to achieve a fleet of 308 ships. However, with major adjustments in annual funding, reactivation of decommissioned ships, and expansion of naval shipyard workforce and facilities, a fleet of 355 ships could be achieved by 2035.[31]

Taken alone, total fleet size can be a misleading statistic; related factors must also be taken into account when considering numbers of ships. One such important factor is the number of ships that are forward deployed to meet operational demands. On average, approximately one-third of the total fleet is deployed at any given time. The type or class of ship is also important. Operational commanders must have the proper mix of capabilities deployed to enable a timely and effective response to emergent crises. Not all ships in the battle force are at sea at the same time. The majority of the fleet is based in the continental U.S. (CONUS) to undergo routine maintenance and training, as well as to limit deployment time for sailors. However, given the COCOMs' requirements for naval power presence in each of their regions, there is an impetus to have as many ships forward deployed as possible.

In November 2014, the Navy established an Optimized Fleet Response Plan (OFRP) "to ensure continuous availability of manned, maintained, equipped, and trained Navy forces capable of surging forward on short notice while also maintaining long-term sustainability of the force."[32] The plan incorporates four phases of ship availability/maintenance as depicted in Chart 4. This results in a basic ratio of 4:1 for CONUS-based force structure required for deployed platforms. OFRP is on track to achieve the Navy's goal of "2 deployed and 3 surge ready" carrier strike groups (CSGs) just beyond 2021.[33]

As of this writing, the Navy had 104 ships deployed globally (including submarines): 38 percent of the total available fleet and an increase from the 94 ships deployed during 2016.[34] While the Navy remains committed to deploying roughly a third of its fleet at all times, capacity shortages have caused the current fleet to fall below the levels needed both for the Navy's stated presence needs and for a fleet capable of projecting power at the two-MRC level. The Navy has tried to increase forward presence by emphasizing non-rotational deployments (having a ship "home-ported" overseas or keeping it forward stationed):[35]

- **Home-ported:** The ships, crew, and their families are stationed at the port or based abroad.

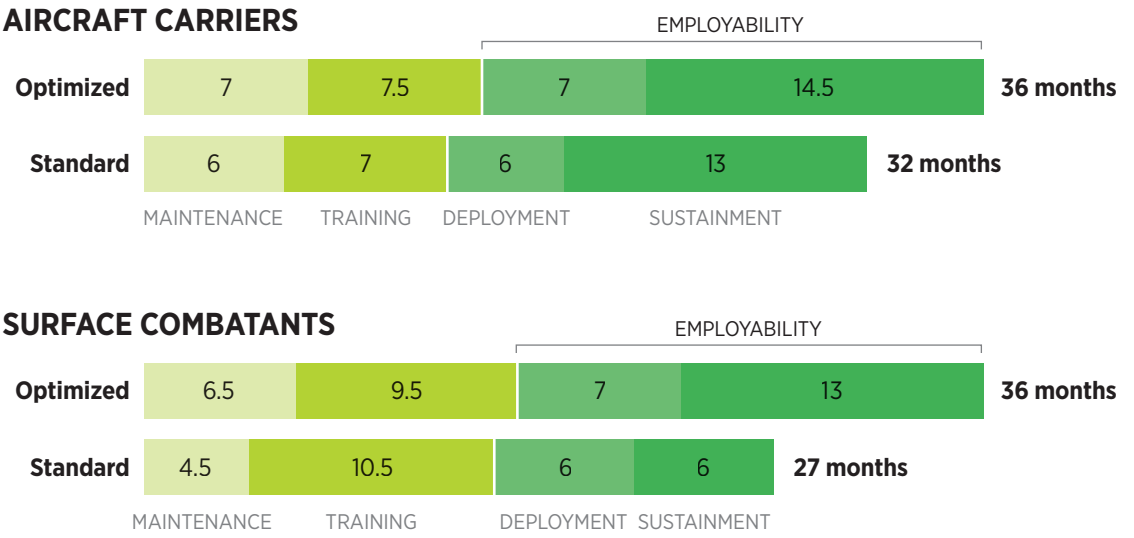
- **Forward Stationed:** Only the ships will be based abroad while crews are rotated out to the ship.[36]

Both of these non-rotational deployment options require cooperation from friends and allies to permit the Navy's use of their facilities, as well as investment in additional facilities abroad. However, these options allow one ship to provide a greater level of presence than four ships based in CONUS and in rotational deployment since they offset the time needed to deploy ships to distant theaters.[37] A key example of the use of this practice is the Navy's constant home-porting of an aircraft carrier at the U.S. naval base in Yokosuka, Japan. In May 2015, the USS *George Washington* (CVN-73) departed this base to return to CONUS,

CHART 4

## Navy's Optimized Fleet Response Plan

The optimized fleet response plan extends the deployment cycle for carriers and surface combatants to 36 months.




