An Assessment of U.S. Military Power

America is a global power with global interests. Its military is meant first and foremost to defend America from attack. Beyond that, it is meant to protect Americans abroad, allies, and the freedom to use international sea, air, and space while retaining the ability to engage in more than one major contingency at a time. America must be able not only to defend itself and its interests, but also to deter enemies and opportunists from taking action that would challenge U.S. interests, a capability that includes preventing the destabilization of a region and guarding against threats to the peace and security of America’s friends.

As noted in the 2015 Index, however, the U.S. does not have the right force to meet a two-major regional contingency (MRC) requirement and is not ready to carry out its duties effectively. Consequently, the U.S. risks seeing its interests increasingly challenged and the world order it has led since World War II undone.

How to Think About Sizing Military Power

Military power begins with the people and equipment used to conduct war: the weapons, tanks, ships, airplanes, and supporting tools such as communications systems that make it possible either for one group to impose its will on another or to prevent such an outcome from happening.

However, simply counting the number of people, tanks, or combat aircraft that the U.S. possesses would be irrelevant because it would lack context. For example, the U.S. Army might have 100 tanks, but to accomplish a specific military task, 1,000 or more tanks might be needed or none at all. It might be that the terrain on which a battle is fought is especially ill-suited to tanks or that the tanks one has are inferior to the enemy’s. The enemy could be quite adept at using tanks, or his tank operations might be integrated into a larger employment concept that leverages the supporting fires of infantry and airpower, whereas one’s own tanks are poorly maintained, the crews are ill-prepared, or one’s doctrine is irrelevant.

Success in war is partly a function of matching the tools of warfare to a specific task and employing those tools effectively in the conditions of the battle. Get these wrong—tools, objective, competency, or context—and you lose.

Another key element is the military’s capacity for conducting operations: how many of the right tools—people, tanks, planes, or ships—it has. One might have the right tools and know how to use them effectively but not have enough to win. Given that one cannot know with certainty beforehand just when, where, against whom, and for what reason a battle might be fought, determining how much capability is needed is an exercise of informed, but not certain, judgment.

Further, two different combatants can use the same set of tools in radically different ways to quite different effects. The concept of employment matters. Concepts are developed to account for numbers,
capabilities, material readiness, and all sorts of other factors that enable or constrain one's actions, such as whether one fights alone or alongside allies, on familiar or strange terrain, or with a large, well-equipped force or a small, poorly equipped force.

All of these factors and a multitude of others bear upon the outcome of any military contest. Military planners attempt to account for them when devising requirements, developing training and exercise plans, formulating war plans, and providing advice to the President in his role as Commander in Chief of U.S. military forces.

Measuring hard combat power in terms of its adequacy in capability, capacity, and readiness to defend U.S. vital interests is hard, especially in such a limited space as this Index, but it is not impossible. Regardless of the difficulty of determining the adequacy of one's military forces, the Secretary of Defense and the military services have to make decisions every year when the annual defense budget request is submitted to Congress.

The adequacy of hard power is affected most directly by the resources the nation is willing to invest. While that investment decision is informed to a significant degree by an appreciation of threats to U.S. interests and the ability of a given defense portfolio to protect U.S. interests against such threats, it is not informed solely by such considerations; hence the importance of clarity and honesty in determining just what is needed in hard power and the status of such hard power from year to year.

Administrations take various approaches to determine the type and amount of military power needed and, by extension, the amount of money and other resources to commit to it. After defining the national interests to be protected, the Department of Defense can use worst-case scenarios to determine the maximum challenges the U.S. military might have to overcome. Another way is to redefine what constitutes a threat. By taking a different view of major actors as to whether they pose a meaningful threat and of the extent to which friends and allies have an ability to assist the U.S. in meeting security objectives, one can arrive at different conclusions about necessary military strength.

For example, one Administration might view China as a rising, belligerent power bent on dominating the Asia-Pacific. Another Administration might view China as an inherently peaceful, rising economic power, with the expansion of its military capabilities a natural occurrence commensurate with its strengthening status. The difference between these views can have a dramatic impact on how one thinks about U.S. defense requirements. So, too, can policymakers amplify or downplay risk to justify defense budget decisions.

There can also be strongly differing views on requirements for operational capacity. Does the country need enough for two major combat operations (MCOs) at roughly the same time or just enough for a single major operation plus some number of lesser cases? To what extent should “presence” tasks—the use of forces for routine engagement with partner countries or simply to be on hand in a region for crisis response—be additive to or a subset of a military force sized to handle two major regional conflicts? How much value should be assigned to advanced technologies as they are incorporated into the force?

Where to Start

There are references that one can use to help sort through the variables and arrive at a starting point for assessing the adequacy of today's military posture: government studies and historical experience. The government occasionally conducts formal reviews meant to inform decisions on capabilities and capacities across the Joint Force relative to the threat environment (current and projected) and evolutions in operating conditions, the advancement of technologies, and aspects of U.S. interests that may call for one type of military response over another.

The 1993 Bottom-Up Review (BUR), conducted by then-Secretary of Defense Les Aspin, is one such frequently cited example. Secretary Aspin recognized “the dramatic changes that [had] occurred in the world as a result of the end of the Cold War and the dissolution of the Soviet Union...[altering] America's security needs” and driving an imperative “to reassess all of our defense concepts, plans, and programs from the ground up.”

The BUR formally established the requirement that U.S. forces should be able “to achieve decisive victory in two nearly simultaneous major regional conflicts [MRCs] and to conduct combat operations characterized by rapid response and a high probability of success, while minimizing the risk of significant American casualties.” Thus was formalized the two-MRC standard.

Dr. Daniel Gouré, in his 2015 Index essay “Building the Right Military for a New Era: The Need for an Enduring Analytic Framework,” noted that various
Administrations have redefined force requirements based on their perceptions of what was necessary to protect U.S. interests. In an attempt to formalize the process, and perhaps to have a mechanism by which to exert influence on the executive branch in such matters, Congress mandated that each incoming Administration must conduct a comprehensive strategic review of the global security environment, articulate a relevant strategy suited to protecting and promoting U.S. security interests, and recommend an associated military force posture.

The Quadrennial Defense Reviews (QDR) have been conducted since 1997, accompanied in 1997, 2010, and 2014 by independent National Defense Panel (NDP) reports that have reviewed and commented on them. Both sets of documents purport to serve as key assessments, but analysts have come to minimize their value, regarding them as justifications for executive branch policy preferences (the QDR reports) or overly broad, generalized commentaries (the NDP reports) that lack substantive discussion about threats to U.S. interests, a credible strategy for dealing with them, and the actual ability of the U.S. military to meet national security requirements.

**Correlation of Forces as a Factor in Force Sizing**

During the Cold War, the U.S. used the Soviet threat as its primary reference for what it needed in hard power. At that time, the correlation of forces—a comparison of one force against another to determine strengths and weaknesses—was highly symmetrical. U.S. planners compared tanks, aircraft, and ships against their direct counterparts in the opposing force. These comparison assessments drove the sizing, characteristics, and capabilities of fleets, armies, and air forces.

The evolution of guided, precision munitions and the rapid technological advancements in surveillance and targeting systems, however, have made comparing combat power more difficult. What was largely a platform v. platform model has shifted somewhat to a munitions v. target model.

The proliferation of precise weaponry increasingly means that each round, bomb, rocket, missile, and even individual bullet (in some instances) can hit its intended target, thus decreasing the number of munitions needed to prosecute an operation. It also means that the lethality of an operating environment increases significantly for the people and platforms involved. We are now at the point where one must consider how many “smart munitions” the enemy has when thinking about how many platforms and people are needed to win a combat engagement instead of focusing primarily on how many ships or airplanes the enemy can bring to bear against one’s own force.

In one sense, increased precision and the technological advances now being incorporated into U.S. weapons, platforms, and operating concepts make it possible to do far more with fewer assets than ever before. Platform signature reduction (stealth) makes it harder for the enemy to find and target them, while the increased precision of weapons makes it possible for fewer platforms to hit many more targets. Additionally, the ability of the U.S. Joint Force to harness computers, modern telecommunications, space-based platforms—such as for surveillance, communications, positioning-navigation-timing (PNT) support from GPS satellites—and networked operations potentially means that smaller forces can have far greater effect in battle than at any other time in history. But these same advances also enable enemy forces. And certain military functions—such as seizing, holding, and occupying territory—may require a certain number of soldiers no matter how state-of-the-art their equipment may be.

With smaller forces, each individual element of the force represents a greater percentage of its combat power. Each casualty or equipment loss takes a larger toll on the ability of the force to sustain high-tempo, high-intensity combat operations over time, especially if the force is dispersed across a wide theater or across multiple theaters of operation.

As advanced technology has become more affordable, it has become more accessible for nearly any actor, state or non-state. Consequently, it may be that the outcomes of future wars will pivot to a much greater degree on the skill of the forces and their capacity to sustain operations over time than they will on some great disparity in technology. If so, readiness and capacity will take on greater importance than absolute advances in capability.

All of this illustrates the difficulties of and need for exercising judgment in assessing the adequacy of America’s military power. Yet without such an assessment, all that we are left with are the quadrennial strategic reviews (which are subject to filtering and manipulation to suit policy interests); annual budget submissions (which typically favor desired military programs at presumed levels of affordability
and are therefore necessarily budget-constrained); and leadership posture statements that often simply align with executive branch policy priorities.

The U.S. Joint Force and the Art of War

This section of the Index, on military capabilities, assesses the adequacy of the United States’ defense posture as it pertains to a conventional understanding of “hard power,” defined as the ability of American military forces to engage and defeat an enemy’s forces in battle at a scale commensurate with the vital national interests of the U.S. While some hard truths in military affairs are appropriately addressed by math and science, others are not. Speed, range, probability of detection, and radar cross-section are examples of quantifiable characteristics that can be measured. Specific future instances in which U.S. military power will be needed, the competency of the enemy, the political will to sustain operations in the face of mounting deaths and destruction, and the absolute amount of strength needed to win are matters of judgment and experience, but they nevertheless affect how large and capable a force one might need.

In conducting the assessment, we accounted for both quantitative and qualitative aspects of military forces, informed by an experience-based understanding of military operations and the expertise of external reviewers.

Military effectiveness is as much an art as it is a science. Specific military capabilities represented in weapons, platforms, and military units can be used individually to some effect. Practitioners of war, however, have learned that combining the tools of war in various ways and orchestrating their tactical employment in series or simultaneously can dramatically amplify the effectiveness of the force committed to battle.

Employment concepts are exceedingly hard to measure in any quantitative way, but their value as critical contributors in the conduct of war is undeniable. How they are utilized is very much an art-of-war matter, learned through experience over time.

What Is Not Being Assessed

In assessing the current status of the military forces, this Index uses the primary references used by the military services themselves when they discuss their ability to employ hard combat power. The Army’s unit of measure is the brigade combat team (BCT), while the Marine Corps structures itself by battalions. For the Navy, it is the number of ships in its combat fleet, and the Air Force’s most consistent reference is total number of aircraft, sometimes broken down into the two primary sub-types of fighters and bombers.

Obviously, this is not the totality of service capabilities, and it certainly is not everything needed for war, but these measures can be viewed as surrogate measures that subsume or represent the vast number of other things that make these “units of measure” possible and effective in battle. There is an element of proportionality or ratio related to these measures that drives other aspects of force sizing. For example:

When planning air operations, the Air Force looks at the targets to be serviced and the nature of the general operation to be supported and then accounts for aircraft and munitions needed (type and quantity) and the availability and characteristics of airfields relevant to the operation. From this, they calculate sorties, distances, flight hours, fuel consumption, number of aircraft in a given piece of airspace, and a host of other pieces of information to determine how many aerial refueling tankers will be needed.

Joint Force detailed planning for operations determines how much equipment, manpower, and supplies need to be moved from one point to another and how much more will be needed to sustain operations: Logistics is a very quantitative business.

U.S. Transportation Command (TRANSCOM) calculates the amount of lift required in cargo planes, sealift shipping, long-haul road movements, and trains.

The Marine Corps operationally thinks in terms of Marine Air-Ground Task Forces (MAGTFs) that are composed of command, ground, air, and logistics elements. The size of a MAGTF varies depending on the mission to be accomplished, but the nucleus is normally (though not always) the ground combat element that typically ranges from a battalion to a division. The amount of airpower, logistics support, and transportation (amphibious, sealift, and airlift) required to execute the operation extends from there.
The Navy thinks in terms of the number of surface combatants, the nature of operations, and proximity to ports to drive planning for all of the combat logistics force vessels that are needed to make it happen.

The Army provides a host of “common user support” capabilities to the overall force that can include operating ports, theater-wide trucking and rail operations, large-scale fuel and ammunition storage and distribution, engineering and construction services, and general supply support.

Institutional elements like recruiting are necessary to generate the force in the first place, the multitude of installations at which units are based, training facilities, acquisition workforce, and the military’s medical infrastructure.

The point here is that the military spear has a great deal of shaft that makes it possible for the tip to locate, close with, and destroy its target, and there is a rough proportionality between shaft and spear tip. Thus, in assessing the basic units of measure for combat power, one can get a sense of what is likely needed in the combat support, combat service support, and supporting establishment echelons. The scope of this Index does not extend to analysis of everything that makes hard power possible; it focuses on the status of the hard power itself.

This assessment also does not account for the Reserve and Guard components of the services; it focuses only on the Active component. Again, the element of proportion or ratio figures prominently. Each service determines the balance among its Active, Reserve, and National Guard elements (only the Army and Air Force have Guard elements; the Navy and Marine Corps do not) based on factors that include cost of the respective elements, availability for operational employment, time needed to respond to an emergent crisis, the allocation of roles between the elements, and political considerations. This assessment looks at the baseline requirement for a given amount of combat power that is readily available for use in a major combat operation—something that is usually associated with the Active components of each service.

The Defense Budget and Strategic Guidance

As for the defense budget, ample discussion of budget issues is scattered throughout (mainly as they pertain to acquisition programs), but the budget itself—whether for the military services individually, the Joint Force as a whole, or the totality of the defense establishment—is actually a reflection of the importance that the U.S. places on the modernity, capacity, and readiness of the force rather than a measure of the capability of the force itself. In other words, the budget itself does not tell us much about the posture of the U.S. military.

The baseline budget for defense in FY 2015 was $522 billion, which paid for the forces (manpower, equipment, training); enabling capabilities (things like transportation, satellites, defense intelligence, and research and development); and institutional support (bases and stations, facilities, recruiting, and the like). The baseline budget does not pay for the cost of ongoing operations, which is captured in supplemental funding known as OCO (overseas contingency operations).

It is true that absent a significant threat to the survival of the country, the U.S. will always balance expenditures on defense with spending in all of the other areas of government activity that it thinks are necessary or desirable. Some have argued that a defense budget indexed to a percent of gross domestic product (GDP) is a reasonable reference, but a fixed percentage of GDP does not accurately reflect national security requirements per se any more than the size of the budget alone correlates to levels of capability. It is possible that a larger defense budget could be associated with less military capability if the money were allocated inappropriately or spent wastefully, and the fact that the economy changes over time does not necessarily mean that defense spending should increase or decrease in lockstep by default.

Ideally, defense requirements are determined by identifying national interests that might need to be protected with military power; assessing the nature of threats to those interests and what would be needed to defeat those threats (and how much that would cost); and then determining what the country can afford (or is willing) to spend. Any difference between assessed requirements and affordable levels of spending on defense would constitute risk to U.S. security interests.

This Index enthusiastically adopts this latter approach: interests, threats, requirements, resulting force, and associated budget. Spending less than the amount needed to maintain a two-MRC force results in policy debates over where to accept risk: force modernization, the capacity to conduct
large-scale or multiple simultaneous operations, or force readiness.

The decision to fund national defense commensurate with interests and prevailing threats is a policy decision reflecting national priorities and acceptance of risk. This Index assesses the ability of the nation’s military forces to protect vital national security interests within the world as it is so that the debate over funding hard power is better informed.

In fiscal year (FY) 2015, debate about how much funding to allocate to defense was affected by a larger political debate that pitted those who wanted to see an overall reduction in federal spending against those who pushed for higher levels of spending for defense and those who wanted to see any increase in defense spending matched by commensurate increases in domestic spending. Efforts to repeal or substantially modify the Budget Control Act (BCA) were stymied by those who feared losing a mechanism that disciplines federal spending. Yet there appears to be a consensus that more money is needed for defense, given the BCA requests for FY 2016 funding from the White House and both chambers of Congress.

The FY 2015 defense budget was only $1 billion more than the FY 2014 budget. Adjusted for inflation, this is actually a 1 percent cut. The President’s budget request for FY 2016 was $561 billion, which would represent an almost 6 percent real increase over FY 2015. For comparison, President Obama’s 2012 defense budget, the last under former Secretary of Defense Robert Gates, proposed spending $624 billion on defense in FY 2015. A bipartisan consensus, as seen in the National Defense Panel report in 2014, has identified the so-called Gates budget as the minimum the United States should be spending on national defense. As seen in Chart 3, the FY 2015 enacted budget and the FY 2016 budget proposal are well below this minimum.

The restrictions placed on defense spending by the BCA continue to be a major concern of the military service chiefs, who have consistently testified about the damage these restrictions are causing to readiness, modernization, and capacity for
operations. As FY 2015 ended, the budget debates about FY 2016 had not been resolved, but it appears unlikely that any resolution will bring the national defense budget close to even the minimum levels proposed by the Gates budget.

“Purpose” as a Driver in Force Sizing

The Joint Force is used for a wide range of purposes, only one of which is major combat operations. Fortunately, such events have been rare, averaging roughly 15–20 years between occurrences. In between (and even during) such occurrences, the military is used in support of regional engagement, crisis response, strategic deterrence, and humanitarian assistance, as well as providing support to civil authorities and U.S. diplomacy.

The U.S. Unified Combatant Commands, or COCOMS (EUCOM, CENTCOM, PACOM, SOUTHCOM, and AFRICOM), all have annual and long-term plans through which they engage with countries in their assigned regions. These engagements range from very small unit training events with the forces of a single partner country to larger bilateral and sometimes multilateral military exercises. In 2015, these engagements included training and assisting Iraqi military forces and participating in joint training exercises with NATO members. Such events help to establish working relationships with other countries, acquire a more detailed understanding of regional political–military dynamics and on-the-ground conditions in areas of interest, and signal U.S. security interests to friends and competitors.

To support such COCOM efforts, the services provide forces that are based permanently in respective regions or that operate in them temporarily on a rotational basis. To make these regional rotations possible, the services must maintain a base force sufficiently large to train, deploy, support, receive back, and make ready again a stream of units ideally numerous enough to meet validated COCOM demand.

The ratio between time spent at home and time spent away on deployment for any given unit is known as OPTEMPO (operational tempo), and each service attempts to maintain a ratio that both gives units enough time to educate, train, and prepare their forces and allows the individuals in a unit to maintain some semblance of a healthy home and family life. This ensures that units are fully prepared for the next deployment cycle and that servicemembers do not become “burned out” or suffer adverse consequences in their personal lives because of excessive deployment time.

Experience has shown that a ratio of at least 3:1 is sustainable, meaning three periods of time at home for every period deployed. (If a unit is to be out for six months, it will be home for 18 months before deploying again.) Obviously, a service needs a sufficient number of people, units, ships, and planes to support such a ratio. If peacetime engagement were the primary focus for the Joint Force, the services could size their forces to support these forward-based and forward-deployed demands.

Thus, the size of the total force must necessarily be much larger than any sampling of its use at any point in time.

In contrast, sizing a force for major combat operations is an exercise informed by history—how much force was needed in previous wars—and then shaped and refined by analysis of current threats, a range of plausible scenarios, and expectations about what the U.S. can do given training, equipment, employment concept, and other factors. The defense establishment must then balance “force sizing” between COCOM requirements for presence and engagement with the amount thought necessary to win in likely war scenarios.

Inevitably, compromises are made that account for how much military the country is willing to buy. Generally speaking:

- The Army sizes to major warfighting requirements.
- The Marine Corps focuses on crisis response demands and the ability to contribute to one major war.
- The Air Force attempts to strike a balance that accounts for historically based demand across the spectrum since air assets are shifted fairly easily from one theater of operations to another (“easily” being a relative term when compared to the challenge of shifting large land forces), and any peacetime engagement typically requires some level of air support.
- The Navy is driven by global presence requirements. To meet COCOM requirements for a continuous fleet presence at sea, the Navy must have three to four ships in order to have one on station. To illustrate with a simplistic example, a commander who wants one U.S. warship stationed off
the coast of a hostile country needs the use of four ships from the fleet: one on station, one that left station and is traveling home, one that just left home and is traveling to station, and one that fills in for one of the other ships when it needs maintenance or training time.

This report focuses on the forces required to win two major wars as the baseline force-sizing metric. The military’s effectiveness as a deterrent against opportunistic competitor states, and a valued training partner in the eyes of other countries, derives from its effectiveness (proven or presumed) in winning wars.

Our Approach

With this in mind, we assessed the state of military affairs for U.S. forces as it pertains to their ability to deliver hard power against an enemy in three areas:

- **Capability,**

- **Capacity,** and

- **Readiness.**

**Capability.** Examining the capability of a military force requires consideration of:

- The proper tools (material and conceptual) of sufficient design, performance characteristics, technological advancement, and suitability for it to perform its function against an enemy force successfully.

- The sufficiency of armored vehicles, ships, airplanes, and other equipment and weapons to win against the enemy.

- The appropriate variety of options to preclude strategic vulnerabilities in the force and give flexibilities to battlefield commanders.

- The degree to which elements of the force reinforce each other in covering potential vulnerabilities, maximizing strengths, and gaining greater effectiveness through synergies that are not possible in narrowly stovepiped, linear approaches to war.

The capability of the U.S. Joint Force was on ample display in its decisive conventional war victory over Iraq in liberating Kuwait in 1991 and later in the conventional military operation to liberate Iraq in 2003. Aspects of its capability have also been seen in numerous other operations undertaken since the end of the Cold War. While the conventional combat aspect at the “pointy end of the spear” of power projection has been more moderate in places like Yugoslavia, Somalia, Bosnia and Serbia, and Kosovo, and even against the Taliban in Afghanistan in 2001, the fact that the U.S. military was able to conduct highly complex operations thousands of miles away in austere, hostile environments and sustain those operations as long as required is testament to the ability of U.S. forces to do things that few if any other countries can do.

A modern-day “major combat operation” along the lines of those upon which Pentagon planners base their requirements would feature a major opponent possessing modern integrated air defenses; naval power (surface and subsurface); advanced combat aircraft (to include bombers); a substantial inventory of short-range, medium-range, and long-range missiles; current-generation ground forces (tanks, armored vehicles, artillery, rockets, and anti-armor weaponry); cruise missiles; and (in some cases) nuclear weapons. Such a situation involving an actor capable of threatening vital national interests would present a challenge that is comprehensively different from the challenges that the U.S. Joint Force has faced in past decades.

In fact, 2015 saw a shift in debate within military circles about the extent to which the U.S. military is ready for major conventional warfare, given its focus on counterinsurgency, stability, and advise-and-assist operations over the past decade. The Army in particular has noted the need to reengage in training and exercises that feature larger-scale combined arms maneuver operations, especially to ensure that its higher headquarters elements are up to the task.

This *Index* ascertains the relevance and health of military service capabilities by looking at such factors as average age of equipment, generation of equipment relative to the current state of competitor efforts as reported by the services, and the status of replacement programs meant to introduce more updated systems as older equipment reaches the end of its programmed service life. While some of the information is quite quantitative, other factors could be considered judgment calls made by
acknowledged experts in the relevant areas of interest or as addressed by senior service officials when providing testimony to Congress or addressing specific areas in other official statements.

It must be determined whether the services possess capabilities that are relevant to the modern combat environment.

**Capacity.** The U.S. military must have a sufficient quantity of the right capability or capabilities. There is a troubling but fairly consistent trend that characterizes the path from requirement to fielded capability within U.S. military acquisition. Along the way to acquiring the capability, several linked things happen that result in far less of a presumed “critical capability” than supposedly was required.

- The manufacturing sector attempts to satisfy the requirements articulated by the military.
- “Unexpected” technological hurdles arise that take longer and much more money to solve than anyone envisioned.
- Programs are lengthened, and cost overruns are addressed (usually with more money).
- Then the realization sets in that the country either cannot afford or is unwilling to pay the cost of acquiring the total number of platforms originally advocated. The acquisition goal is adjusted downward (if not canceled), and the military finally fields fewer platforms (at higher unit cost) than it originally said it needed to be successful in combat.

As deliberations proceed toward a decision on whether to reduce planned procurement, they rarely focus on and quantify the increase in risk that accompanies the decrease in procurement.

Something similar happens with force structure size: the number of units and total number of personnel the services say they need to meet the objectives established by the Commander in Chief and the Secretary of Defense in their strategic guidance. The Marine Corps has stated that it needs 27 infantry battalions to fully satisfy the validated requirements of the regional Combatant Commanders, yet current funding for defense has the Corps at 23 on a path to 21. The Army was on a build toward 48 brigade combat teams, but funding reductions now have it at 35 on its way to 24 BCTs by 2019—half the number that the Army originally thought necessary—if sequestration remains law.

Older equipment can be updated with new components to keep it relevant, and commanders can employ fewer units more expertly for longer periods of time in an operational theater to accomplish an objective. At some point, however, sheer numbers of updated, modern equipment and trained, fully manned units are likely necessary to win in battle against a credible opponent when the crisis is profound enough to threaten a vital interest.

Capacity (numbers) can be viewed in at least three ways: compared to a stated objective for each category by each service, compared to amounts required to complete various types of operations across a wide range of potential missions as measured against a potential adversary, and as measured against a set benchmark for total national capability. This *Index* employs as a benchmark the two-MRC metric.

The two-MRC benchmark for force sizing is the minimum standard for U.S. hard-power capacity because one will never be able to employ 100 percent of the force at the same time. Some percentage of the force will always be unavailable because of long-term maintenance overhaul (for Navy ships in particular); unit training cycles; employment in myriad engagement and small-crisis response tasks that continue even during major conflicts; and the need to keep some portion of the force uncommitted to serve as a strategic reserve.

The historical record shows that the U.S. Army commits 21 BCTs on average to a major conflict; thus, a two-MRC standard would require 42 BCTs available for actual use. But an Army built to field only 42 BCTs would also be an Army that could find itself entirely committed to war, leaving nothing back as a strategic reserve, to replace combat losses, or to handle other U.S. security interests. Again, this *Index* assesses only the Active component of the services, though with full awareness that the Army also has Reserve and National Guard components that together account for half of the total Army. The additional capacity needed to meet these “above two-MRC requirements” could be handled by these other components or mobilized to supplement Active-component commitments. In fact, this is how the Army thinks about meeting operational demands and is at the heart of the current debate within the total Army about the roles and contributions of the various Army components. A similar situation exists with the Air Force and Marine Corps.
## Historical U.S. Force Allocation

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ARMY</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Troop Deployment During Engagement</td>
<td>206,307</td>
<td>219,275</td>
<td>267,000</td>
<td>99,664</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>Divisions*</td>
<td>6</td>
<td>7</td>
<td>4</td>
<td>1</td>
<td>10</td>
<td>10</td>
<td>11</td>
<td>11</td>
<td>18</td>
<td>11</td>
<td>10</td>
<td>10</td>
<td>n/a</td>
</tr>
<tr>
<td>Reserve Component Divisions Total for Strategic Documents</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>5</td>
<td>8</td>
<td>8</td>
<td>8</td>
<td>7</td>
<td>8</td>
<td>8</td>
<td>n/a</td>
<td></td>
</tr>
<tr>
<td>Total Army End Strength During Engagement, During Year of Strategy Document Active</td>
<td>1,313,750</td>
<td>1,113,333</td>
<td>738,000</td>
<td>499,000</td>
<td>572,000</td>
<td>492,000</td>
<td>481,000</td>
<td>505,000</td>
<td>566,000</td>
<td>566,000</td>
<td>550,000</td>
<td>490,000</td>
<td>490,000</td>
</tr>
<tr>
<td>Total Active End Strength Recommendations</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>482,400</td>
<td>n/a</td>
<td>1,106,000</td>
<td>600,000</td>
<td>450,000</td>
<td>490,000</td>
</tr>
<tr>
<td><strong>NAVY</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Fleet During Engagement</td>
<td>904</td>
<td>770</td>
<td>529</td>
<td>297</td>
<td>346</td>
<td>310</td>
<td>n/a</td>
<td>n/a</td>
<td>346</td>
<td>350</td>
<td>n/a</td>
<td></td>
<td>n/a</td>
</tr>
<tr>
<td>Aircraft Carriers</td>
<td>6</td>
<td>5</td>
<td>6</td>
<td>5</td>
<td>12</td>
<td>12</td>
<td>12</td>
<td>11</td>
<td>11</td>
<td>11</td>
<td>11</td>
<td>11</td>
<td>n/a</td>
</tr>
<tr>
<td>Carrier Air Wings</td>
<td>6</td>
<td>5</td>
<td>6</td>
<td>5</td>
<td>12</td>
<td>11</td>
<td>11</td>
<td>n/a</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>n/a</td>
</tr>
<tr>
<td>Large Surface Combatants</td>
<td>37</td>
<td>14</td>
<td>30</td>
<td>23</td>
<td>124</td>
<td>116</td>
<td>116</td>
<td>n/a</td>
<td>84-88</td>
<td>n/a</td>
<td>120</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Small Surface Combatants</td>
<td>16</td>
<td>47</td>
<td>16</td>
<td>9</td>
<td>41</td>
<td>36</td>
<td>36</td>
<td>n/a</td>
<td>14-28</td>
<td>n/a</td>
<td>n/a</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Attack Submarines</td>
<td>4</td>
<td>0</td>
<td>12</td>
<td>12</td>
<td>55</td>
<td>50</td>
<td>55</td>
<td>n/a</td>
<td>53-55</td>
<td>50</td>
<td>51</td>
<td></td>
<td>n/a</td>
</tr>
<tr>
<td>Amphibious Vessels</td>
<td>34</td>
<td>26</td>
<td>21</td>
<td>7</td>
<td>41</td>
<td>36</td>
<td>36</td>
<td>n/a</td>
<td>29-31</td>
<td>n/a</td>
<td>38</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Combat Logistics and Support Ships</td>
<td>28</td>
<td>29</td>
<td>45</td>
<td>42</td>
<td>65</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>58</td>
<td>n/a</td>
<td>75</td>
<td></td>
<td>n/a</td>
</tr>
<tr>
<td>Fighter/Attack Squadrons</td>
<td>21</td>
<td>43</td>
<td>22</td>
<td>24</td>
<td>33</td>
<td>30</td>
<td>30</td>
<td>n/a</td>
<td>30</td>
<td>30</td>
<td>30</td>
<td></td>
<td>n/a</td>
</tr>
<tr>
<td><strong>MARINE CORPS</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Troop Deployment During Engagement</td>
<td>33,531</td>
<td>44,661</td>
<td>90,000</td>
<td>66,166</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td></td>
<td>n/a</td>
</tr>
<tr>
<td>Active Divisions*</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>4</td>
<td>3</td>
<td>3</td>
<td>n/a</td>
<td>3</td>
<td>n/a</td>
<td>n/a</td>
<td></td>
<td>n/a</td>
</tr>
<tr>
<td>Reserve Divisions</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>n/a</td>
<td>1</td>
<td>n/a</td>
<td>n/a</td>
<td></td>
<td>n/a</td>
</tr>
<tr>
<td>Marine Expeditionary Force</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>n/a</td>
<td>3</td>
<td>3</td>
<td>2</td>
<td>n/a</td>
<td></td>
</tr>
<tr>
<td>Air Wings Active/Reserve</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>4</td>
<td>n/a</td>
<td>4</td>
<td>n/a</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Marine Corps End Strength During Engagement by Year of Strategy Document</td>
<td>187,000</td>
<td>289,000</td>
<td>196,250</td>
<td>178,000</td>
<td>174,000</td>
<td>174,000</td>
<td>173,000</td>
<td>180,000</td>
<td>202,000</td>
<td>202,000</td>
<td>196,000</td>
<td>182,000</td>
<td>182,000</td>
</tr>
<tr>
<td>Total Recommended End Strength</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>175,000</td>
<td>n/a</td>
<td>243,000</td>
<td>202,000</td>
<td>182,000</td>
<td>182,000</td>
</tr>
<tr>
<td><strong>AIR FORCE</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bombers or Bomber Squadrons**</td>
<td>21</td>
<td>23</td>
<td>3</td>
<td>4</td>
<td>200</td>
<td>187</td>
<td>112</td>
<td>96</td>
<td>180</td>
<td>200</td>
<td>96**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fighter Squadrons</td>
<td>26</td>
<td>30</td>
<td>30</td>
<td>30</td>
<td>54</td>
<td>54</td>
<td>46</td>
<td>n/a</td>
<td>42</td>
<td>66</td>
<td>54</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Active Fighter Wings</td>
<td>7</td>
<td>8</td>
<td>10</td>
<td>10</td>
<td>13</td>
<td>12+</td>
<td>15</td>
<td>n/a</td>
<td>20</td>
<td>20</td>
<td>9</td>
<td>n/a</td>
<td></td>
</tr>
<tr>
<td>Reserve Fighter Wings</td>
<td>7</td>
<td>8</td>
<td>12</td>
<td>12</td>
<td>8</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>7</td>
<td>n/a</td>
<td></td>
<td></td>
<td>n/a</td>
</tr>
<tr>
<td>Airlift/Tankers</td>
<td>239</td>
<td>167</td>
<td>388</td>
<td>293</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>1023</td>
<td>1023</td>
<td>1,000</td>
<td>954</td>
<td>n/a</td>
</tr>
</tbody>
</table>

* Figures for engagements are numbers deployed; figures for documents are totals.
** Figures for Air Force bombers for Korean War, Vietnam War, Persian Gulf War, and Iraq are bomber squadrons. All other figures are bombers.
*** 2014 QDR prescribed nine heavy bomber squadrons, equaling 96 aircraft.
The balance among Active, Reserve, and Guard elements is beyond the scope of this study. Our focus here is on establishing a minimum benchmark for the capacity needed to handle a two-MRC requirement.

We conducted a review of the major defense studies (1993 BUR, QDR reports, and independent panel critiques) that are publicly available, as well as modern historical instances of major wars (Korea, Vietnam, Gulf War, Operation Iraqi Freedom), to see whether there was any consistent trend in U.S. force allocation. The results of our review are presented in Table 6. To this we added 20 percent, both to account for forces and platforms likely to be unavailable and to provide a strategic reserve to guard against unforeseen demands. Summarizing the totals, this Index concluded that a two-MRC capable Joint Force would consist of:

- **Army:** 50 BCTs.
- **Navy:** 346 ships, 624 strike aircraft.
- **Air Force:** 1,200 fighter/attack aircraft.
- **Marine Corps:** 36 battalions.

America’s security interests require the services to have the capacity to handle two major regional conflicts successfully.

**Readiness.** The consequences of the current sharp reductions in funding mandated by sequestration have caused military service officials, senior DOD officials, and even Members of Congress to warn of the dangers of recreating the “hollow force” of the 1970s when units existed on paper but were staffed at reduced levels, minimally trained, and woefully equipped. To avoid this, the services have traded quantity/capacity and modernization to ensure that what they do have is “ready” for employment.

As was the case in 2014, the service chiefs have stated that current and projected levels of funding continue to take a toll on the ability of units to maintain sufficient levels of readiness across the force. Some units have reduced manning. Though progress has been made in some areas due to supplemental funding provided by Congress in 2014, the return of full sequestration threatens to undo these gains. For example:

- General Raymond T. Odierno, former Chief of Staff of the Army, has stated that the Army can maintain only one-third of its force at acceptable levels of readiness. Each shuttering of a BCT incurs a lengthy restart cost. Specifically, “it takes approximately 30 months to generate a fully manned and trained Regular Army BCT,” and “senior command and control headquarters... take even longer.”

- General Mark A. Welsh, Chief of Staff of the Air Force, has noted that if the Air Force shut off all utilities at all major installations for 12 years or quit flying for nearly two years, it would save $12 billion—enough to buy back just one year of sequestered funds.

- The Navy is accepting risk in its ability to meet defense strategy requirements according to Admiral Jonathan Greenert, Chief of Naval Operations. He has testified that under current spending limitations, “ships will arrive late to a combat zone, engage in conflict without the benefit of markedly superior combat systems, sensors and networks, or desired levels of munitions inventories.” Also, the Navy can now surge only one-third of the force required by Combatant Commanders to meet contingency requirements.

It is one thing to have the right capabilities to defeat the enemy in battle. It is another thing to have a sufficient amount of those capabilities to sustain operations over time and many battles against an enemy, especially when attrition or dispersed operations are significant factors. But sufficient numbers of the right capabilities are rather meaningless if the force is unready to engage in the task.