**SOURCE:** U.S. Government Accountability Office, *Navy's Optimized Fleet Response Plan*, Updated Briefing for Congressional Committees, p. 12, attached to report, *Military Readiness: Progress and Challenges in Implementing the Navy's Optimized Fleet Response Plan*, GAO-16-466R, May 2, 2016, http://www.gao.gov/assets/680/676904.pdf (accessed August 16, 2017).

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with the USS *Ronald Reagan* sailing there to replace it.[38] The *George Washington*, stationed at Yokosuka since 2008, was withdrawn so that it could undergo its midlife refueling and complex overhaul (RCOH), the lengthy process of refueling its nuclear reactors and applying a variety of repairs and capability upgrades.

The Navy maintains that it currently will be able to meet GFMAP requirements and the 10 missions outlined in the DSG, but Admiral Richardson has indicated that the fleet will continue to be stretched to meet demand.

### Capability

Scoring the U.S. Navy's overall ability to protect U.S. interests globally is not just a matter of counting the fleet. The quality of the battle force is also important in determining naval strength.

A comprehensive measure of platform capability would involve a comparison of each ship and its weapons systems relative to the military capabilities of other nations. For example, a complete measure of naval capabilities would have to assess not only how U.S. platforms would match up against an enemy's weapons, but also whether formal operational concepts would be effective in a conflict, after which the assessment would be replicated for each potential conflict. This is a necessary exercise and one in which the military currently engages, but it is beyond the scope of this *Index* because such details and analysis are routinely classified.

Capability can be usefully assessed based on the age of ships, the modernity of the platform, the payloads and weapons systems carried by ships, and the ability of planned modernization

programs to maintain the fleet's technological edge. The Navy has several classes of ships that are nearing the end of their lifespans, and this will precipitate a consolidation of ship classes in the battle force.

As noted, the Navy retired its entire fleet of *Oliver Hazard Perry*-class guided missile frigates in 2015. The *Perry* class is being replaced by the Littoral Combat Ship.[39] Planned capability upgrades to give the LCS fleet frigate-like capabilities include "[o]ver-the-horizon surface to surface missile and additional weapon systems and combat system upgrades" and "increased survivability...achieved by incorporating additional self-defense capabilities and increased hardening of vital systems and vital spaces."[40] However, critics of the LCS program have expressed concerns about "past cost growth, design and construction issues with the first LCSs"; "the survivability of LCSs (i.e., their ability to withstand battle damage)"; "whether LCSs are sufficiently armed and would be able to perform their stated missions effectively"; and "the development and testing of the modular mission packages for LCSs."[41]

In July 2017, the Navy released a Request for Information to the shipbuilding industry with the goal of moving forward in FY 2020 with a new ship, currently referred to as the future Guided Missile Frigate (FFG(X)).[42] The Navy stated that a reevaluation of its frigate requirements as a result of evolving threats in the global maritime environment had led to a more robust SSC with better abilities to engage in undersea and surface warfare, operate independently in contested environments, extend the fleet's network of unmanned systems, and relieve large surface combatants from routine duties during operations other than war, thus freeing them for higher-end duties. The notional FFG(X) procurement plan would purchase 20 ships over 11 years.[43]

The Administration's FY 2018 budget request includes funding for two LCSs. While the Navy has not decided on the number to be procured in FY 2019, it has stated that it will maintain the LCS industrial base until the FFG(X) contract is awarded in 2020.[44] The Navy projects that the deployable force will include 11 LCSs by the end of FY 2017 and another four, for a total of 15, by the end of FY 2018. However, this is still well below the fleet size of small surface combatants necessary to fulfill the Navy's global responsibilities (52) even when combined with the remaining mine countermeasure vessels in the fleet (11).

The Navy possesses 22 *Ticonderoga*-class cruisers.[45] To save operating expenses, it has been pursuing a plan to put half of this fleet into temporary layup status in order to extend this class's fleet service time into the 2030s—even though these ships are younger than their expected service lives (i.e., have been used less than planned). Under the FY 2015 National Defense Authorization Act:

> Congress...directed the Navy to implement the so-called "2-4-6" program for modernizing the 11 youngest Aegis cruisers. Under the 2-4-6 program, no more than two of the cruisers are to enter the modernization program each year, none of the cruisers is to remain in a reduced status for modernization for more than four years, and no more than six of the cruisers are to be in the program at any given time.[46]

In FY 2018, the Navy will continue to execute the "2-4-6" plan on seven of 11 cruisers.[47] By the end of FY 2017, the Navy will have inducted six cruisers into modernization.[48] Along with the USS *Anzio*, inducted in May 2017, the program includes *Cape St. George*, inducted in March 2017; *Cowpens* and *Gettysburg*, inducted in FY 2015; and *Chosin* and *Vicksburg*, inducted in FY 2016.[49]

In early 2016, Rear Admiral William Lescher, Deputy Assistant Secretary of the Navy for Budget, advanced an alternative to the current 2-4-6 model.[50] The alternative phased modernization plan in the FY 2017 budget request asked Congress to allow the Navy to put the remaining seven unmodernized cruisers into maintenance in FY 2017, arguing that doing so would save $3 billion in operating costs over the Future Years Defense Program. Congress had not agreed to this request as of the time this *Index* went to press.

The Navy's 12 landing ships (LSD), the *Whidbey Island*-class and *Harpers Ferry*-class amphibious vessels, will reach the end of their 40-year service lives in 2025 and are to be replaced by the next-generation LX(R) program, a ship that will be based on the *San Antonio* (LPD-17)-class amphibious ship.

Many of the other ships that the Navy sails are legacy platforms. Of the 18 classes of ships in the Navy, only seven are currently in production. For example, 66 percent of the Navy's attack submarines are *Los Angeles*-class submarines, an older platform that is being replaced with a more modern and capable *Virginia* class.[51]

The 30-year shipbuilding plan is not limited to programs of record and assumes procurement programs that have yet to materialize. Some of the Navy's ship designs in recent years, such as the *Gerald R. Ford*-class aircraft carrier, the *San Antonio*-class amphibious ship, and the Littoral Combat Ship, have proven to be substantially more expensive to build than the Navy originally estimated.[52] The first ship of any class is typically more expensive than early estimates project, which is not entirely surprising given the assumptions that must be made before actual construction begins. The Congressional Budget Office has reported that such estimates are off by 27 per cent, on average.[53] For that reason, the 30-year shipbuilding plan is often considered overly optimistic.

For example, the goal of 355 ships stated in the Navy's most recent 30-year plan includes an objective for 12 SSBN(X) *Columbia*-class submarines to replace the legacy *Ohio*-class submarine. Production of these 12 SSBN(X) submarines will require a significant portion of the SCN account if the overall budget is not increased.

The Navy's FY 2013 budget deferred the procurement of the lead boat from FY 2019 to FY 2021, with the result that "the Navy's SSBN force will drop to 11 or 10 boats for the period FY2029–FY2041."[54] This is something that the Navy will continue to have difficulty maintaining as it struggles to sustain, overhaul, modernize, and eventually retire the remainder of its legacy SSBN fleet. The *Columbia*-class ballistic missile submarine is "the Navy's top priority program"[55] and has been allocated almost $843 million in the Navy's FY 2018 request, or 4 percent of its total shipbuilding budget, for advanced procurement funding.[56]

The Navy's long-range strike capability derives from its ability to launch various missiles and combat aircraft. Of the two, naval aircraft are much more expensive and difficult to modernize as a class. Until the 1980s, the Navy operated several models of strike aircraft that included the F-14 Tomcat, A-6 Intruder, A-4 Skyhawk, and F/A-18 Hornet. The last of each of these aircraft were retired in 1997 (A-6); 2003 (A-4); and 2006 (F-14). Over the past 20 years, this variety has been winnowed to a single model: the F/A-18. The F/A-18A-D Legacy Hornet has served since 1983; it is out of production and currently flown by 13 Marine Corps squadrons, six Navy squadrons, the Naval Aviation Warfighting Development Center (NAWDC), and the Blue Angels.