**Scoring.** In our final assessments, we tried very hard not to convey a higher level of precision than we think is achievable using unclassified, open-source, publicly available documents; not to reach conclusions that could be viewed as based solely on assertions or opinion; and not to rely solely on data and information that can be highly quantified, since simple numbers do not tell the whole story.

We believe the logic underlying our methodology is sound. This Index drew from a wealth of public testimony from senior government officials, from the work of recognized experts in the defense and national security analytic community, and from historical instances of conflict that seemed most appropriate to this project. This Index considered several questions, including:

<table>
<thead>
<tr>
<th>Operation</th>
<th>Indep.</th>
<th>2-MRC</th>
<th>2014</th>
<th>2014</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1993</td>
<td>2006</td>
<td>BUR</td>
<td>QDR</td>
</tr>
<tr>
<td>Iraq</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vietnam</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gulf War</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Freedom</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Army:**
- Divisions: 6, 7, 4, 1, 10, 10, 10, 11
- Reserve Component Divisions Total
- Total Army End Strength During Engagement, During Year of Strategy Document: 1,313,750, 1,113,333, 738,000, 499,000, 572,000, 492,000, 481,000, 505,000, 566,000, 566,000, 550,000, 490,000, 490,000
- Total Active End Strength Recommendations: n/a, n/a, n/a, n/a, n/a, n/a, n/a, 482,400, n/a, 1,106,000, 600,000, 450,000, 490,000

**Navy:**
- Total Fleet During Engagement: 904, 770, 529, 297, 346, 310, n/a, n/a, n/a, 346, 350, n/a, 346
- Aircraft Carriers: 6, 5, 6, 5, 12, 12, 11, 11, 11, 11, 11, n/a
- Carrier Air Wings: 6, 5, 6, 5, 12, 11, 11, n/a, 10, 10, 10, 10, n/a
- Large Surface Combatants: 37, 14, 30, 23, 124, 116, 116, n/a, 84–88, n/a, 120, 92, n/a
- Attack Submarines: 4, 0, 12, 12, 55, 50, 55, n/a, 53–55, 55, 50, 51, n/a
- Amphibious Vessels: 34, 26, 21, 7, 41, 36, 36, n/a, 29–31, n/a, 38, 33, n/a
- Combat Logistics and Support Ships: 28, 29, 45, 42, 65, n/a, n/a, n/a, 58, n/a, 75, n/a, n/a

**Marine Corps:**
- Total Troop Deployment During Engagement: 33,531, 44,661, 90,000, 66,166, n/a, n/a, n/a, n/a, n/a, n/a, n/a, n/a, n/a
- Marine Expeditionary Force: 1, 1, 1, 2, 3, 3, 3, n/a, 3, 3, 3, 2, n/a
- Total Marine Corps End Strength During Engagement by Year of Strategy Document: 187,000, 289,000, 196,250, 178,000, 174,000, 174,000, 173,000, 180,000, 202,000, 202,000, 196,000, 182,000, 182,000
- Total Recommended End Strength: n/a, n/a, n/a, n/a, n/a, n/a, n/a, 175,000, n/a, 243,000, 202,000, 182,000, 182,000
- Bombers or Bomber Squadrons: 21, 23, 3, 4, 200, 187, 112, n/a, 96, 180, 200, 96, n/a
- Active Fighter Wings: 7, 8, 10, 10, 13, 12+, 15, n/a, 20, 20, 9, n/a
- Reserve Fighter Wings: 7, 8, 12, n/a, n/a, n/a, 7, n/a
- Airlift/Tankers: 239, 167, 388, 293, n/a, n/a, n/a, n/a, 1023, 1023, 1,000, 954, n/a
• How does one place a value on the combat effectiveness of such concepts as Air-Sea Battle, Network-centric Operations, Global Strike, or Joint Operational Access?

• Is it entirely possible to assess accurately (1) how well a small number of newest-generation ships or aircraft will fare against a much larger number of currently modern counterparts when (2) U.S. forces are operating thousands of miles from home, (3) orchestrated with a particular operational concept, and (4) the enemy is leveraging a “home field advantage” that includes strategic depth and much shorter and perhaps better protected lines of communication and (5) might be pursuing much dearer national objectives than the U.S. such that the political will to conduct sustained operations in the face of mounting losses might differ dramatically?

• How does one neatly quantify the element of combat experience, the health of a supporting workforce, the value of “presence and engagement operations,” and the related force structures and deployment/employment patterns that presumably deter war or mitigate its effects if it does occur?

This *Index* focused on the primary purpose of military power—to defeat an enemy in combat—and the historical record of major U.S. engagements for evidence of what the U.S. defense establishment has thought was necessary to execute a major conventional war successfully. To this we added the two-MRC benchmark, on-the-record assessments of what the services themselves are saying about their status relative to validated requirements, and the analysis and opinions of various experts in and out of government who have covered these issues for many years.

Taking it all together, we rejected scales that would imply extraordinary precision and settled on a scale that conveys broader characterizations of status that range from very weak to very strong. Ultimately, any such assessment is a judgment call informed by quantifiable data, qualitative assessments, thoughtful deliberation, and experience. We trust that our approach makes sense, is defensible, and is repeatable.

### U.S. Military Power

<table>
<thead>
<tr>
<th></th>
<th>VERY WEAK</th>
<th>WEAK</th>
<th>MARGINAL</th>
<th>STRONG</th>
<th>VERY STRONG</th>
</tr>
</thead>
<tbody>
<tr>
<td>Army</td>
<td>✔</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Navy</td>
<td></td>
<td>✔</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Air Force</td>
<td></td>
<td>✔</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Marine Corps</td>
<td></td>
<td>✔</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nuclear</td>
<td></td>
<td>✔</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>OVERALL</td>
<td></td>
<td>✔</td>
<td></td>
<td>✔</td>
<td>✔</td>
</tr>
</tbody>
</table>
U.S. Army

The U.S. Army is America’s primary land warfare component. Although it addresses all types of operations across the range of ground force employment, its chief value to the nation is its ability to defeat and destroy enemy land forces in battle.

As is the case with all of the other services, the U.S. Army has sought ways to absorb the budget cuts driven by the Budget Control Act (BCA) of 2011 in a responsible manner while still meeting the missions outlined in the 2012 Defense Strategic Guidance (DSG). Fiscal challenges have strained the Army’s ability to meet the national security requirements outlined in the DSG even as it has worked to find a proper balance among readiness, modernization, and end strength. The Army has continued to reduce its end strength and accept greater risk to its modernization programs to preserve readiness levels—an even more challenging problem given that its budget in FY 2015 was $4 billion lower than it was in FY 2014.

From a height of 566,000 in FY 2011, the Army’s end strength has shrunk to 490,000 Active Army soldiers in FY 2015. The ongoing debate between the White House and Congress (and within Congress) over funding levels as constrained by the BCA will determine whether the Army is able to sustain a projected end strength of 450,000—the minimum force level required to execute the DSG—or must reduce its end strength even further to 420,000 soldiers. It should be noted that in July 2015, the Army announced that it would accelerate its troop reduction timeline, shedding 40,000 soldiers by the end of FY 2018 to arrive at the 450,000 minimum outlined in the DSG. (Since these cuts are not in effect in FY 2015, they do not factor into the Army scoring for the 2016 Index.)

Operationally, the Army has 140,130 soldiers forward stationed across 150 countries. This is a slight decline from the previous year’s level of 150,090 soldiers. Of these 140,130 soldiers, approximately 45,000 are actively engaged in named operations, with the Army maintaining less than 8,000 soldiers in Afghanistan, a dramatic decline from the 32,000 stationed there in 2014.

Capacity

In FY 2015, total Army end strength was 1,042,000 soldiers: 490,000 Active soldiers, 202,000 in the Army Reserve, and 350,000 in the Army National Guard. In FY 2015, all soldiers in the Active Component were paid for in the base budget. This is unlike FY 2014, where a portion of personnel costs was paid through the Overseas Contingency Operations (OCO) budget function.

The Army also refers to its size in terms of brigade combat teams (BCTs). BCTs are the basic “building blocks” for employment of Army combat forces. They are normally employed within a larger framework of U.S. land operations but are sufficiently equipped and organized so that they can conduct independent operations as circumstances demand. A BCT averages 4,500 soldiers in strength depending on...
its variant: Stryker, Armored, or Infantry. A Stryker BCT is a mechanized infantry force organized around the Stryker ground combat vehicle (GCV). Armored BCTs are the Army’s principal armored unit and employ the Abrams main battle tank and the M2 Bradley fighting vehicle. An Infantry BCT is a highly maneuverable motorized unit.

The Army also has a separate air component organized into combat aviation brigades (CABs), which can also operate independently.27 CABs are made up of Army rotorcraft, such as the AH-64 Apache, and perform various roles including attack, reconnaissance, and lift.

CABs and Stryker, Infantry, and Armored BCTs make up the Army’s main combat force, but they do not make up the entirety of the Army. About 90,000 troops form the “Institutional Army” and provide support, such as preparing and training troops for deployments and overseeing military schools and Army educational institutions.28 The troops constituting the “Institutional Army” cannot be reduced at the same ratio as BCTs or CABs, and the Army plans to insulate these soldiers from drawdown and restructuring proposals in order to “retain a slightly more senior force in the Active Army to allow growth if needed.”29 In addition, a great number of functional or multi-functional support brigades provide air defense, engineering, explosive ordnance disposal (EOD), military police, military intelligence, and medical support among other types of battlefield support for BCTs.

While end strength is a valuable metric in understanding Army capacity, counting BCTs is a more telling measure of actual hard-power capacity. In concert with the end strength reduction to 490,000 soldiers, the Active Army underwent brigade restructuring that decreased the number of BCTs from 38 to 32 by the end of FY 2015.30 As a part of this reorganization, the Army is also adding a third maneuver battalion to its infantry and armored BCTs by the end of FY 2015.31 Additionally, all BCTs will receive additional engineer and fire support capabilities (i.e., additional 105mm and/or 155mm howitzers).32 In FY 2015, the Active Army retained 13 CABs, and the Army National Guard maintained eight CABs,33 although under the Aviation Restructure Initiative, two more CABs are expected to be inactivated from the Active Component by the end of the fiscal year.34

The reduction in end strength in the past year has had a disproportionate effect on BCTs. To illustrate, the Active Army has been downsized from 45 BCTs (552,100 soldiers) in FY 2013 to 32 BCTs (490,000 soldiers) in FY 2015. Thus, a 12 percent reduction in troop numbers resulted in a 29 percent reduction in BCTs. The Army Chief of Staff told the Senate Armed Services Committee in March 2015 that the Army can meet the missions outlined in the 2012 DSG with this current force size, but he also warned that the continuation of sequestration would prevent the Army from executing the DSG.35

**Capability**

The Army’s main combat platforms are ground vehicles and rotorcraft. The M1A1 Abrams and M2 Bradley vehicles are used in Armored BCTs, and Stryker BCTs, as one would expect, are equipped with Stryker vehicles. Infantry BCTs rely on the inventory of M113 armored personnel carriers (APCs). CABs are made up of Army helicopters including AH-64 Apaches, UH-60 Black Hawks, and CH-47 Chinooks.

Overall, the Army’s equipment inventory is relatively healthy. While some equipment has been worn down by usage in Afghanistan and Iraq, the Army has undertaken a “reset” initiative that is discussed below in the readiness section. The bulk of Army vehicles are young because of recent remanufacture programs for the Abrams and Bradley that have extended the service life of both vehicles. For example, the M1A1 Abrams main battle tank has recently been completely upgraded and is now only 5.5 years old.36 The Army also maintains an inventory of battlefield-tested and reliable rotorcraft, including its UH-60 Black Hawks, AH-64 Apaches, and CH-47 Chinooks.

The Army has been methodically replacing the oldest variants of its rotorcraft and upgrading others that still have plenty of airframe service life. Today, the UH-60M, which is a newer version of the UH-60A, makes up more than half of the total UH-60 inventory. Similarly, the Chinook, the Army’s heavy-lift helicopter, is expected to remain in service until 2030.

In addition to the viability of today’s equipment, the military must ensure the health of future programs. While future modernizing programs are not “current hard power capabilities” that can be applied against an enemy force, they are a significant indicator of a service’s overall fitness for sustained combat operations: The service may be able to engage an enemy but be forced to do so with aging equipment
and no program in place to maintain viability or endurance in sustained operations.

The U.S. military services are continually assessing how best to stay a step ahead of competitors, whether to modernize the force today with currently available technology or wait to see what their investments in research and development produce years down the road. Technologies mature and proliferate, becoming more accessible to a wider array of actors over time. U.S. forces will be challenged by state and non-state competitors that will leverage the latest developments in matériel, computing, platform sciences, and designs.

The Army is currently undertaking several modernization programs to replace or improve its ground combat vehicles and current rotorcraft fleet. However, budget reductions levied in previous years have significantly affected modernization, with Research and Development, Acquisition, and Procurement accounts all experiencing cuts. In fact, “the Army has ended 20 programs, delayed 125 and restructured 124.” For example, current and projected budget pressures led the Army to cancel the ground combat vehicle program, which was intended to replace the M2 Bradley fighting vehicle, to free funding for its readiness account.

The Army’s most high-profile joint service Major Defense Acquisition Program (MDAP) is the Joint Light Tactical Vehicle (JLTV), a program shared with the Marine Corps. Intended to combine the protection offered by Mine Resistant Ambush Protected Vehicles (MRAPs) with the mobility of the original unarmored High Mobility Multipurpose Wheeled Vehicle (HMMWV), the JLTV is a follow-on to the HMMWV (also known as the Humvee) and features design improvements that will increase its survivability against anti-armor weapons and the now commonly found improvised explosive device (IED) threat.

The JLTV is still in development, but the Army plans to procure a total of 49,099 vehicles, replacing only a portion of the current HMMWV fleet. The program is heavily focused on vehicle survivability and is not intended as a one-for-one replacement of the HMMWV. In fact, the JLTV is intended to take on high-risk missions traditionally tasked to the HMMWV, to include scouting and troop transport in adverse environments, guerrilla ambushes, and artillery bombardment. Several issues, including changed requirements and some technical obstacles in the early development phases, have delayed the program from its originally intended schedule by about one year. In FY 2015, the Army purchased 184 JLTVs, and the proposed funds for FY 2016 supported a low rate initial production (LRIP) decision in 2015 and selection of the vendor for production.

Other Army MDAPs of note in FY 2016 include the M1A2 Abrams, M2 Bradley, M109A6 Paladin 155mm Howitzers, and Stryker. These platforms will undergo various structural modifications and upgrades that are needed to keep them ready to meet future contingencies.

The M1A2 is currently being enhanced with Vehicle Health Management and Power Train Improvement & Integration Optimization in order to upgrade the tank’s reliability, durability, and fuel efficiency so that it can provide ground forces with superior battlefield firepower. Similarly, the M109A6 is being outfitted with the Paladin Integrated Management (PIM) program, which consists of a new drivetrain and suspension components, in order to sustain the platform’s utility in combat through 2050. Planned upgrades for the Stryker include a major Engineering Change Proposal (ECP) aimed at improving mechanical and electrical power, an enhanced chassis, and electronics network.

The Army’s rotorcraft modernization programs do not include any new platform designs. Instead, the Army is upgrading current rotorcraft to account for more advanced systems.

The Army’s main modernization programs are not encumbered by any major problems, but there is concern about the future direction of Army capability. For example, cancellation of the Ground Combat Vehicle (GCV) program raises the question of replacing the M2 Bradley. Although the DOD officially cancelled the GCV program, the possibility of replacing the M2 Bradley at some point in the future could still be considered, as the Army set aside $150 million in funding for GCV research and development in FY 2015 despite the absence of a budget request for the program for that year. Updating the capability that the Bradley Infantry Fighting Vehicle provides remains a requirement, and the Army is currently “refining concepts, requirements, and key technologies” in preparation for a future modernization program.

The Army is also continuing development efforts for the Armored Multi-Purpose Vehicle (AMPV) to replace its 1960s-vintage M113 Armored Personnel Carrier. The AMPV will have five mission modules, including General Purpose, Medical Treatment, Medical Evacuation, Mortar Carrier, and Mission
Command. Because it is still in development and has not yet entered LRIP, the AMPV is not yet an MDAP and is not included in this year’s scoring.

**Readiness**

As a result of sequestration in FY 2013, the Army experienced a shortage in readiness funding that resulted in “significantly and rapidly degraded Army readiness,” which the Secretary of the Army and the Army Chief of Staff testified would “translate directly into FY 14 and beyond.” Although a higher level of funding in FY 2014 allowed for some degree of budget relief, the Army received $5.1 billion less in funding dedicated to rebuilding its readiness in FY 2015. Army Vice Chief of Staff General Daniel Allyn explained that:

[T]o operate under this budget, we are significantly reducing key installation services, individual training events, and modernization to such an extent as to jeopardize future readiness and quality of life. For example, Logistics Readiness Centers were underfunded by $350 million in FY15, which covers funding for dining facilities, contract operations at ammo supply points, central issue facilities, maintenance, laundry and dry cleaning operations. In addition to the effect on Soldier quality of life, these cuts force Commanders to divert Soldiers from training to perform logistics tasks.

Recognizing the risk that degraded readiness introduces into its ability to respond to an emergent threat, the Army chose to prioritize operational readiness over other expenditures, such as near-term modernization, for FY 2015. A return to “full spectrum combat readiness” would require sustained investment and a projected timeline stretching to FY 2023.

This tiered readiness strategy means that only a limited number of BCTs are available and ready for decisive action. Accordingly, the tiered readiness model employed by the Army has resulted in approximately one-third of the 32 Active BCTs being ready for contingency operations in FY 2015. This is an improvement from early in 2014 when 80 percent of the Army was considered to be “at a lower readiness level.” As stated, the Army had prioritized funding in readiness over capacity and modernization, allowing it to regain some of the readiness lost as a result of sequestration the prior year.

The Army uses Combat Training Centers (CTCs) to train its forces to desired levels of proficiency. Specifically, the mission of the CTC Program is to “provide realistic Joint and combined arms training” to approximate actual combat and increase “unit readiness for deployment and warfighting.” In FY 2015, the Army financed 19 CTC rotations, the same number as in FY 2014, despite lower levels of funding. Although utilizing CTCs continues to be a priority for the Army, resource constraints have limited investment in readiness.

In FY 2015, the Army supported the Army Contingency Force (ACF) initiative that is developing “a contingency response force which provides Combatant Commanders an initial response capability that can achieve early objectives for most contingency plans.” Under the ACF model, the Army maintains readiness for only 24 of the 60 total BCTs maintained by the Active, National Guard, and Reserve Components, which “receive sufficient funding to conduct training at CTCs and home station.” The other 36 BCTs maintained by the Total Army are limited to “minimum Individual/Crew/Squad resourcing levels through sufficient Training Support Systems.” The aforementioned numbers can be misleading, as the Active Component maintains only 32 BCTs in total and realistically maintains only about 30 percent of them at acceptable levels of combat readiness.

Another key factor in readiness is sustainment of equipment. At the most basic level, a unit’s equipment must work when the unit is deployed. As a result of extensive combat usage in Afghanistan and the lingering effects of nearly a decade of combat operations in Iraq, the Army has continued with its reset program to restore used equipment to desired capability or to replace worn-out equipment for use in future engagements. In 2014, the Army estimated that it would require three years of reset funding “after redeployment of the last piece of equipment from theater” to complete redeployment and retrograde operations.

Reduced funding throughout FY 2013, as a consequence of sequestration, forced the Army to postpone the reset of several pieces of equipment, totaling “700 vehicles, 28 aircraft, and 2,000 weapons” in 2014. However, the Army was able to synchronize equipment retrograde out of Afghanistan efficiently in 2014, and “retrograde operations remain on schedule” in 2015. Furthermore, after identifying “potential requirement reductions in contractor logistics and training support” and reducing depot maintenance, the Army was able to enhance
“the capability of its prepositioned stocks program” without raising the associated costs.\textsuperscript{20} If the necessary funding is again reduced by the BCA, the Army’s efforts to recover from recent operations and prepare for the future will be further stymied.

**Scoring the U.S. Army**

**Capacity Score: Weak**

Historical evidence shows that, on average, the Army needs 21 brigade combat teams to fight one major regional conflict. Based on a conversion of roughly 3.5 BCTs per division, the Army deployed 21 BCTs in Korea, 25 in Vietnam, 14 in the Persian Gulf War, and around four in Operation Iraqi Freedom—an average of 16 BCTs (or 21 if the much smaller OIF contingency is excluded). In the 2010 Quadrennial Defense Review, the Obama Administration recommended a force capable of deploying 45 active BCTs. Previous government force-sizing documents discuss Army force structure in terms of divisions; they consistently advocate for 10–11 divisions, which equates to roughly 37 active BCTs.

Considering the varying recommendations of 35–45 BCTs and the actual experience of nearly 21 BCTs deployed per major engagement, 42 BCTs would be needed to fight two MRCs.\textsuperscript{71} Taking into account the need for a strategic reserve, the Active Army force should also include an additional 20 percent of the 42 BCTs.

- **Two-MRC Benchmark:** 50 brigade combat teams.
- **Actual 2015 Level:** 32 brigade combat teams.

The Army’s current Active Component BCT capacity meets 64 percent of the two-MRC benchmark and thus is scored as “weak.”

**Capability Score: Marginal**

The Army’s aggregate capability score remains “marginal.” While the Army will continue to pursue a model of tiered readiness with the aim of improving, if only slightly, troop readiness levels in FY 2015 over the previous year, the service’s overall capability score remains static due to continued reductions to end strength, which degrades capability. Capability is further diminished by the fact that the Army now has fewer soldiers deployed around the world than it has had in recent years.

Additionally, in spite of progress with the JLTV and AMPV, subsequent budget reductions and continuing resolutions have led to inadequate and short-sighted funding for the development of future modernization programs, negatively affecting platform innovation and modernization. These subsequent reductions have set back the Army’s development of future capabilities needed to remain dominant in any operational environment.

This aggregate score is a result of “marginal” scores for “Age of Equipment,” “Size of Modernization Programs,” and “Health of Modernization Programs.” The Army scored “weak” for “Capability of Equipment.”

**Readiness Score: Weak**

Only 12 Active BCTs were ready for action according to official Army testimony by the Vice Chief of Staff in March 2015.\textsuperscript{72} The Army had 32 BCTs; therefore, roughly a third of the Active Army was considered ready for combat. For that reason, this Index assesses Army readiness as “weak.” However, it should be noted that the Vice Chief of Staff also reported in March that of the BCTs fully trained for “decisive action operations,” the readiness of nine had been consumed in support of ongoing operations, which means that only three were uncommitted and ready for use.\textsuperscript{73} With this in mind, actual readiness is therefore likely dangerously close to nearing a state of “very weak.”

**Overall U.S. Army Score: Weak**

The Army’s overall score is calculated based on an unweighted average of its capacity, capability, and readiness scores. The average score was 2.3; thus, the overall Army score is “weak.” This was derived from the aggregate score for capacity (“weak”); capability (“marginal”); and readiness (“weak”).
## U.S. Military Power: Army

<table>
<thead>
<tr>
<th></th>
<th>VERY WEAK</th>
<th>WEAK</th>
<th>MARGINAL</th>
<th>STRONG</th>
<th>VERY STRONG</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capacity</td>
<td>✔️</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Capability</td>
<td>✔️</td>
<td>✔️</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Readiness</td>
<td>✔️</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>OVERALL</strong></td>
<td>✔️</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
U.S. Navy

The Navy’s mandate is “to be where it matters, when it matters.” As the military’s primary maritime arm, the Navy enables the United States to project military power in the maritime and air domains, a critical capability in war, crisis response, and peacetime engagement missions. Unlike land forces (or even, to a large extent, air forces), which are tethered to a set of fixed, larger-scale support bases, the Navy is able to shift its presence wherever needed so long as the world’s oceans and seas permit. 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.

Three key documents inform the Navy as to the level of its day-to-day fleet requirements: the 2012 Defense Strategic Guidance (DSG), the fiscal year (FY) 2015 Global Force Management Allocation Plan (GFMAP), and the 2015 update to “A Cooperative Strategy for 21st Century Seapower.” 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 FY 2015 GFMAP, which states the force presence needed around the world as determined by the combatant commanders (COCOMs) and the Secretary of Defense.

This past year, the Navy was able to avert some of the foreseen challenges caused by budget cuts as a result of legislative action; however, as Admiral Jonathan Greenert, Chief of Naval Operations (CNO), testified in his March 2015 posture statement, the Navy was “compelled to further reduce the capacity of weapons and aircraft, slow modernization, and delay upgrades to all but the most critical shore infrastructure” due to continued budget shortfalls of $11 billion.

Capacity

For the Navy, capacity is measured 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 considered to be directly related to its combat missions.

Last year, the Navy attempted to change how it counted its “battle force” fleet by justifying the inclusion of hospital ships and certain smaller craft that previously had not been counted. Congress added language to the FY 2015 National Defense Authorization Act that prevented this new counting rule from going into effect. The language clarified a battle force ship as “any commissioned ship built or armed for naval combat or any naval ship designed to provide support to combatant ships and other naval operations. Such term does not include patrol coastal ships, non-commissioned combatant craft specifically designed for combat roles, or ships
that are designated for potential mobilization.”

This subsequently prevented 12 vessels (two hospital ships and 10 forward-deployed patrol craft) from being counted in the battle force fleet. As a consequence, the battle force fleet declined from 282 as of the time the 2015 Index was published to 271 as of the time the 2016 Index was being written. This rule change accounts in part for the major fluctuation in the fleet between the 2015 and 2016 Indexes, which also changed due to normal ship commissionings and retirements that occur annually.

In 2015, the Navy increased its battle force requirement to 308 ships, two more than the previous year. This figure is derived from the 2014 Force Structure Analysis, the DSG, and the GFMAP. The additional two ships in the fleet requirement are an LPD-17 amphibious ship and a Mobile Landing Platform vessel. Congress added funding for the amphibious ship in FY 2013 and FY 2015; it had not been requested by the Navy. While this may seem excessive since the Navy did not officially request a 12th LPD-17 ship, the Navy’s amphibious fleet is currently well below the Navy and Marine Corps program of record requirement (34 hulls); therefore, the addition of an unrequested LPD-17 contributes to the Navy’s broader amphibious vessel needs. The highest ship count in the past five years was 288 in FY 2010.

The “biggest shortfall” assessed in the 2016 Index is the same as in the 2015 edition: “small surface combatants: Littoral Combat Ships, frigates, and mine countermeasures (MCM) ships.”

The main driver of this gap is the retirement of all remaining Oliver Hazard Perry-class frigates by the end of FY 2015 (September 2015). Of the larger battle force ships (including destroyers, cruisers, amphibious vessels, and aircraft carriers), the aircraft carrier fleet currently has a shortfall of one vessel (10 instead of 11), but that is considered to be a temporary condition that will be remedied in early 2016.

The carrier gap resulted from the delayed delivery of the first Ford-class carrier, which was supposed to enter the fleet as the USS Enterprise was decommissioned in 2012. The USS Gerald R. Ford is now expected to be commissioned in March 2016. Other shortfalls are due to underinvestment in the Shipbuilding and Conversion, Navy (SCN) budget to procure new hulls quickly enough to increase the size of the Navy.

Without significant funding increases, it appears unlikely that the Navy will reach its own capacity goals for the foreseeable future. Due to expected funding shortfalls relative to fleet goals, “the Navy projects that the fleet would experience a shortfall in small surface combatants from FY2016 through...”
FY2027, a shortfall in attack submarines from FY2025 through FY2036, and a shortfall in large surface combatants (i.e., cruisers and destroyers) from FY2036 through at least FY2045.94

In December 2014, the Congressional Budget Office (CBO) calculated that the Navy’s 306-ship fleet goal would cost $20.7 billion annually, well above the historical average of $15.7 billion per year.95 Using its own cost estimates, the CBO estimated that the Navy would be able to purchase 69 fewer ships over a 30-year period, including two fewer aircraft carriers, 17 fewer attack submarines, and six fewer amphibious ships. Although the CBO had not published its assessment of the FY 2016 shipbuilding request as of the time the 2016 Index was being written, the Navy’s FY 2016 request of $16.6 billion also falls well below the $20.7 billion level that the CBO assesses as necessary to reach fleet goals.96

As important as the total fleet size is, the Navy must also consider the number of ships that are forward deployed to meet operational demands. Not all ships in the battle force are at sea at the same time. The majority of ships are 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. Striking a balance between deploying ships to meet operational demands and keeping them in port to perform needed maintenance and provide relief to sailors is a constant challenge.

Today, the Navy has 95 ships deployed globally—just over 35 percent of the total available fleet (a 1 percent decline since last year’s assessment).97 Note that this slight decline in percentage of ships deployed to the total battle force fleet is driven partly by the more significant decline in the total fleet from the past year (as previously noted, down from 282 ships to 271 ships). The percent decrease in presence around the globe, using the forward-deployed ship count in 2014 (104) and that of 2015 (95) is therefore roughly 9 percent.98

The Navy has tried to increase forward presence by emphasizing non-rotational deployments: having a ship “home-ported” overseas or keeping the ship forward stationed.99

- **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.100

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 necessary to deploy ships to distant theaters.101 A key example of the use of this practice is the Navy’s constant forward deployment 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 with the USS *Ronald Reagan* sailing there to replace it.102 The *George Washington*, stationed at Yokosuka since 2008, left to undergo its midlife refueling and complex overhaul (RCOH).

The Navy maintains that it currently will be able to meet the FY 2015 GFMAP requirements and 10 missions outlined in the DSG. However, Admiral Greenert has acknowledged that budget shortfalls over the past few years, under Budget Control Act of 2011 (BCA) caps and otherwise, have “forced the Navy to accept significant risk in key mission areas, notably if the military is confronted with a technologically advanced adversary or forced to deny the objective of an opportunistic aggressor in a second region while engaged in a major contingency.”103 This statement refers to a sizing construct that enables the U.S. military to win a major contingency operation in one region of the world while holding off or deterring another adversary from creating another major engagement. Note that this sizing construct is below the one prescribed in this Index: one that would enable the U.S. military to win two major operations nearly simultaneously.

### Capability

Scoring the U.S. Navy’s capability is not just a matter of counting the fleet. The quality of the battle force is also important in determining the strength of the Navy.

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 operational concepts like...
the often discussed Air-Sea Battle would be effective in a conflict. This assessment would then have to be replicated for each potential conflict. While this is a necessary exercise and one in which the military currently engages, 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, and whether or not modernization programs will maintain the fighting edge of the fleet. The Navy has several classes of ships that are nearing the end of their lifespan, and this will precipitate a consolidation of ship classes in the battle force.

This year, the Navy will retire its entire fleet of Oliver Hazard Perry-class guided missile frigates. The Perry-class is to be replaced by the new Littoral Combat Ship (LCS), but some naval analysts have suggested that the LCS lacks the firepower of the frigate. In 2015, the Navy modified its LCS program to add more firepower to future hulls, and it will be referring to these upgunned LCSs as frigates beginning in FY 2019. This modification resulted from a restructuring of the LCS program initiated in 2014 by Secretary of Defense Chuck Hagel. The upgrades that the Navy says will give this future block of LCS/frigates capabilities closer to those of the Perry-class frigates include “over-the-horizon surface to surface missile and additional weapon systems and combat system upgrades” and “increased survivability [through] incorporating additional self-defense capabilities and increased hardening of vital systems and vital spaces.”

On March 31, 2015, the final Tarawa-class amphibious ship, the USS Peleliu, was decommissioned. The Austin-class amphibious ships will be retiring soon as well. In the 2020s, the last Avenger-class mine countermeasures ships and Los Angeles-class attack submarines will also go out of service.

The Navy is attempting to put the Ticonderoga-class cruiser fleet into temporary layup status in order to extend this class’s fleet service time into the 2030s, even though these ships average 24.2 years out of an expected 35-year service life. In early 2015, for the second year in a row (after Congress pushed back on the 2014 attempt), the Navy proposed a plan to put some of these cruisers in temporary layup status. The proposal issued in the Navy’s FY 2016 budget request would mean that “two cruisers would enter in a modernization cycle each year, and no cruisers will remain in layup for more than four years with no more than six cruisers out of service at one time,” according to Rear Admiral William Lescher, Deputy Assistant Secretary of the Navy for Budget. Driven by budget shortfalls, this plan is an attempt (as was the previous year’s) to keep 11 of the 22 commissioned cruisers in service at all times through 2034. There is currently no program to replace the Ticonderoga-class cruisers; a program initiated in FY 2001, called “CG(X),” was to yield a replacement cruiser vessel, but it was canceled in FY 2011 after it was deemed too expensive.

Similarly, the Navy’s two current LSD classes of amphibious ships, Whidbey Island and Harpers Ferry, are receiving extensions to remain in service until about 2038.

Many of the other ships that the Navy sails are also legacy platforms. Of the 18 classes of ships in the Navy, only seven are currently in production. For example, 72 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. This will shift as the Navy continues to purchase more ships.

The procurement of ships is a critical aspect of meeting Navy capacity requirements, maintaining ship capabilities, and maintaining the industrial capacity to build any warships. The Navy plans to procure 48 ships between FY 2016 and FY 2020, including 14 battle force ships in FY 2016 alone. The procurement of 10 Arleigh Burke-class DDGs (two per year) and 10 Virginia-class SSNs (two per year) and funding for the final nine LCS (three per year in FY 2016–FY 2018) along with the upgraded frigate (FF) variants will also be prioritized and executed in accordance with the 2016 budget. Current procurement plans also call for securing the first LX(R), the amphibious ship replacement for the LSD; a 12th LPD (landing platform/dock); four Fleet oilers; and four Fleet salvage ships.

Modernization programs supplement procurement plans and are intended to replace current platforms as they reach the end of their planned service lives, build up forces to meet capacity requirements, and introduce new technologies to the operating forces. Ship modernization programs as they currently stand are problematic because they do not “keep pace to deal with high-end adversary weapons systems by 2020.” The CBO reported in 2015 that to reach its procurement goals, the Navy would need to increase spending on shipbuilding by one-third over what it has spent per year during the past.
30 years. It is worth noting that this assessment was for the Navy’s goal of a 306-ship Navy, which is lower than the previous determination of 313 ships and lower than the current requirement of 308; it is also well below this Index’s prescribed fleet size of 346 ships.

Because ships take such a long time to build and only a few shipyards are capable of building them, and because shipbuilding programs require carefully orchestrated, long-lead-time planning to account for sequencing in the shipyards, supply chain and workforce management, and multi-year funding, the Navy publishes a 30-year plan as its top-level document that captures objectives by class and sequencing of replacements as older ships reach the end of their service lives. According to the current 30-year plan, the Navy will reach its 308-ship requirement by FY 2022.

However, the 30-year shipbuilding plan is not limited to programs of record and assumes procurement programs that have yet to materialize. For that reason, it is often considered optimistic. For example, the goal of 308 ships stated in the Navy’s most recent 30-year plan includes an objective for 12 Ohio-class replacement submarines, the SSBN(X), which will require an average of $17.2 billion a year in shipbuilding costs from 2020–2035. This is something that the Navy will have difficulty maintaining as it struggles to sustain, overhaul, modernize, and eventually retire the remainder of its legacy SSBN fleet.

The service is planning to acquire the first SSBN(X) in FY 2021, with advanced procurement funding starting in FY 2017. The Government Accountability Office (GAO) reported that total program acquisition costs will be about $95.8 billion. According to the Congressional Research Service, “The Navy in January 2015 estimated the average procurement cost of boats 2 through 12 in the Ohio replacement program at about $5.2 billion each in FY2010 dollars.” Based on the historical average, the Navy will have to spend more than a third of its shipbuilding budget on one SSBN(X) hull each year that it procures one. This Index therefore relies on budget and programmatic data from programs of record to determine the state of Navy modernization.

The most glaring problem with the Navy’s current modernization program has to do with how many ships it plans to purchase. While the Navy has stated its intent to purchase additional attack submarines, the current Virginia-class program of record is slated to produce a total of 30 submarines—well short of the 48 attack submarines the Navy requires. At this current rate, assuming that the Seawolf-class has been retired, there will be an 18-attack submarine shortfall in the Navy’s 308-ship requirement. The Navy has stated that it will attempt to lengthen deployments and possibly perform service life extensions on some of the existing attack submarines to account for this shortfall. Similarly, the Navy plans to replace the 14 aging Ohio-class SSBN with 12 SSBN(X). The shortfall in small surface combatants is similarly alarming.

The Avenger-class MCM and Oliver Hazard Perry-class frigate are being retired, which means that the Littoral Combat Ship will assume the entire small surface combatant fleet requirement. As discussed above, the LCS and its follow-on, which will be called a frigate, are intended to make up this shortfall with a procurement of 52 total projected LCS/frigates.