The Navy is divesting itself of F/A-18 A-D variants and shifting to F/A-18 E/F Super Hornets, a newer and more capable version "that entered operational service with the U.S. Navy in 1999."[57] The F/A-18E/F Super Hornet has better range, greater weapons payload, and increased survivability over the F/A-18A-D Legacy Hornet.[58] The Navy is implementing efforts to extend the life of some of the older variants until the F-35C is fully fielded in the mid-2030s but plans to have a mix of the F-35C and F/A-18 E/F Super Hornets comprising its carrier-based strike aircraft capability.

The Navy's FY 2018 budget request includes $1.25 billion for 14 F/A-18E/F Super Hornets, and it plans to buy at least 80 more over the next five years in an attempt to mitigate shortfalls in its strike aircraft inventory.[59]

The Navy has been addressing numerous incidents, or physiological episodes (PE), of dizziness and blackouts by F/A-18 aircrews over the past five years. There were 57 such incidents in 2012 and 114 in 2016, and 52 were reported during the first half of 2017.[60] The Navy report data show that "41 percent of the total

FA-18 PEs have been attributed to breathing air delivery system (27 percent possible contamination; 11 percent aircrew oxygen system; 3 percent breathing air delivery component) and 24 percent are adjudicated to be the result of ECS component failure."[61] The report concludes that:

> To date, finding a solution to the U.S. Navy and U.S. Marine Corps' high performance jet aircraft PE challenge has proved elusive. The complexity of aircraft human–machine interfaces and the unforgiving environment in which aircrew operate will continue to generate PEs whenever systems do not operate as intended or human physiology is a factor. The number and severity of PEs can and must be dramatically reduced with a unified, systematic approach.[62]

The F-35C is the Navy's largest aviation modernization program. It is a fifth-generation fighter (all F/A-18 variants are considered fourth-generation) that will have greater stealth capabilities and state-of-the-art electronic systems, allowing it to communicate with multiple other platforms. The Navy plans to purchase 260 F-35Cs[63] (along with 67 F-35Cs for the Marine Corps[64]) to replace "a portion of the existing inventory of 546 Navy and Marine Corps F/A-18 A-D aircraft [that] will be flown through the mid-2030 timeframe."[65] The F-35C, however, will not replace all of the A-Ds.

The F-35 is supposed to be a more capable aircraft relative to the F/A-18, but at planned procurement levels of 260 aircraft, it will not be enough to make up for the Hornets that the Navy will need to replace. Transition to the F-35C is slated to begin in 2018, leading to the first operational deployment in 2021.[66]

In addition, like the other F-35 variants, the F-35C has faced development problems. The system has been grounded because of engine problems, and software development issues have threatened further delay. The aircraft also has grown more expensive through the development process. The Navy's FY 2018 budget request indicates that the service plans to buy four additional F-35Cs before the end of 2017.[67]

## Readiness

Although the Navy states that it can still deploy forces in accordance with GFMAP requirements, various factors indicate a continued decline in readiness over the past year. According to Admiral William Moran, Vice Chief of Naval Operations:

> [W]hile our first team on deployment is ready, our bench—the depth of our forces at home—is thin. It has become clear to me that the Navy's overall readiness has reached its lowest level in many years.
>
> There are three main drivers of our readiness problems: 1) persistent, high operational demand for naval forces; 2) funding reductions; and 3) consistent uncertainty about when those reduced budgets will be approved.
>
> The operational demand for our Navy continues to be high, while the fleet has gotten smaller. Between 2001 and 2015, the Navy was able to keep an average of 100 ships at sea each day, despite a 14 percent decrease in the size of the battle force. The Navy is smaller today than it has been in the last 99 years. Maintaining these deployment levels as ships have been retired has taken a significant toll on our sailors and their families as well as on our equipment.
>
> The second factor degrading Navy readiness is the result of several years of constrained funding levels for our major readiness accounts, largely due to fiscal pressures imposed by the Budget Control Act of 2011. Although the Bipartisan Budget Act of 2015 provided temporary relief, in FY 2017 the Navy budget was $5 billion lower than in FY 2016. This major reduction drove very hard choices, including the difficult decision to reduce readiness accounts by over $2 billion this year.
>
> The third primary driver of reduced readiness is the inefficiency imposed by the uncertainty around when budgets will actually be approved. The inability to adjust funding levels as planned, or to commit to longer-term contracts, creates additional work and drives up costs. This results in even less capability for any given dollar we invest, and represents yet another tax on our readiness. We are paying more money and spending more time to maintain a less capable Navy.[68]

Like the other services, the Navy has had to dedicate readiness funding to the immediate needs of various engagements around the globe, which means that maintenance and training for ships and sailors that are not deployed is not prioritized. Deferral of ship and aircraft depot maintenance because of inadequate funding or because public shipyards do not have sufficient capacity has had a ripple effect on the whole fleet. When ships and aircraft are finally able to begin depot maintenance, their material condition is worse than normal due to the delay and high OPTEMPO of the past 15 years. This in turn causes maintenance to take longer than scheduled, which leads to further delays in fleet depot maintenance and increases the demands placed on ships and aircraft that are still operational. The public shipyards are undermanned for the amount of work they need to do.