Timing for the small surface combatants will be another issue. While the LCS/frigate procurement has been scheduled, ship delivery will not be rapid enough to fill small surface combatant requirements entirely.

Of the seven classes of ships the Navy is building, some have been relatively successful, whereas others are more problematic. Both the Virginia-class submarines and Arleigh Burke-class destroyers have a steady production rate and are being considered for upgrades to improve their respective capabilities. The newer Arleigh Burke-class Flight III design would be able to support a new and larger Air and Missile Defense Radar (AMDR). The Navy is also considering extending the Virginia class’s hull to provide space for additional missiles or torpedoes. The San Antonio-class LPD-17 program, as mentioned earlier, received funding for one additional hull (which the Navy requested be procured in FY 2016) but is not likely to continue beyond 12 ships of this class.

On the other hand, the Ford-class aircraft carrier, America-class amphibious ship, Zumwalt-class (DDG-1000) destroyer, and Littoral Combat Ship have had varying degrees of difficulty in cost overruns. The Zumwalt class was essentially relegated to an experimental order, having been reduced from a projected fleet of 32 hulls to just three. The delivery of CVN-78, the first of the new Gerald R. Ford class of aircraft carriers, was delayed by a year, causing a shortfall in the number of aircraft carriers (down to 10) in the U.S. fleet. Both the America-class
amphibious ship and the Littoral Combat Ship also face delays and adjustments of requirements. The America class will produce only two ships of the current design, and the survivability and strike requirements for the LCS are being questioned. All four programs have experienced cost growth, with the Zumwalt-class, Ford-class, and America-class ships incurring cost breaches. It should be noted that the LCS program was able to reduce overall costs in 2015, as it was reported that the cost per hull has been reduced by a third since the first hull in class was built.\textsuperscript{128}

Despite these difficulties, the Navy regards its fleet as capable of handling today’s threats, albeit with increased risk.

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. Not long ago, 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.\textsuperscript{129} Over the past 20 years, this variety has been winnowed to a single model: the F/A-18. While the F/A-18 A–D variants were first introduced in 1983 and already have undergone service life extensions, the Navy flies a significant number of F/A-18 E/F Super Hornets that are not only newer, but also considered to be extremely capable. The Navy is implementing efforts to extend the life of some of the older variants but plans to have a mix of the F-35C and F/A-18 E/F Super Hornets.

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 (along with 80 F-35Bs for the Marine Corps, discussed in the section on that service)\textsuperscript{130} to replace a current inventory of 455 F/A-18 A–Ds.\textsuperscript{131} The F-35 is supposed to be a more capable aircraft relative to the F/A-18, but at 260 aircraft, it will not be enough to make up for the Hornets the Navy will need to replace.

In addition, like the other F-35 variants, the F-35C faces 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 F-35C is expected to reach initial operating capability (IOC) by FY 2018 or FY 2019. This is later than the initial expectation of IOC by FY 2015. Admiral Greenert stated in 2015 that this delay, combined with unforeseen higher operational tempo on the existing fighter fleet caused by strikes against ISIS, is leading to a possible fighter shortfall of 36 aircraft.\textsuperscript{132} This shortfall in turn has led the Navy to consider extending the service lives of its legacy F/A-18 C/D Hornet aircraft.

The Navy’s other aircraft programs, EA-18G and E-2D, have been relatively successful. The EA-18G program, which had completed its planned procurement of 135 aircraft in FY 2014, added 15 aircraft in FY 2015 out of 22 it had sought through that fiscal year’s “unfunded priorities” list.\textsuperscript{133} The Navy included 12 F/A-18F Super Hornets in its FY 2016 list of unfunded priorities that the service explained could be “built…to be converted to EA-18G Growler electronic attack aircraft if necessary.”\textsuperscript{134} DOD has also established an “Electronic Warfare (EW) Executive Committee” that is currently assessing, among other issues, the potential necessity of future Growlers.\textsuperscript{135} However, the FY 2016 Navy budget request did not seek additional Growlers.\textsuperscript{136} The E-2D program is on a steady procurement schedule, with the Navy having successfully procured its requested level of five aircraft each in FY 2014 and FY 2015.

Readiness

Although the Navy can still deploy forces in accordance with GFMAP requirements, various factors indicate a decline in readiness over the past year. Admiral Michelle Howard, Vice Chief of Naval Operations, reported that “Navy readiness is at its lowest point in many years,” which can be attributed chiefly to budget reductions.\textsuperscript{137} Admiral Greenert acknowledged that continued cuts under BCA limits “compelled us to reduce both afloat and ashore operations, which created ship and aircraft maintenance and training backlogs.”\textsuperscript{138} As a result, unit deployments were also extended, exacting a cost not only on the service life of the ship, but also on the resiliency of the sailors assigned to the vessel.\textsuperscript{139}

To support readiness, the Navy synchronizes maintenance and modernization with the fleet training required to achieve GFMAP objectives utilizing the Fleet Response Plan (FRP). This force generation plan has been used by the Navy effectively since its implementation in 2007, but “continued utilization of our contingency response units...has
limited their availability to complete required maintenance and training, negatively affecting overall readiness.

The GAO published a report in May 2015 that identified readiness challenges that forward-stationed ships are facing due to budget shortfalls. The GAO specifically found that:

[C]asualty reports—incidents of degraded or out-of-service equipment—have doubled over the past five years and that the material condition of overseas-homeported ships has decreased slightly faster than that of U.S.-homeported ships.... GAO also found that the high pace of operations the Navy uses for overseas-homeported ships limits dedicated training and maintenance periods, which has resulted in difficulty keeping crews fully trained and ships maintained.

The GAO also commented generally on the gap between demand for naval presence with a diminishing supply of ships: "To meet the increasing demands of combatant commanders for forward presence in recent years, the Navy has extended deployments; increased operational tempos; and shortened, eliminated, or deferred training and maintenance."

The effects of these degradations in training and maintenance, the report argues, could include the failure of ships to reach their intended service lives in the future.

Admiral Greenert has indicated that over the past few years, although the Navy has been able to deploy one Amphibious Ready Group (ARG) and one Carrier Strike Group (CSG) at all times (even under periods of unforeseen budget reductions such as those caused by the BCA), this has resulted in reductions in the readiness of non-deployed forces. Specifically, the Navy has a goal of being able to surge three ARGs and three CSGs, but maintenance and training delays have reduced this capability. Furthermore, Greenert acknowledged at a hearing in March 2015 that budget challenges have forced the Navy to lengthen deployments to provide the same amount of global presence.

While specific readiness figures are scarce, this Index assumes that FY 2015 readiness levels are somewhat lower than those of the previous year, meaning that they are still below where they should be. However, there is not enough information to quantify the change in readiness from last year to this one beyond the Navy's own statements about still meeting baseline mission requirements.

Of note, while the Navy is still able to forward deploy a third of its fleet, the total fleet reduction has caused a subsequent reduction in global presence (from 104 to 95 as reported by CNO Greenert). It is 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.

The 2015 Index reported on the Navy's readiness status as follows:

In May 2013, only a third of the Navy was fully mission-capable. Historically, 50 percent of the fleet has been certified for major combat operations due to maintenance requirements.

The Navy has stated that despite this maintenance shortfall, it can still "support the FY2014 GFMAP," but it is doing so by deferring yard maintenance to keep ships at sea instead of in the shipyards, extending the length of deployments, and counting days spent in transit through an area of responsibility (which a ship sometimes must do to get to an assigned AOR) as credit toward GCC/GFMAP requirements. However, the impact that will be felt is in the Navy's surge capacity. In addition to the two carrier strike groups and two amphibious ready groups that are fully mission-capable, the Navy will have one extra carrier and amphibious ready group that are fully mission-capable and available to deploy quickly as a surge capacity. According to the Navy, this is "one-third of the normal surge capacity."

The Navy did not officially issue an update to the status discussed in the previous paragraphs. However, Admiral Greenert did state that, "Since 2013, many CSGs, ARGs, and destroyers have been on deployment for 8-10 months or longer. This comes at a cost to the resiliency of our people, sustainability of our equipment, and service lives of our ships."

The need to stretch deployments and defer maintenance is likely caused in part by the reduced number of ships deployed while the Navy's presence requirement has not been reduced.
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 forward presence around the world. This ongoing peacetime requirement to be present around the world is the driving force behind ship count requirements: a set total number to ensure that the required number of ships is actually available to 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 simultaneously 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 in the numbers recommended for the overall fleet and in the Navy’s shipbuilding plan.

The role of SSBNs (fleet ballistic missile submarines) as one leg (arguably the most survivable component) of America’s nuclear triad capability is well-known; perhaps less well-known are the day-to-day tasks undertaken by the SSN (attack submarines) force, which can include collection, surveillance, and support to the special operations community and whose operations 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. However, it is important to observe the historical context of naval deployments during a major theater war.

13 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. 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 carrier strike groups.

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

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

13 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 major contingencies. 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. 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.
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, with a resulting fleet of 38 amphibious vessels required. 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). 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, where 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). 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.

While the Marine Corps has consistently advocated a fleet of 38 amphibious vessels to execute its two-MEB strategy, 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 carrier strike group. 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, mainly 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 346 ships as the benchmark, the Navy’s current battle forces fleet capacity of 271 ships retains a score of “marginal,”
as was the case in the 2015 Index. However, as mentioned above, the fleet size has significantly declined from the previous Index assessment and continues to trend downward. Given the CBO’s assessment that the Navy will continue to underfund its shipbuilding programs, 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 in a tabular format as shown in the Appendix.

This Index does not include an assessment of future programs such as the Ohio-Class Replacement SSBN(X); Unmanned Carrier-Launched Airborne Surveillance and Strike (UCLASS); and LX(R) because these are not yet categorized by the government as MDAPs.

**Readiness Score: Marginal**

The Navy’s current readiness score has dropped from “strong” in the 2015 Index to “marginal.” 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 reported that it continues to meet GFMAP goals but at the cost of future readiness. The GAO reported in May 2015 that “to meet the increasing demands of combatant commanders for forward presence in recent years, the Navy has extended deployments; increased operational tempos; and shortened, eliminated, or deferred training and maintenance.” Furthermore, as the Navy seeks to provide the same amount of forward presence with a smaller fleet through overseas home-porting, the GAO has found that “this additional time is available primarily because training and maintenance periods are shorter than those provided for ships homeported in the United States.”

While forward-deployed ships do not fully represent the total fleet, the Navy has indicated in other ways that its readiness could be compromised in the near future. Admiral Howard testified in March 2015 that “we continue our efforts to rebuild the workforce in our public depots—both shipyards and aviation readiness centers—and reduce the number of lost operational days, but it will take years to dig out of a readiness hole.” She explained that the Bipartisan Budget Act of 2013 has alleviated some of the Navy’s funding concerns wrought by the Budget Control Act of 2011 but that the Navy has “not yet recovered from the readiness impact of over a decade of combat operations.”

While no precise information is provided for the exact levels of current readiness, the Navy has been able to make up previous readiness shortfalls that resulted from sequester in FY 2013. In FY 2013, 66 percent of the Navy was not assessed to be full-mission capable, compared to a 50 percent average. The previous 16 percent gap will not affect immediate deployments, but it will reduce the Navy’s ability to surge in response to a major conflict. As stated by the Navy, the FY 2014 funding allowed some of this gap to be closed.

While it has been reported that congressional support for increases over sequestered funding levels through the BCA and subsequent authorizations and appropriations in FY 2013 and FY 2014 has helped to stabilize readiness, the Navy, as Admiral Howard noted, has “not yet recovered from the readiness impact of over a decade of combat operations.” Furthermore, the USN reports that “it will require several years to fully recover the capability to rapidly respond to COCOM requirements for a major contingency.” However, readiness of naval expeditionary combat forces (to include COCOM requirements) has improved “significantly” over prior years, as baseline funding in FY 2016 will cover 80 percent of the enduring requirement, with OCO funding covering an additional 15 percent.

Therefore, the Navy’s readiness as it pertains to providing global presence is rated as “strong.”

Another element of naval readiness is the ability to surge forces to respond to a major contingency. As discussed above, the Navy’s goal is the ability to surge three CSGs and three ARGs for a contingency...
operation, three times the level it is currently capa-
bility of deploying. Admiral Greenert stated in 2015
that “we might be able to recover from the accumu-
lated backlogs by 2018 for our [CSGs] and by 2020
for our [ARGs]” to deploy three of each, but only if
there is stable funding and no major contingency
occurs over that time frame. Therefore, the Navy is
operating at a third of its own prescribed ability to
surge to meet a regional contingency operation. This
yields a surge capacity score of “weak.”

Since the Index of U.S. Military Strength uses the
two-MRC construct as its benchmark level of nec-
essary military force, the Navy would actually need
to be able to surge forces to a level higher than three
each of CSGs and ARGs. However, doubling the
Navy’s surge capacity requirement to account for
this is an oversimplification, as not enough public
information exists to assess how much surge capac-
ity the Navy would require to engage in a second
contingency. Therefore, this Index notes that the
Navy must be able to surge remaining forces if the
U.S. finds itself responding to a second MRC but
does not attempt to determine or count this addi-
tional level in its scoring.

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

The Navy’s overall score for the 2016 Index is
“marginal,” the same as the previous year. This was
derived by aggregating the scores for capacity (“mar-
ginal”); capability (“weak”); and readiness (“mar-
ginal”). However, given the continued decline in the
Navy’s fleet size without a coinciding reduction in
presence requirements, Navy officials’ increasing-
dly dire assessment of readiness challenges, and few
signs of funding increases to correct these trends,
the Navy’s score could degrade to “weak” in the near
future if it does not reverse course.

**U.S. Military Power: Navy**

<table>
<thead>
<tr>
<th></th>
<th>VERY WEAK</th>
<th>WEAK</th>
<th>MARGINAL</th>
<th>STRONG</th>
<th>VERY STRONG</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capacity</td>
<td></td>
<td>✔</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Capability</td>
<td>✔</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Readiness</td>
<td></td>
<td>✔</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>OVERALL</strong></td>
<td></td>
<td></td>
<td>✔</td>
<td></td>
<td>✔</td>
</tr>
</tbody>
</table>
U.S. Air Force

The U.S. Air Force (USAF) provides military dominance in the domains of air and space, enabling the Joint Force to project power quickly anywhere in the world at any time. The Air Force maintains that it must be able to respond rapidly to contingencies across the world to “guarantee the global freedom of movement and access that Americans have come to expect” and to project our nation’s power, influence, and reach.

To support and defend America’s global interests along with the Joint Force, the Air Force focuses on five main missions:

- Air and space superiority;
- Intelligence, surveillance, and reconnaissance (ISR);
- Mobility and lift;
- Global strike; and
- Command and control (C2).

The Air Force has used the 2012 Defense Strategic Guidance (DSG) as its framework for determining investment priorities and posture. As a result of the DSG and fiscal constraints, the Air Force has “traded size for quality” by aiming to be a “smaller, but superb, force that maintains the agility, flexibility, and readiness to engage a full range of contingencies and threats,” a goal reiterated in the President’s fiscal year (FY) 2016 budget request. But while the Air Force’s fleet has been cut intentionally to maintain capability, the FY 2016 Air Force Posture Statement acknowledges that continued cuts in capacity will result in a loss of capability: “[W]e have reached a point where the two are inextricable; lose any more capacity, and the capability will cease to exist.”

Capacity

Due to the constrained fiscal environment of the past few years, the Air Force continues to prioritize capability over capacity. The force also has made clear that near-term reductions will be made in lift, command and control, and fighter aircraft to ensure that its top three modernization programs—the F-35A, Long-Range Strike Bomber (LRS-B), and KC-46A—are preserved. The USAF is now the oldest and smallest in its history, and the problem is growing as the demand for air power continues to grow. For FY 2015, the Air Force was granted an authorized end strength of 312,980 active airmen, 67,100 reservists, and 105,000 guardsmen. Between the active and reserve components, it fields 5,433 aircraft in the total active inventory (TAI), including 54 total fighter squadrons. In the active component, the Air Force retained 40 combat coded squadrons during FY 2015.

The Air Force’s capacity in terms of number of aircraft has been on a constant downward slope since 1952. Unlike some of the other services, the
Air Force did not grow during the post-9/11 build-up. Rather, it got smaller as older aircraft were retired and replacement programs, such as the F-35, experienced successive delays in bringing new aircraft into the fleet. This reduction in capacity is expected to continue in the future because of ongoing budgetary pressure. Under BCA-mandated spending caps, the Air Force would shrink to 26 tactical aircraft (TACAIR) squadrons, a far cry from the 133 active fighter squadrons during Operation Desert Storm.

The foregoing figures illustrate the difficulty of assessing the Air Force’s capacity, as the service uses a variety of inventory categorizations. “Tactical aircraft” refers to air superiority fighters (specializing in air-to-air engagements); strike fighters (dual-role aircraft); and attack planes (those that are tasked primarily with attacking ground targets and providing close air support). “Combat-coded aircraft” refers to “aircraft assigned to meet the primary aircraft authorization to a unit for the performance of its wartime mission” and can include both tactical aircraft and strategic aircraft such as the B-2 and B-52 strategic bombers.

The total count of 5,433 aircraft includes all manned and unmanned aircraft in the Air Force’s inventory. This Index assesses the Air Force’s fleet of tactical aircraft, which, as noted in the introduction and described below, requires 1,200 planes to execute a two-MRC strategy. Additionally, four years ago, the Air Force assessed that a fighter force structure of 1,200 primary mission aircraft was necessary. More recently, the service determined that the requirement could be reduced by 100, although the Air Force would take on more risk as a result. Divestments in FY 2015 placed additional risk on the Air Force and left the fighter force structure significantly below this requirement. The continuation of constrained funding levels will only deepen the shortage of fighters, degrading “vital air operations” and “test and training expertise.”

**Capability**

Per the 2012 DSG and budget constraints, the Air Force is offsetting cuts in future capacity to preserve present capability, arguing that it prefers to have fewer aircraft that can win against the advanced fighters and anti-aircraft missiles being developed by top-tier potential adversaries like China and Russia rather than greater numbers of its current fleet of aircraft, which it states are becoming obsolete.

This strategy is associated with another chief concern: maintaining the service and support required for sustaining ongoing operations in Afghanistan, Iraq, and Syria while preparing for traditional contingencies, such as state-vs.-state conflict. Essentially, the Air Force is seeking to maintain the balance required for full-spectrum operations, from relatively simple operations in uncontested airspace to complex, multi-layered operations in anti-access/area denial (A2/AD) environments.

The state of aircraft capability includes not only the incorporation of advanced technologies, but also the overall state of the inventory, with age being a large determinant. According to the USAF, the average age of its aircraft is 27 years, and some fleets, such as the B-52 bomber fleet, are much older. Most aircraft have an original life span of 20 to 30 years, determined largely by estimated flying hours—more flying equals more stress on an aircraft—and dependent on the severity of the flying environment. Thus, without modification, much of the Air Force’s capability is nearing the end of its expected life cycle. Although service life extension programs can lengthen the useful life of some aircraft, the Air Force cannot keep an old aircraft going forever. While the Air Force has stated that it is prioritizing capability over capacity, it still has had to reduce investment in modernization, an element critical to ensuring future capability.

On average, the Air Force’s main combat platforms (fighter aircraft, bombers, mobility aircraft, and lift) are nearing the end of their service lives. Air superiority is overwhelmingly being supported by the F-15, which makes up 71 percent of the air superiority platforms but has consumed over 90 percent of its estimated 30-year service life (the average age of the F-15C/D is just over 29 years). With the eventual retirement of the 438 F-15s, 177 F-22s will make up the main arm of air superiority with eventual support from the F-35. The F-16, the most numerous platform (comprising 50 percent of the fighter fleet at 913 aircraft) has consumed nearly 80 percent of its expected life span and has an average age of approximately 23 years. The KC-135 comprises 87 percent of the Air Force’s tankers and is over 50 years old on average. The aircraft’s reliability is at risk due to problems linked to its age and high usage rate.

The Air Force’s ISR and lift capabilities do not face the same problem. The bulk (362 of 457) of the Air Force’s ISR aircraft are now unmanned aerial vehicles (UAVs), which are relatively young.
(though they have shorter life spans than manned aircraft) and less expensive to procure, operate, and maintain. Maintaining the service’s shift to predominantly unmanned ISR aircraft will depend on fielding enhanced sensors on the RQ-4 Global Hawk platform to make it as capable as legacy manned U-2 aircraft. The Air Force stated in February 2015 that the Global Hawk was able to reduce costs such that it is now cheaper per flying hour to operate.

A service’s investment in modernization ensures that future capability remains healthy. Investment programs aim not only to procure enough to fill current capacity requirements, but also to advance current capabilities with new technology. Going into FY 2016, the Air Force has structured its budget to preserve funding for its top acquisition priorities: the F-35A Joint Strike Fighter, the KC-46A Pegasus aerial refueling and strategic military transport aircraft, and the Long Range Strike–Bomber (LRS-B).

The Air Force’s number one priority remains the F-35A. It is the next-generation fighter scheduled to replace all legacy A-10, F-15, and F-16 aircraft. Interestingly, if the Air Force is able to fund its full program of 1,763 aircraft, it will procure more aircraft than the current inventory of F-16s, F-15s, and A-10s combined (1,610). The Air Force has not explicitly stated the rationale behind its F-35A procurement plan (beyond reporting a one-to-one replacement of all F-16, A-10, and F-117 aircraft in service as of 2001), and this has led to speculation that the F-35A could also replace the F-15.

The service states officially that the F-35A will complement the F-22, much as the F-16 ground attack aircraft complements the F-15 air combat aircraft. However, the Air Force did not procure enough F-22s to replace the F-15s. The Active Air Force currently has 438 F-15s to its 159 F-22s, and there are concerns about what will fill this gap when the F-15 is eventually retired. Fulfilling the operational need for fighters could be further strained in the near term, as the F-22 retrofit—a mix of structural alterations to 162 aircraft needed for the airframe to reach its promised service life—has been forecasted to run through 2021, a year later than previously predicted. As a result of the retrofit, only 62 percent of the mission fleet is available.

The F-35A was not designed primarily for air-to-air combat; rather, like the F-16s and A-10s that it is replacing, the plane is suited for attack missions against ground targets, with the F-22 shouldering the air-superiority mission. Like the F-35B and F-35C (the Marine Corps and Navy variants, respectively), the F-35A has experienced a host of problems (including technological delays, cost growth, production delays, and quantity reductions caused by budget cuts) that have slowed development. As a result, the initial operating capability (IOC) date was pushed from 2013 to 2016. In addition, the test program suffered further delays in 2014 due to an engine problem. With regard to software, flight testing for Block 2B is nearly completed, and Block 3i is still undergoing tests as well. Current projections assess that Block 3F—full warfighting capability—will be completed about half a year later than planned. Given the age of the aircraft that the F-35A will be replacing, there is little room for further slippage in the F-35 program.

A second top priority for the USAF is the KC-46A air refueling tanker aircraft, a replacement for the legacy KC-135. Both the Air Force and U.S. Transportation Command have stated that replacing the KC-135 is “their highest priority.” The KC-46A is still in development and is also experiencing delays, which is troublesome given the advanced age (averaging 52 years) and condition of the current KC-135 inventory. In addition, the KC-46A program of record is for 179 aircraft (with current program plans for delivery of 70 aircraft by FY 2020), indicating that this system will replace less than half of the current tanker inventory of 391 aircraft (though a one-to-one replacement of legacy platforms is not inherently necessary for weapons systems).

The third and final priority for the USAF from an acquisition perspective is the Long-Range Strike Bomber (LRS-B), the service’s next-generation deep-strike platform intended to replace the B-52 Stratofortress and the B-1B Lancer by the mid-2020s (B-2s are to be replaced later). The LRS-B is still in the development phase, and continued funding must be maintained so that the Air Force has a bomber with deep-strike capabilities that can penetrate “highly contested environments.” The USAF expects to announce the contract award for the LRS-B in September 2015, and current plans include the acquisition of 80–100 new bombers at a cost of approximately $550 million per plane.

Readiness

The Air Force’s readiness is affected by several inputs: training (such as flying hours); weapon system sustainment; facilities; and installations. While all are critical, weapon systems sustainment
is becoming an area of particularly heightened concern because, as a result of the ongoing air campaigns in the Middle East, munitions are being used faster than they can be replaced. Air-to-Surface weapons such as Stand-Off, Direct Attack, and Penetrators are short of current inventory objectives, and the concurrent shortage of Air-to-Air weapons could lead to an increase in the time needed to gain and maintain air superiority in future environments, particularly highly contested ones.

The decision to reduce the size of the Air Force to minimum COCOM requirements now requires that the entire force must be ready at all times, which means there will be no strategic reserve capacity for the service to respond to unanticipated requirements. Maintaining a very high state of readiness is necessary if the Air Force is going to continue to be the world’s dominant air superiority force. By the Air Force’s own assessment, without unequivocal air superiority, American influence is at risk of being diminished, and the U.S. military will be forced to radically change the way it goes to war.

According to the Air Force, readiness has been declining since 2003. This trend was further aggravated in FY 2013 by the implementation of cuts under the Budget Control Act of 2011. In FY 2013, flying hours were reduced by 18 percent, and 17 combat-coded squadrons of 40 (43 percent) were temporarily stood down. In FY 2014, the Air Force prioritized funding for readiness, but not at a rate to make up completely for cuts in FY 2013, and the shortfalls in readiness have persisted into FY 2015. This situation illustrates how difficult it is to regain lost readiness even after short-term divestments. According to Air Force Vice Chief of Staff General Larry Spencer, less than 50 percent of the service’s combat air forces meet full-spectrum readiness requirements.

The Air Force claims that it does not have the excess capacity to make cuts without also reducing capability. If requirements continue to increase, the Air Force “will have to make difficult decisions on mission priorities and dilute coverage across the board.” Furthermore, as legacy aircraft continue flying, maintenance costs rise, and the demand for weapons system sustainment increases. As a result, reduced funding for aircraft modernization and sustainment degrades capabilities and lowers readiness levels. The Air Force’s FY 2016 budget submission seeks to strike a balance among capability, capacity, and readiness with the goal of achieving full-spectrum readiness by 2023.

In addition to funding, making up readiness losses takes significant time. For example, standing down a unit for 60 days results in a degraded (unfit for combat) unit. To return the unit to desired levels of proficiency takes six months to a year. Similarly, because of depot delays, “it can take two-to-three years to recover full restoration of depot workforce productivity and proficiency.”

A key aspect of building unit readiness is sufficient training. In order to reach full-spectrum readiness, the Air Force must execute its flying hour program successfully and dedicate enough time and resources to training. The Air Force’s “high operations tempo” and worsening deployment to dwell ratios negatively affect “reconstitution and training cycles” and compromise its efforts to recover lost readiness.

### Scoring the U.S. Air Force

**Capacity Score: Very Strong**

The preponderant element of combat power in the U.S. Air Force is its fleet of fighter aircraft. The Air Force has deployed an average of 28 squadrons to major combat engagements since World War II. Based on an average of 18 aircraft per fighter squadron, around 500 fighter aircraft are necessary in the active component to execute one MRC. Based on the government force-sizing documents that counted fighter aircraft, squadrons, or wings, an average of 55 squadrons, or 990 aircraft, is required to field a two-MRC-capable force. By doubling the historical combat average, one arrives at a force of 1,000 fighter aircraft. This Index looks for 1,200 active fighter aircraft to account for the 20 percent reserve necessary when considering availability for deployment and the risk of employing 100 percent of fighters at any one time.

- **Two-MRC Level:** 1,200 fighter aircraft.
- **Actual 2015 Level:** 1,113 fighter aircraft.

---
Based on the above figure, the Air Force is operating at 93 percent of the benchmark requirement of 1,200, and its capacity is therefore scored as “very strong.” The 113 aircraft over the 1,000 necessary to fight two major conflicts (based on historical averages) serves to reduce operational risk and provide a strategic buffer or reserve capacity but is still short of the 200 additional aircraft needed to reach the benchmark.

This increase in capacity score over the 2015 Index is due to an additional 15 F-35As becoming operational, the rejection of USAF plans to retire A-10 aircraft, and the decision to stretch the service lives of other fighter aircraft. Since the F-35A was to replace many of these legacy platforms, the decision not to retire them (e.g., the A-10) has resulted in a net increase in the Air Force’s fighter and attack capacity.

**Capability Score: Marginal**

The Air Force’s capability score is “marginal,” a result of being scored “strong” in “Size of Modernization Program,” “marginal” for “Age of Equipment” and “Health of Modernization Programs,” but “weak” for “Capability of Equipment.” These scores have not changed from the 2015 Index’s assessment. However, continued concerns about the F-35 program’s progress toward replacing legacy aircraft effectively could cause the USAF’s capability score to decline in the near future.

**Readiness Score: Marginal**

The Air Force scores “marginal” in readiness in the 2016 Index, a reduction from the previous Index’s score of “strong.” This is based primarily on the Air Force’s reporting that less than half of its combat air forces met full-spectrum readiness requirements in 2015. While it should be prepared to respond quickly to an emergent crisis and retain full readiness of its combat airpower, the Air Force has been suffering from degraded readiness since 2003, and the implementation of BCA-imposed budget cuts in FY 2013 has continued to exacerbate this problem into 2015. While the USAF’s response ability appears to have been insulated from budget cuts, maintaining full readiness has proved challenging. Similar to the other services, the USAF was able to make up some of its readiness shortfalls under the FY 2015 budget, but given the Air Force’s poor readiness assessment, significant further improvement is needed.

With so little information in the public domain about the current state of readiness in FY 2015, statements such as the foregoing must be heavily weighted. This Index assumes that today’s readiness levels are better than those in FY 2013 when 13 combat-coded squadrons were grounded due to funding shortfalls, but that they are still suboptimal.

**Overall U.S. Air Force Score: Marginal**

The Air Force is scored as “marginal” overall. This is an unweighted average of its capacity score of “very strong,” capability score of “marginal,” and readiness score of “marginal” and is a decline from the 2015 Index score of “strong,” driven primarily by degradation in capability and readiness.

---

**U.S. Military Power: Air Force**

<table>
<thead>
<tr>
<th></th>
<th>VERY WEAK</th>
<th>WEAK</th>
<th>MARGINAL</th>
<th>STRONG</th>
<th>VERY STRONG</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capacity</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Capability</td>
<td></td>
<td>✔</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Readiness</td>
<td></td>
<td>✔</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>OVERALL</td>
<td></td>
<td>✔</td>
<td></td>
<td></td>
<td>✔</td>
</tr>
</tbody>
</table>
The U.S. Marine Corps (USMC) is the nation’s expeditionary armed force, positioned and ready to respond to crises around the world. Marine units assigned aboard ships (“soldiers of the sea”) or at bases abroad stand ready to project U.S. power into crisis areas. Marines also serve in a range of unique missions, from combat defense of U.S. embassies abroad under attack to operating the President’s helicopter fleet. Although Marines have a wide variety of individual assignments, the focus of every Marine is on combat; every Marine is first a rifleman. The USMC has positioned itself for crisis response and has evolved its concepts to leverage its equipment more effectively to support operations in a heavily contested maritime environment such as the one found in the Western Pacific. Even though force levels have been decreasing in Afghanistan as operations draw down, the military will maintain 9,800 troops in Afghanistan to support its mission in 2015, and the Marines will make up a portion of those troops. Worldwide, over 31,000 Marines are forward deployed and engaged. Throughout the year, Marines engage in various operations elsewhere; for example, they supported the evacuation of the U.S. embassy in Sana’a, Yemen, in 2015.

Per the Defense Strategic Guidance (DSG), maintaining the Corps’ crisis response capability is critical. Thus, given the fiscal constraints imposed, the Marines have prioritized “near-term readiness” at the expense of other areas, such as capacity, capability, modernization, home station readiness, and infrastructure. This trade-off is a short-term fix to meet immediate needs: Over the longer term, the degradation of investment in equipment will lead to lowered readiness.

**Capacity**

The Marine Corps has managed the reduction in funding by cutting capacity. The Corps’ measures of capacity are similar to the Army’s: end strength and units (battalions for the Marines and brigades for the Army). End strength has been decreased from a force of 202,100 Active personnel in fiscal year (FY) 2012 to 184,100 in FY 2015. Of these 184,100 Marines, 1,400 were funded from the Overseas Contingency Operations (OCO) budget. For FY 2016, the Marine Corps requested a pause in capacity cuts (to remain at an end strength of 184,000) in order to reduce the “impact on deployment to dwell ratios” and “assess the impact of its four[-]year drawdown.” The drawdown is expected to continue in FY 2017, when the Corps will reach an “enduring” end strength of 182,000 Active personnel, funded entirely from the base budget. The Department of Defense estimated in 2014 that if sequestration cuts occurred in FY 2016, end strength would be cut further to 175,000 by FY 2017. With a force of that size, the USMC would be unable to meet the requirements of the DSG and, according to General Joseph Dunford, Commandant of the Marine Corps, a new strategy would need to be developed.
The Marine Corps organizes itself in infantry battalions, which are its basic combat unit. A battalion has about 900 Marines and includes three rifle companies, a weapons company, and a headquarters and service company. The overall reductions in end strength left the USMC with 23 infantry battalions in the Active Component in FY 2015, down from 25 in FY 2014. While funding at the requested levels for FY 2016 would yield an additional Active infantry battalion, under full sequestration, USMC end strength would be able to support only 21 infantry battalions, which, according to General Dunford, would leave the USMC “with fewer active duty battalions and squadrons than would be required for a single major contingency.”

Marine Aviation units have been particularly stressed by insufficient funding. Although operational requirements have not decreased, fewer Marine aircraft are available for tasking or training. For example, the number of active component squadrons (including both fixed wing and rotary wing aircraft) has decreased from 58 in 2003 to 55 in 2015. Recently, it was announced that three of these active component squadrons would transition to the reserve component, meaning that the Corps will have 52 active squadrons for the foreseeable future. Approximately 33 percent of these 52 active duty squadrons are deployed, and 17 percent are in a pre-deployment phase. Any reduction in Marine Corps aviation capability has a direct effect on overall Corps combat capability, as the Corps usually fights with its ground and aviation forces integrated as Marine Air-Ground Task Forces (MAGTFs).

Additionally, the current inventory of non-commissioned officers and staff non-commissioned officers does not meet USMC force structure requirements. This will pose readiness challenges for the Corps as the shortage of “small unit leaders with the right grade, experience, technical skills and leadership qualifications” grows.

In 2010, the USMC determined that its ideal force size would be 186,800 in light of the requirements of the President’s National Security Strategy. However, given the budget pressures from the Budget Control Act (BCA) of 2011 and the newer 2012 DSG, the Corps decided that a force size of “182,100 active component Marines could still be afforded with reduced modernization and infrastructure support.”

One impact of reduced capacity is a reduction in dwell time. The stated ideal deployment-to-dwell (D2D) time ratio is 1:3 (seven months deployed for every 21 months at home), which is possible with 186,000 troops. The “fundamental difference” between that optimal force size and an active end strength of 182,000 is a lower D2D ratio of 1:2, which translates to roughly seven-month deployments separated by stretches of 14 months at home. Under the budget caps imposed by the BCA of 2011, capacity will be reduced even further, and the dwell ratio for the Marine Corps could fall to 1:1. This increase in deployment frequency would worsen the degradation of readiness as people and equipment would be used more frequently, with less time to recover between deployments.

**Capability**

The nature of the Marine Corps’ crisis response role requires capabilities that span all domains. The USMC ship requirement is managed by the Navy and is covered in the Navy’s section of the Index. The Marine Corps is focusing on “essential modernization” and emphasizing programs that “underpin our core competencies,” making the Amphibious Combat Vehicle (ACV) and the F-35 Joint Strike Fighter (JSF) programs its top two priorities.

Of the Marine Corps’ current fleet of vehicles, its amphibious vehicles—specifically, the Assault Amphibious Vehicle (AAV-7A1) and Light Armored Vehicle (LAV)—are the oldest, averaging 36 and 24 years, respectively. Comparatively, the Corps’ M1A1 Abrams inventory is 14 years old with an estimated 34-year life span, and its fleet of light tactical vehicles such as HMMWs (“Humvees”) is relatively young, averaging six years.

The Corps’ main combat vehicles all entered service in the 1970s and 1980s, and while service life extensions, upgrades, and new generations of designs have allowed the platforms to remain in service, these vehicles are quickly becoming ill-suited to the changing threat environment. For example, with the advent of improvised explosive devices (IEDs), the flat-bottom hulls found on most legacy vehicles are ineffective compared to the more blast-resistant V-shaped hulls incorporated in modern designs.