Correcting this will require sufficient and stable funding both to defray the costs of ship maintenance and to expand the workforce of the public (government) shipyards. These maintenance and readiness issues also affect the Navy's capacity by significantly reducing the numbers of operational ships and aircraft available to support the combatant commanders.

The FY 2018 budget seeks to increase the public shipyard workforce by more than 1,100 workers and to provide additional funding to private yards for submarine maintenance in order to lessen the workload on government yards.[69]

A Government Accountability Office (GAO) analysis of OFRP's performance since its implementation in 2014 compared to naval readiness of the recent past yielded mixed results. The GAO found that during the period from 2011 to implementation of OFRP, the Navy's deployment and maintenance schedules were in poor condition. The three aircraft carriers that have implemented OFRP "have not completed maintenance tasks on time, a benchmark that is crucial to meeting the Navy's employability goals. Further, of the 83 cruisers and destroyers, only 15 have completed a maintenance availability under OFRP."[70] The GAO found that these rates were better than before OFRP was implemented, but only slightly.

The Navy's aviation readiness is also suffering as a consequence of deferred maintenance, delayed modernization, and high OPTEMPO. The naval aviation community has made extreme efforts to gain every bit of readiness possible with the existing fleet, but even these efforts cannot solve the problems of too little money, too few usable assets, and too much work. As noted in Air Force testimony before the Tactical Air and Land Forces Subcommittee of the House Armed Services Committee in June 2017:

> Service life management efforts have extended the F-A-18 A-D beyond its original service life of 6,000 flight hours to 8,000 flight hours with select aircraft that may be extended up to 10,000 flight hours. Discovery of unanticipated corrosion on these legacy jets complicates depot throughput, and service life extensions for aircraft with more than 8,000 flight hours require High Flight Hour inspections, which furthers increases maintenance-man hours. These inspections assess the material condition of each aircraft and apply a unique combination of inspections and airframe modifications to maintain airworthiness certification. As of April 2017, 92 percent of the F/A-18 A-D fleet has over 6,000 flight hours and 24 percent have flown more than 8,000 flight hours; the highest flight hour airframe has attained over 9,799 hours.[71]

In short, Navy readiness levels are problematic. It is also worth noting again that the Navy's own readiness assessments are based on the ability to execute a strategy that assumes a force sizing construct that is smaller than the one prescribed by this *Index*.

### Scoring the U.S. Navy Capacity Score: Marginal

The Navy is unusual relative to the other services in that its capacity requirements must meet two separate objectives. First, during peacetime, the Navy must maintain a global

forward presence. This enduring peacetime requirement to maintain a constant presence around the world is the driving force behind ship force structure requirements: enough ships to ensure that the Navy can provide the necessary global presence.

On the other hand, the Navy also must be able to fight and win wars. In this case, the expectation is to be able to fight and win two simultaneous or nearly simultaneous MRCs. When thinking about naval combat power in this way, the defining metric is not necessarily a total ship count, but rather the carrier strike groups, amphibious ships, and submarines deemed necessary to win both the naval component of a war and the larger war effort by means of strike missions inland or cutting off the enemy's maritime access to sources of supply.

An accurate assessment of Navy capacity takes into account both sets of requirements and scores to the larger requirement.

It should be noted that the scoring in this *Index* includes the Navy's fleet of ballistic missile and fast attack submarines to the extent that they contribute to the overall size of the battle fleet and with general comment on the status of their respective modernization programs. Because of their unique characteristics and the missions they perform, their detailed readiness rates and actual use in peacetime and planned use in war are classified. Nevertheless, the various references consulted are fairly consistent, both with respect to the numbers recommended for the overall fleet and with respect to the Navy's shipbuilding plan.