The Corps’ aircraft have age profiles similar to the Navy’s. The USMC has 264 F/A-18 A-Ds and 27 EA-6Bs in its primary mission aircraft inventory (including one reserve squadron), which are nearing (if they have not already surpassed) their intended lifespans. Unlike the Navy, the Corps did not acquire the newer F/A-18 E/F Super Hornets;
thus, the older F/A-18 Hornets are going through a service life extension program to extend their lifespan to 10,000 flight hours from the original 6,000 hours. 251 This is to bridge the gap to when the F-35Bs and F-35Cs enter service to replace the Harriers and most of the Hornets.

The AV-8B Harrier, designed to take off from the LHA and LHD amphibious assault ships, will be retired from Marine Corps service in 2026. 252 Before its retirement, the AV-8B will receive near-term capability upgrades in 2015 and 2017. 253 The Corps declared its first F-35B squadron operationally capable on July 31, 2015, after it passed an “Operational Readiness Inspection” test. 254 Reservations remain, however, regarding the platform’s reliability following sea trials aboard the USS Wasp. Michael Gilmore, Director of Operational Test and Evaluation for the U.S. Department of Defense, reported reliability figures at less than 50 percent during the readiness inspection test. 255

The Marine Corps has one Major Defense Acquisition (MDAP) vehicle program. The Joint Light Tactical Vehicle (JLTV) is a joint program with the Army to acquire a more survivable light tactical vehicle to replace a percentage of the older HMMWV fleet, originally introduced in 1985. The Army retains overall responsibility for JLTV development through its Joint Program Office. 256 The Marines intend to purchase 5,500 vehicles (10 percent of a total of 54,599). 257 and acquisition of the JLTVs should be completed by FY 2022. 258 The program is still in development and previously experienced delays due to a change in requirements, a contract award protest, and concerns regarding technical maturity. 259 In 2014, the Corps cancelled the HMMWV Sustainment Modification Initiative, which would have upgraded 13,000 vehicles, 260 in order to prioritize JLTV funding. 261 Although the Marine Corps has indicated that the JLTV will not be a one-for-one replacement of the HMMWV, 262 there are concerns that reduced procurement will create a battlefield mobility gap for some units. 263

The JLTV’s FY 2015 plans anticipate that a Production and Deployment Phase Approval decision will be made in the fourth quarter, after which Low Rate Initial Production (LRIP) will follow. 264 Following FY 2015 plans for JLTV, the program awarded a low rate initial production (LRIP) contract, which includes a future option of producing JLTVs for the Marine Corps, to defense contractor Oshkosh. 265 The Marine Corps procured seven JLTVs in FY 2015. 266

The lack of operational detail in the Army’s updated Tactical Wheeled Vehicle Strategy could be an issue for future USMC JLTV procurement and modernization plans. 267 Nevertheless, the USMC expects the JLTV program, consisting of “one infantry battalion fully fielded with the JLTV plus a training element,” to reach initial operational capability in the fourth quarter of 2018. 268

It should be noted that the Marine Corps has plans to replace the AAV-7A1 and LAV, but those programs are not yet MDAP programs, largely because of recent cancellations and program restructuring. The AAV-7A1 was to be replaced by the Expeditionary Fighting Vehicle (EFV), a follow-on to the cancelled Advanced AAV, but the EFV was also cancelled in 2011 due to technical obstacles and cost overruns. The Amphibious Combat Vehicle, which has taken the place of the EFV, is in the development phase and “has been structured to provide a phased, incremental capability.” 269 Similarly, the Corps planned to replace the LAV inventory with the Marine Personnel Carrier (MPC), which would serve as a Light Armored Vehicle with modest amphibious capabilities but would be designed primarily to provide enhanced survivability and mobility once ashore. 270

After restructuring its ground modernization portfolio, the Marine Corps determined that it would combine its efforts by upgrading 392 of its legacy AAVs and continuing development of the ACV in order to replace part of the existing fleet and complement the upgraded AAVs. 271 This would help the USMC to meet its requirement of having armored lift for 10 battalions of infantry. 272 In March 2015, the Marine Corps released its RFP for the ACV program’s engineering and manufacturing development (EMD) phase. 273 Brigadier General Joseph Shrader confirmed that this ACV 1.1 increment would not replace the AAV, but rather would serve to “enhance that capability.” 274

The ACV 1.1 platform is notable in that it will be an amphibious wheeled vehicle instead of a tracked vehicle, capable of traversing open water only with the assistance of Navy shore connectors such as Landing Craft, Air Cushion Vehicles (LCAC). The ACV 1.2 platform is being planned as a fully amphibious, tracked version. 275 Development and procurement of the ACV program will be phased so that the new platforms can be fielded incrementally alongside a number of modernized AAVs. 276 Plans call for outfitting six battalions with 200 ACVs by 2023 and for modernizing enough of the current AAV fleet
to outfit four additional battalions, which would allow the Corps to meet its armored lift requirement for 10 battalions. In addition, the Corps will purchase new vehicles based on the MPC concept. In the future, it is likely that this program will become an MDAP.

In FY 2015, the Marine Corps’ largest investment program was the F-35B program. As planned, the F-35B variant will be the first operational variant of the F-35 family and is estimated to reach IOC by late 2015. The service’s total procurement will consist of 420 F-35s (357 F-35Bs and 63 F-35Cs), and the retirement of AV-8Bs and F/A-18A-Ds will begin after the F-35 enters service. As the F-35 enters into service and legacy platforms reach the end of their service life, the Marine Corps expects a near-term inventory challenge. Specifically, this is due to a combination of reduced JSF procurement, increasing tactical aircraft utilization rates, and shortfalls in F/A-18A-D and AV-8B depot facility production. Like the F-35A, the F-35B and F-35C variants are subject to development delays, cost overruns, budget cuts, and production problems. The F-35B in particular was placed on probation in 2011 because of its technical challenges. Probation has since been lifted and the Corps declared initial operational capability (IOC) with its first F-35B squadron, VMFA-121, on July 31, 2015.

Today, the MV-22 program is operating with few problems and nearing completion of the full acquisition objective of 460 aircraft. As of February 2015, the Marine Corps had received 97 Block C MV-22 aircraft and 250 of the 360 aircraft included in the Program of Record. Following deactivation of the final CH-46 squadron in April 2015, the Osprey has replaced the Sea Knight as the USMC’s primary medium lift platform. Currently, there are 13 fully operational capability squadrons to meet these needs, and two additional squadrons are being stood up. The MV-22’s capabilities are in high demand from the Combatant Commanders (COCOMS), and the Corps is adding capabilities such as fuel delivery and use of precision-guided munitions to the MV-22 to enhance its value to the COCOMS.

The USMC heavy lift replacement program, the CH-53K, is a bit more problematic. The CH-53K will replace the Corps’ CH-53E, which averages 25 years. However, the CH-53K is still in development, and critical technologies necessary to achieve the lift requirements are still unproven. The CH-53K’s first flight has been scheduled for 2015, and the helicopter is predicted to reach initial operational capability in 2019. This time line has been disrupted and now faces the prospect of delay due to problems experienced with the airframe’s gearbox and drive-shaft during ground testing. The FY 2016 request asks for continued RDT&E funding and retains the current Program of Record of 200 CH-53Ks.

Readiness

The Marine Corps’ first priority is to be the crisis response force for the military, which is why investment in readiness has been prioritized over capacity and capability. However, in order to invest in readiness in a time of downward fiscal pressure, the Corps has been forced to reduce end strength and delay investment in modernization. Even though funding for near-term readiness has been relatively protected from cuts, future readiness is threatened by underinvestment in long-term modernization and infrastructure. As General Dunford has explained, extended or long-term imbalance among the USMC “pillars” of readiness, which address both operational and foundational readiness, “will hollow the force and create unacceptable risk for our national defense.” In order to address readiness challenges more effectively, the Marine Corps is undertaking a comprehensive review of manning and readiness reporting systems and developing a plan to enhance overall readiness during FY 2015.

In FY 2015, “over half of home-station/non-deployed units reported unacceptable levels of readiness.” This constitutes about 42 percent of the total USMC force. Personnel and equipment shortages, lower end strength, shorter dwell times, and a scarcity of prepositioned ships have inhibited sufficient training for home-station units and have “degraded full spectrum capability across the Service.”

Additionally, Marine aviation is experiencing significant readiness shortfalls. With a smaller force structure and fewer aircraft available for training, aviation units are having difficulty keeping up with demanding operational requirements. Stressed depots, affected by reduced procurement and workforce cuts, are contributing to readiness problems, leaving fewer aircraft available for training or operations. In total, approximately 19 percent of USMC aircraft are unavailable for use, according to Deputy Commandant for Aviation Lieutenant General Jon Davis. The aircraft affected are awaiting “long-term” repairs and spare parts, and their inability to participate in operations has been felt by the Corps.
immediately, as wiring problems kept heavy-lift aircraft from deploying to assist with earthquake relief efforts in Nepal, making it necessary to fill the void by deploying platforms that were less suited to the mission. In particular, some units, such as MV-22 and F/A-18 squadrons, are experiencing deployment ratios below 1:2, exacerbating readiness challenges.

In order to achieve the minimum readiness goal, squadrons must be qualified to perform 70 percent of their Mission Essential Tasks. Deployed squadrons are well-trained and well-resourced, next-to-deploy units, but frequently do not achieve the readiness goal until just before deployment, and non-deployed squadrons face “significant and unhealthy resource challenges” that degrade readiness.

The Marines’ Ground Equipment Reset Strategy has been progressing and is anticipated to be completed by the end of FY 2017. As of February 2015, all of the equipment in Afghanistan had been withdrawn, and 56 percent of the total reset requirement had been completed. Reconstituting equipment and ensuring that the Corps’ inventory can meet operational requirements are critical aspects of readiness.

Scoring the U.S. Marine Corps

Capacity Score: Weak

Based on the deployment of Marines across major engagements since the Korean War, the Corps requires roughly 15 battalions for one MRC. Therefore, it would need a force of around 30 battalions to fight two MRCs simultaneously. The government force-sizing documents that discuss Marine Corps composition support this. Though the documents that make such a recommendation count the Marines by divisions, not battalions, they are consistent in arguing for three Active Marine Corps divisions, which in turn requires roughly 30 battalions. With a 20 percent strategic reserve, the ideal USMC capacity for a two-MRC force-sizing construct is 36 battalions.

More than 35,000 Marines were deployed in Korea, and over 44,000 were deployed in Vietnam. In the Persian Gulf, one of the largest Marine Corps missions in U.S. history, some 90,000 Marines were deployed, and around 66,000 were deployed for Operation Iraqi Freedom. As the Persian Gulf War is the most pertinent example for this construct, a force of 180,000 Marines is a reasonable benchmark for a two-MRC force, not counting Marines that would be unavailable for deployment (assigned to institutional portions of the Corps) or that are deployed elsewhere. This is supported by government documents, which have advocated for a force as low as 174,000 (1993 BUR) and as high as 202,000 (2010 QDR), with an average of end strength of 185,000 being recommended.

- Two-MRC Level: 36 battalions.
- Actual 2015 Level: 23 battalions.

The Corps is operating with slightly less than 64 percent of the number of battalions relative to the two-MRC benchmark. Its capacity is therefore scored as “weak.”

Capability Score: Marginal

The Corps received scores of “weak” for “Capacity of Equipment,” “marginal” for “Age of Equipment” and “Health of Modernization Programs,” but “strong” for “Size of Modernization Program.” Therefore, the aggregate score for Marine Corps capability is “marginal.”

Excluded from the scoring are various ground vehicle programs that have been cancelled and are now being reprogrammed. This includes redesign of the ACV program and the MPC.

Readiness Score: Marginal

In FY 2015, 42 percent of the USMC experienced degraded readiness. As the nation’s crisis response force, the Corps requires that all units, whether deployed or non-deployed, be ready. Thus, this Index scores the Corps’ readiness as “marginal” because the USMC is meeting 58 percent of its readiness requirement.

Overall U.S. Marine Corps Score: Marginal

The Marine Corps is scored as “marginal” overall in the 2016 Index. This is the same as the assessment in the previous Index. However, the Corps is at the lower end of this category, and potential further declines in both capacity and readiness signal that this score could drop below “marginal” in the near future.
### U.S. Military Power: Marine Corps

<table>
<thead>
<tr>
<th></th>
<th>VERY WEAK</th>
<th>WEAK</th>
<th>MARGINAL</th>
<th>STRONG</th>
<th>VERY STRONG</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capacity</td>
<td>✔</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Capability</td>
<td></td>
<td>✔</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Readiness</td>
<td></td>
<td>✔</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>OVERALL</strong></td>
<td></td>
<td>✔</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
U.S. Nuclear Weapons Capability

Assessing the state of U.S. nuclear weapons capabilities presents several challenges.

First, the U.S. has elected to maintain the weapons—based on designs from the 1960s—that were in the stockpile when the Cold War ended rather than take advantage of technological developments to field new weapons that are safer, are more secure, and give the United States improved options for guaranteeing a credible deterrent.

Second, detailed data about the readiness of nuclear forces, their capabilities, and weapon reliability are not publicly available, and this makes analysis difficult.

Third, the U.S. nuclear enterprise is composed of many components, some of which are also involved in supporting conventional missions. For example, dual-capable heavy bombers do not fly with nuclear weapons today, although they did routinely until the late 1960s (and are capable of doing so again if the decision should ever be made to resume this practice). Additionally, the nuclear weapons laboratories do not focus solely on the nuclear weapons mission; they also perform a variety of functions related to nuclear nonproliferation, medical research, threat reduction, and countering nuclear terrorism, including nuclear detection.

Thus, assessing the extent to which any one piece of the nuclear enterprise is sufficiently funded, focused, and effective with regard to the nuclear mission is problematic.

Additionally, the U.S. nuclear weapons enterprise should be flexible and resilient to underpin the U.S. nuclear deterrent. If the U.S. detects a game-changing nuclear weapons development in another country, the ability of the U.S. nuclear weapons complex to adjust is important.

To this end, the U.S. does maintain an inactive stockpile that includes near-term hedge warheads that can be put back into operational status within six to 24 months. Extended hedge warheads are said to be ready within 24 to 60 months. The U.S. preserves some of the upload capability on its strategic delivery vehicles, which means that the nation can decide to increase the number of nuclear warheads on each type of its delivery vehicles. For example, the U.S. Minuteman III intercontinental ballistic missile (ICBM) can carry up to three nuclear warheads, though it is currently deployed with only one.

Presidential Decision Directive-15 (PDD-15) requires the U.S. to maintain the ability to conduct a nuclear test within 24 to 36 months of a presidential decision to do so, but even this extended timeline is proving to be a challenge for the National Nuclear Security Administration (NNSA). Successive governmental reports have noted the continued deterioration of technical and diagnostics equipment and the inability to fill technical positions supporting nuclear testing readiness.

The weapons labs are beset by demographic challenges of their own. Thomas D’Agostino, former Under Secretary of Energy for Nuclear Security and Administrator of the NNSA, has stated that...
in about five years, the United States will not have a single active engineer who had “a key hand in the design of a warhead that’s in the existing stockpile and who was responsible for that particular design when it was tested back in the early 1990s.” This is a significant problem because for the first time since the dawn of the nuclear age, the U.S. will have to rely on the scientific judgment of people who were not directly involved in nuclear tests of weapons that they designed, developed, and are certifying.

It is unclear how much of the existing inactive stockpile will go through the life extension program. Hence, our ability to reconstitute nuclear forces could well decline with the passage of time, making certification of warhead safety and reliability more difficult as the small changes inherent in a continuous process of refurbishing aging components inevitably cause the weapons to depart from their original tested design envelope.

The uncertainty regarding the funding and direction of the nuclear weapons complex is one of the factors that complicate the National Laboratories’ efforts to attract and maintain young talent. The shift of focus away from the nuclear mission after the end of the Cold War caused the weapons labs to lose their sense of purpose and to feel compelled to reorient their mission focus. Their relationship with the government also evolved in hindering ways. The NNSA was supposed to address these problems but has largely failed in this task, partly because “the relationship with the NNSA and the National security labs appears to be broken.”

In 1999, the Commission on Maintaining U.S. Nuclear Weapons Expertise concluded that 34 percent of the employees supplying critical skills to the weapons program were more than 50 years old. The number increased to 40 percent in 2009. This is more than the average in the U.S. high-technology industry. In 2012, a number of employees of the Los Alamos National Laboratory were laid off in anticipation of a $300 million shortfall.

The lack of resources has undermined the morale of the workforce. The issue is so serious that the Congressional Advisory Panel on the Governance of the Nuclear Security Enterprise recommended fundamental changes in the nuclear weapons enterprise’s culture, business practices, project management, and organization. Others propose moving the NNSA to the Department of Defense.

Yet another important indication of the health of the overall force is the readiness of forces that actually operate U.S. nuclear systems. In 2006, the Air Force mistakenly shipped non-nuclear warhead components to Taiwan. A year later, the Air Force transported nuclear-armed cruise missiles across the U.S. without authorization (or apparently even awareness that it was doing so, mistaking them for conventional cruise missiles). These serious incidents led to the establishment of a Task Force on DOD Nuclear Weapons Management, which found that “there has been an unambiguous, dramatic, and unacceptable decline in the Air Force’s commitment to perform the nuclear mission and, until very recently, little has been done to reverse it” and that “the readiness of forces assigned the nuclear mission has seriously eroded.”

Following these incidents, the Air Force instituted broad changes to improve oversight and management of the nuclear mission and the inventory of nuclear weapons, including creating the Air Force Global Strike Command to organize, train, and equip intercontinental-range ballistic missile and nuclear-capable bomber crews as well as other personnel to fulfill a nuclear mission and implement a stringent inspections regime.

The success of these changes has been limited. In January 2014, the Air Force discovered widespread cheating on nuclear proficiency exams and charged over 100 officers with misconduct. The Navy had a similar problem, albeit on a smaller scale. The Department of Defense conducted two nuclear enterprise reviews, one internal and one external. Both reviews identified a lack of leadership attention, a lack of resources to modernize the atrophied infrastructure, and unduly burdensome implementation of the personnel reliability program as some of the core challenges preventing a sole focus on accomplishing the nuclear mission.

The Force Improvement Program was initiated and mostly implemented throughout 2014 and into 2015, and the Air Force shifted over $160 million to address the problem with the ICBM mission. The Air Force has also seen an increase in badly needed manpower. If changes in the nuclear enterprise are to be effective, leaders across the executive and legislative branches will have to continue to provide sufficient resources to mitigate readiness and morale issues within the force.

Fiscal uncertainty and a steady decline in resources for the nuclear weapons enterprise (trends that have begun to reverse in recent years) have negatively affected the nuclear deterrence mission. Admiral Cecil D. Haney, Commander, U.S.
Implications for U.S. National Security

U.S. nuclear forces are not designed to shield the nation from all types of attacks from all adversaries. They are designed to deter conventional and nuclear attacks that threaten American sovereignty, forward-deployed troops, and allies.