The role of SSBNs (fleet ballistic missile submarines) as one leg of America's nuclear triad capability is well known; perhaps less well known are the day-to-day tasks undertaken by the SSN force, whose operations, which can include collection, surveillance, and support to the special operations community, often take place apart from the operations of the surface Navy.

**Two-MRC Requirement.** The primary elements of naval combat power during a major regional contingency operation derive from carrier strike groups (which include squadrons of strike aircraft and support ships) and amphibious assault capacity. Since the Navy is constantly deployed around the globe during peacetime, many of its fleet requirements are beyond the scope of the two-MRC construct, but it is nevertheless important to observe the historical context of naval deployments during a major theater war.

**Thirteen Deployable Carrier Strike Groups.** The average number of aircraft carriers deployed in the Korean War, Vietnam War, Persian Gulf War, and Operation Iraqi Freedom was between five and six. This correlates with the figures recommended in the 1993 Bottom-Up Review (BUR) and subsequent government force-sizing documents, each of which recommended at least 11 aircraft carriers.[72] Assuming that 11 aircraft carriers are needed to engage simultaneously in two MRCs, and assuming that the Navy ideally should have a 20 percent strategic reserve in order to avoid having to commit 100 percent of its carrier groups and account for scheduled maintenance, the Navy should have 13 CSGs.

The aircraft carrier is the centerpiece of a CSG, composed of one guided missile cruiser, two guided missile destroyers, one attack submarine, and a supply ship in addition to the carrier itself.[73] Therefore, based on the requirement for 13 aircraft carriers, the following numbers of ships are necessary for 13 deployable CSGs:

- 13 aircraft carriers,
- 13 cruisers,
- 26 destroyers, and
- 13 attack submarines.

**Thirteen Carrier Air Wings.** Each carrier deployed for combat operations was equipped with a carrier air wing, meaning that five to six air wings were necessary for each of those four major contingencies listed. The strategic documents differ slightly in this regard because

each document suggests one less carrier air wing than the number of aircraft carriers.

A carrier air wing usually includes four strike fighter squadrons.[74] Twelve aircraft typically comprise one Navy strike fighter squadron, so at least 48 strike fighter craft are required for each carrier air wing. To support 13 carrier air wings, the Navy therefore needs a minimum of 624 strike fighter aircraft.[75]

**Fifty Amphibious Ships.** The 1993 BUR recommended a fleet of 45 large amphibious vessels to support the operations of 2.5 Marine Expeditionary Brigades (MEBs). Since then, the Marine Corps has expressed a need to be able to perform two MEB-level operations simultaneously, which would require a fleet of 38 amphibious vessels. The 1996 and 2001 QDRs each recommended 12 "amphibious ready groups" (ARGs). One ARG typically includes one amphibious assault ship (LHA/LHD); one amphibious transport dock ship (LPD); and one dock landing ship (LSD).[76] Therefore, the 12-ARG recommendation equates to 36 amphibious vessels.

The number of amphibious vessels required in combat operations has declined since the Korean War, in which 34 amphibious vessels were used; 26 were deployed in Vietnam, 21 in the Persian Gulf War, and only seven in Operation Iraqi Freedom (which did not require as large a sea-based expeditionary force).[77] The Persian Gulf War is the most pertinent example for today because similar vessels were used, and modern requirements for an MEB most closely resemble this engagement.[78]

While the Marine Corps has consistently advocated a fleet of 38 amphibious vessels to execute its two-MEB strategy,[79] it is more prudent to field a fleet of at least 42 such vessels based on the Persian Gulf engagement. Similarly, if the USMC is to have a strategic reserve of 20 percent, the ideal number of amphibious ships would be 50.

**Total Ship Requirement.** The bulk of the Navy's battle force ships are not directly tied to a carrier strike group. Some surface vessels and attack submarines are deployed independently, which is often why their requirements exceed those of a CSG. The same can be said of the ballistic missile submarine (nuclear missiles) and guided missile submarine (conventional cruise missiles), which operate independently of an aircraft carrier.

This *Index* uses the benchmark set by previous government reports, especially the 1993 BUR, which was one of the most comprehensive reviews of military requirements. Similar Navy fleet size requirements have been echoed in follow-on reports.

The numerical values used in the score column refer to the five-grade scale explained earlier in this section, where 1 is "very weak" and 5 is "very strong." Taking the full Navy requirement of ships as the benchmark, the Navy's current battle forces fleet capacity of 276 ships retains a score of "marginal," as was the case in the *2017 Index*. Given the fact that the Navy has not updated its 30-year shipbuilding plan to reflect its new force structure objective, and in view of the impending need for a ballistic missile submarine replacement that could cost nearly half of the current shipbuilding budget per hull, the Navy's capacity score could fall to "weak" in the near future.

### Capability Score: Weak

The overall capability score for the Navy is "weak." This was consistent across all four components of the capability score: "Age of Equipment," "Capability of Equipment," "Size of Modernization Program," and "Health of Modernization Programs." Given the number of programs, ship classes, and types of aircraft involved, the details that informed the capability assessment are more easily presented in a tabular format as shown in the Appendix.

### Readiness Score: Marginal

The Navy's readiness score has returned to an assessment of "marginal," down from the *2017 Index*'s score of "strong." This assessment combines two major elements of naval readiness: the ability to consistently provide the required levels of presence around the globe and surge capacity. As elaborated below, the Navy's ability to maintain required presence in key

regions is "strong," but its ability to surge to meet combat requirements ranges from "weak" to "very weak" depending on how one defines the requirement. In both cases—presence and surge—the Navy is sacrificing long-term readiness to meet current demand.

The Navy has reported that it continues to meet GFMAP goals but at the cost of future readiness. The GAO reported in May 2016 that "[t]o meet heavy operational demands over the past decade, the Navy has increased ship deployment lengths and has reduced or deferred ship maintenance"[80] The GAO further found that the Navy's efforts to provide the same amount of forward presence with an undersized fleet have "resulted in declining ship conditions across the fleet" and have "increased the amount of time that ships require to complete maintenance in the shipyards."[81] There was no compelling evidence in 2017 that this condition has improved.

Though the Navy has been able to maintain a third of its fleet globally deployed, and although the OFRP has preserved readiness for individual hulls by restricting deployment increases, demand still exceeds the supply of ready ships needed to meet requirements sustainably. Admiral Moran expressed deep concern about the ability of the Navy to meet the nation's needs in a time of conflict in this exchange with Senator Joni Ernst (R–IA):

> Senator Ernst: ...If our Navy had to answer to two or more of the so-called four-plus-one threats today, could we do that?
>
> Admiral Moran: ...[W]e are at a point right now...that our ability to surge beyond our current force that's forward is very limited, which should give you a pretty good indication that it would be challenging to meet the current guidance to defeat and deny in two conflicts.[82]

As if to sharpen Admiral Moran's concerns, the Navy experienced a number of at-sea incidents—three ship collisions and one grounding—during 2017.[83] Admiral Richardson responded by ordering a "servicewide operational pause" to review practices throughout the fleet.[84] An investigation into the latest of these incidents was underway at the time of this writing, and observers have speculated that high operational tempo and lack of funding for adequate training have contributed to poor readiness across the Navy.[85]

The Navy's readiness as it pertains to providing global presence is rated as "marginal." The level of COCOM demand for naval presence and the fleet's ability to meet that demand is similar to that of 2017 but is increasingly challenged by the range of funding problems noted in this section. The Navy maintains its ability to forward deploy a third of its fleet and has been able to stave off immediate readiness challenges through the OFRP. However, continued problems in ship maintenance and an inadequate number of hulls to relieve pressure on the maintenance cycle are jeopardizing the Navy's ability to respond effectively to COCOM requirements for sustained presence, crisis support, and surge response in the event of a major conflict.

Without increased funding for further fleet recapitalization and improvements in shipyard maintenance capacity, the readiness of the Navy's fleet will remain compromised. Admiral Moran's concerns about the Navy's ability to handle two major crises are therefore worrisome.

### Overall U.S. Navy Score: Marginal

The Navy's overall score for the *2018 Index* is "marginal," the same as for the previous year. This was derived by aggregating the scores for capacity ("marginal"); capability ("weak"); and readiness ("marginal"). However, given the continued upward trends in OPTEMPO that have not been matched by similar increases in capacity or readiness funding, the Navy's overall score could degrade in the near future if the service does not recapitalize and maintain the health of its fleet more robustly than is now the case.

# U.S. Military Power: Navy

| | VERY WEAK | WEAK | MARGINAL | STRONG | VERY STRONG |
|---|---|---|---|---|---|
| Capacity | | | ✓ | | |
| Capability | | ✓ | | | |
| Readiness | | | ✓ | | |
| **OVERALL** | | | ✓ | | |

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