U.S. nuclear forces have played an important role in the global nonproliferation regime by providing U.S. assurances to NATO, Japan, and South Korea that have led these allies either to keep the number of their nuclear weapons lower than otherwise would be the case (France, the U.K.) or to forgo their development and deployment altogether. North Korea has proven that a country with very limited intellectual and financial resources can develop a nuclear weapon if it decides to do so. Iran continues to be on a path to obtaining a nuclear weapon.

This makes U.S. nuclear assurances to allies and partners ever more important. Should the credibility of American nuclear forces continue to degrade, countries such as South Korea could pursue an independent nuclear option, causing a destabilizing effect across the region.

Certain negative trends could undermine U.S. nuclear deterrence if problems are not addressed. There is no shortage of challenges on the horizon, from an aging nuclear weapons infrastructure and workforce to the need to recapitalize all three legs (land, air, and sea) of the nuclear triad, from the need to conduct life extension programs while maintaining a self-imposed nuclear weapons test moratorium to limiting the spread of nuclear know-how and the means to deliver nuclear weapons. Additionally, the United States must take account of adversaries who are modernizing their nuclear forces.

Deterrence is a complex interplay between U.S. conventional and nuclear forces and the psychology of both allies and adversaries that the U.S. would use these forces to defend both the interests of the U.S. and those of its allies. The requirements of nuclear deterrence and nuclear warfighting may be quite different and thus should be considered within their own contexts and then balanced against each other to ensure that the U.S. nuclear portfolio is structured in capacity, capability, variety, flexibility, and readiness to meet both types of demands. In addition, military requirements and specifications for nuclear weapons might be different, depending on different circumstances, who is being deterred, and what they are being deterred from doing.

Due to the complex interplay among strategy, policy, actions that states take in international relations, and other actors’ perceptions of the world around them, it is quite possible that one might never know precisely if and when a nuclear or conventional deterrent provided by U.S. forces loses credibility. Nuclear weapons capabilities take years or decades to develop, as does the infrastructure supporting them. The U.S. has neglected its nuclear infrastructure for decades. We can be reasonably certain that a robust, well-resourced, focused, and reliable nuclear enterprise is more likely to sustain its deterrent value than is an outdated and questionable one.

We know that the U.S. is capable of incredible mobilization when danger materializes. The evidence points to just such a danger maturing on our doorstep with regard to nuclear affairs. The nuclear threat environment is dynamic and proliferating, with old and new actors developing advanced capabilities while the U.S. enterprise is relatively static, potentially leaving the United States at a technological disadvantage. This is worrisome because of its implications both for the security of the United States and for the security of its allies and the free world generally.

Scoring U.S. Nuclear Weapons Capabilities

The U.S. nuclear weapons enterprise is composed of several key elements that include warheads, delivery systems, nuclear command and control, and the physical infrastructure that designs, manufactures, tests, and maintains U.S. nuclear weapons. The complex also includes the talent of people from physicists to chemical engineers to maintainers and operators, without which the continuous maintenance of the nuclear infrastructure would not be possible.
The factors selected below are the most important elements of the nuclear weapons complex. They are judged on a five-grade scale, where “very strong” means that a sustainable, viable, and funded plan is in place and “very weak” means that the U.S. is not meeting its security requirements, which has the potential to damage vital national interests if the situation is not corrected.

U.S. Warhead Surety Score: Strong

U.S. warheads must be safe, secure, effective, and reliable. The Department of Energy (DOE) defines reliability as “the ability of the weapon to perform its intended function at the intended time under environments considered to be normal” and as “the probability of achieving the specified yield, at the target, across the Stockpile-to-Target Sequence of environments, throughout the weapon’s lifetime, assuming proper inputs.” Since 1993, reliability has been determined through non-nuclear experiments (that is, without the use of experiments producing nuclear yield); sophisticated calculations using high-performance computers; and related evaluations.

Nuclear warhead and delivery system reliability becomes more important as the number and diversity of nuclear weapons in the stockpile decrease, because fewer types of nuclear weapons leave a smaller margin of error should one type of a weapon be affected by a technical problem that requires the decommissioning of a weapon type or its delivery system. Americans and allies must be confident that U.S. nuclear warheads will perform as expected.

As warheads age, they become less able to perform their mission as expected, and this can complicate military planning significantly. Despite creating impressive amounts of knowledge about nuclear weapons physics, the U.S. is not completely certain about the long-term effects of aging components that comprise a nuclear weapon. Former NNSA spokesman Bryan Wilkes said, “We know that plutonium pits have a limited lifetime.” A plutonium pit is a crucial component of a nuclear weapon and with life extension programs introducing new components to warheads whose radiological effects are not fully known, the level of uncertainty has increased.

The United States has the safest stockpile in the world, but security of long-term storage sites, potential problems introduced by improper handling, or unanticipated effects stemming from long-term handling could compromise the integrity of U.S. warheads. The nuclear warheads themselves contain security measures that are designed to make it difficult, if not impossible, to detonate a weapon absent a proper authorization.

Grade: The Department of Energy (DOE) and Department of Defense are required to certify the reliability of the nuclear stockpile annually. This assessment does not include delivery systems, although the U.S. Strategic Command does assess overall weapons system reliability, which includes both the warhead and delivery platforms.

Absent nuclear weapons testing, the assessment of weapons reliability becomes more subjective, albeit based on experience and non-nuclear tests rather than fact. While certainly an educated opinion, it is not a substitute for the type of objective data obtained through nuclear testing. Testing was used to diagnose potential problems and to certify the effectiveness of fixes to those problems. Given that modern simulation is based on nuclear tests that were conducted primarily in the 1950s and 1960s, using testing equipment of that era, there is a great deal that modern testing equipment and computer capability could teach about nuclear physics.

According to the late Major General Robert Smolen, some of the nuclear weapon problems the U.S. now faces “in the past would have [been] resolved with nuclear tests.” By 2005, a consensus emerged in the NNSA, informed by the nuclear weapons labs, that it would “be increasingly difficult and risky to attempt to replicate exactly existing warheads without nuclear testing and that creating a reliable replacement warhead should be explored.” When the U.S. did nuclear testing, it was frequently found that small changes in the tested configuration of a weapon had dramatic impact on weapons performance. In fact, the 1958–1961 testing moratorium resulted in weapons with serious problems being introduced into the U.S. stockpile.

In fiscal year (FY) 2014, the NNSA met its goal of maintaining 100 percent of the U.S. nuclear stockpile as safe, secure, reliable, effective, and available.

The lack of nuclear weapons testing does create some uncertainty concerning the adequacy of fixes to the stockpile when problems are found. This includes updates made in order to correct problems that were found in the weapons or changes in the weapons resulting from life extension programs. It is simply impossible to duplicate exactly weapons that were designed and built many decades ago.
ago. According to former Defense Threat Reduction Agency Director Dr. Stephen Younger, we have had “a number of problems that were never anticipated” and had to fix them by using “similar but not quite identical parts.”328 The high costs of having to certify weapons without nuclear testing are resulting in fewer types of weapons and, as a consequence, a greater impact across the inventory if there is an error in the certification process.

Secretary of Defense Robert Gates warned in October 2008 that, “[t]o be blunt, there is absolutely no way we can maintain a credible deterrent and reduce the number of weapons in our stockpile without either resorting to testing our stockpile or pursuing a modernization program.”329 The U.S. is pursuing warhead life extension programs that replace aging components before they can cause reliability problems. However, the national commitment to this modernization program, including the necessary funding over the long term, continues to be uncertain. As a result, this indicator is graded “strong.”

Reliability of U.S. Delivery Platforms Score: Strong

Reliability encompasses not only the warhead, but the strategic delivery vehicles as well. This includes a successful missile launch, the separation of missile boost stages, the performance of the missile guidance system, the disgorgement of the multiple re-entry vehicle warheads from the missile, and the accuracy of the final re-entry vehicle in reaching its target.330

The U.S. conducts ICBM and submarine launched ballistic missile (SLBM) flight tests every year to ensure the reliability of its systems. Anything from electrical wiring to faulty booster separations could degrade the efficiency and safety of the U.S. strategic deterrent if it were to malfunction. U.S. strategic, long-range bombers regularly conduct intercontinental training and receive upgrades in order to sustain a high level of combat readiness. However, potential challenges are on the horizon. The United States is not seriously considering modernization of delivery platforms infrastructure, including old communication cables, computers, and silos.

Grade: U.S. ICBMs and SLBMs are flight tested annually, and these tests were successful in 2014. To the extent that data from these tests are publicly available, they provide objective evidence of the delivery systems’ reliability. The aged systems, however, occasionally have reliability problems.331 Overall, this factor earns a grade of “strong.”

Nuclear Warhead Modernization Score: Weak

During the Cold War, the United States maintained a strong focus on designing and developing new nuclear warhead designs in order to counter Soviet advances and modernization efforts. Today, the United States is not developing a single new nuclear warhead even though all of its nuclear-armed adversaries are developing new nuclear warheads and capabilities. Since the collapse of the Soviet Union, nuclear weapons and delivery vehicles have not been replaced despite being well beyond their designed service life. This both increases the risk of failure due to aging components and signals to adversaries that the United States is less committed to nuclear deterrence.

New weapon designs could allow American engineers and scientists to improve previous designs and address new military requirements (for example, the need to destroy deeply buried and hardened targets) that have emerged since the end of the Cold War. With new warheads, the safety and security of American weapons could also be enhanced in ways that may not be possible today without nuclear testing.

An ability to work on new weapon designs would also help American experts to remain engaged and knowledgeable and would help to attract the best talent to the nuclear enterprise. As the Panel to Assess the Reliability, Safety, and Security of the United States Nuclear Stockpile noted, “Only through work on advanced designs will it be possible to train the next generation of weapon designers and producers. Such efforts are also needed to exercise the DoD/NNSA weapon development interface.”332 Other nations maintain their levels of proficiency by having their scientists work on new nuclear warheads and possibly conducting very low-yield nuclear weapons tests.
Grade: The lack of plans to modernize nuclear weapons—life extension programs are not modernization—and the restrictions on thinking about new designs that might be able to accomplish the deterrence mission in the 21st century more effectively earn nuclear warhead modernization a grade of “weak.”

Nuclear Delivery Systems Modernization Score: Weak

The age of American platforms can have a significant impact on the operational capacity of the U.S. strategic deterrent. The older the weapons, the more at risk they are from faulty components or malfunctioning equipment. Age can degrade reliability by increasing the potential for systems to break down or fail to respond correctly. Corrupted systems, defective electronics, or performance degradation due to long-term storage defects (in the case of nuclear warheads) can have serious implications for American deterrence and assurance. If a strategic delivery vehicle cannot be counted on to operate at all times, its deterrence and assurance value becomes significantly reduced.

While the U.S. Air Force and U.S. Navy have plans to replace each leg of the nuclear triad in the next several decades, fiscal constraints are likely to make such efforts unlikely. Existing ICBMs and SLBMs are expected to remain in service until 2032 and 2042, respectively, and new bombers are planned to enter into service in 2023. Budgetary shortfalls are leading to uncertainty as to whether the nation will be able to modernize all three legs of the nuclear triad. Having three different methods of delivering nuclear weapons increases the risk of successful delivery of those weapons and complicates our adversary’s efforts to prevent such delivery.

Maintenance issues caused by the aging of American SSBNs and long-range bombers could make it difficult to deploy units overseas for long periods of time or remain stealthy in enemy hotspots. The United States can already send a limited number of bombers on missions at any one time. As Bradley Thayer and Thomas Skypek have noted, “Using 2009 as a baseline, the ages of the current systems of the nuclear triad are 39 years for the Minuteman III, 19 years for the Trident II D-5 SLBM, 48 years for the B-52H, 12 years for the B-2, and 28 years for the Ohio Class SSBNs.” Remanufacturing some weapon parts is difficult and expensive because some of the manufacturers are no longer in business or the materials that constituted the original weapons are no longer available (for example, due to environmental restrictions). The ability of the U.S. to produce solid-fuel rocket motors is another long-range concern.

Grade: U.S. nuclear platforms are in dire need of recapitalization. The U.S. has put into place plans for nuclear triad modernization, and despite some delays, funding has been limited given the circumstance and difficulties caused by sequestration. Uncertainty regarding when the new platforms will enter into force and be nuclear-certified and uncertainty regarding U.S. future stockpile strategy earn this indicator a grade of “weak.”

Nuclear Weapons Complex Score: Weak

A large part of maintaining a reliable and effective nuclear stockpile depends on the facilities where U.S. devices and components are developed, tested, and produced. These facilities constitute the foundation of our strategic arsenal and include the:

- Los Alamos National Laboratories,
- Lawrence Livermore National Laboratories,
- Sandia National Laboratory,
- Nevada National Security Site,
- Pantex Plant,
- Kansas City Plant,
- Savannah River Site, and
- Y-12 National Security Complex.

In addition to these government sites, the defense industrial base supports the development and maintenance of American delivery platforms.

These complexes design, develop, test, and produce the weapons in the U.S. nuclear arsenal. Their maintenance is of critical importance. As the 2010 Nuclear Posture Review (NPR) stated:

In order to remain safe, secure, and effective, the U.S. nuclear stockpile must be supported by a modern physical infrastructure—comprised of the national security laboratories and a complex of supporting facilities—and a highly capable
workforce with the specialized skills needed to sustain the nuclear deterrent.335

A flexible and resilient infrastructure is an essential hedge in the event that components fail or the U.S. is surprised by the nuclear weapon capabilities of potential adversaries.336 U.S. research and development efforts and the industrial base that supports modernization of delivery systems are an important part of this indicator.

Maintaining a safe, secure, effective, and reliable nuclear stockpile requires modern facilities, technical expertise, and tools to repair any malfunctions quickly, safely, and securely and to produce new nuclear weapons if required. The existing nuclear weapons complex is not fully functional. The U.S. cannot produce more than a few new warheads per year. There are limits on the ability to conduct life extension programs. Dr. John Foster has reported that the U.S. no longer can “serially produce many crucial components of our nuclear weapons.”337

If the facilities are not properly funded, the U.S. will gradually lose the ability to conduct high-quality experiments. Obsolete facilities and poor working environments make maintaining a safe, secure, reliable, and militarily effective nuclear stockpile exceedingly difficult, in addition to demoralizing the workforce and hampering further recruitment. According to the Obama Administration’s Section 1251 Report to Congress, recapitalization of the nuclear weapons program would cost $8.7 billion in FY 2015.338 In reality, the National Nuclear Security Administration received about $8.2 billion for this recapitalization.

Since 1993, the DOE has not had a facility dedicated to production of plutonium pits, one of the main components of America’s nuclear weapons. The U.S. currently keeps about 5,000 plutonium pits in strategic reserve. There are significant disagreements as to the effect of aging on pits and whether the U.S. will be able to maintain them indefinitely without nuclear weapons testing. Currently, the U.S. can produce about 20 plutonium pits a year at the Los Alamos PF-4 facility. Russia, the closest competitor and potential adversary, can produce around 2,000 pits a year.339

Manufacturing non-nuclear components can be extremely challenging either because some materials may no longer exist or because manufacturing processes have been forgotten and must be retrieved. There is a certain element of art to the process of building a nuclear weapon, and such a skill can be acquired and maintained only through actual hands-on experience.

**Grade:** On one hand, the U.S. maintains some of the most advanced nuclear facilities in the world. On the other, their focus is not solely on the nuclear mission. Some parts of the complex—most importantly, parts of the plutonium and highly enriched uranium component manufacturing infrastructure—have not been modernized since the 1950s, and plans for long-term infrastructure recapitalization remain uncertain. Thus, the infrastructure receives a grade of “weak.”

**Quality of People Working in the National Nuclear Laboratories Score: Marginal**

Combined with nuclear facilities, U.S. nuclear weapons scientists and engineers are critical to the health of the complex and the stockpile. The 2010 NPR emphasizes that:

> [A] highly skilled workforce [is] needed to ensure the long-term safety, security, and effectiveness of our nuclear arsenal and to support the full range of nuclear security work to include non-proliferation, nuclear forensics, nuclear, counter-terrorism, emergency management, intelligence analysis and treaty verification.340

The U.S.’s ability to maintain and attract a high-quality workforce is critical to assuring the future of the American nuclear deterrent. While today’s weapons designers and engineers are first-rate, they also are aging and retiring. It is essential that their knowledge be passed on to the next generation that will take on this mission. The weapons labs understand this problem and are taking steps, despite significant challenges, to mentor the next generation.

The U.S. currently relies on non-yield-producing laboratory experiments, flight tests, and the judgment of experienced nuclear scientists and engineers to ensure continued confidence in the safety, security, effectiveness, and reliability of its nuclear deterrent. Without their experience, the nuclear weapons complex could not function. A basic problem is that few scientists or engineers at the NNSA have either nuclear weapons design or testing experience. It is essential that the complex attract and retain the best and brightest. Between 2013 and 2014, the NNSA lost 94 people of a total of 2,446 employed
as of March 2014. The average age of the workforce increased to 47.7 years.}

**Grade:** Despite employing world-class experts, the NNSA complex continues to face serious challenges in attracting and retaining talent. Because many scientists and engineers with a practical nuclear weapon design and testing experience are retired, nuclear warhead certifications will rely on the judgments of people who have never tested or designed a nuclear weapon. The NNSA’s management challenges and a lack of focus on the nuclear weapon mission contribute to the lowering of morale in the NNSA complex. Because these issues have to do more with policy than with the quality of people per se, the complex earns a score of “marginal.”

**Readiness of Forces Score: Marginal**

The readiness of forces is a vital component of America’s strategic forces. It is essential that the military personnel operating the three legs of the nuclear triad are properly trained and equipped. It is also essential that these systems be maintained in a high state of readiness.

During FY 2015, the services continue to align resources in order to preserve strategic capabilities in the short term, but the long-term impacts continue to be uncertain. Continued decline in U.S. general purpose forces could eventually affect nuclear forces, especially the bomber leg of the nuclear triad. Changes prompted by the Navy and Air Force cheating scandals have begun to address some of the morale issues.

**Grade:** Uncertainty regarding the further potential impacts of sequestration earns this indicator a grade of “marginal.”

**Allied Assurance Score: Marginal**

The number of weapons that U.S. allies keep is an important element when speaking about the credibility of America’s extended deterrence. Allies that already have nuclear weapons can coordinate action with other powers or act independently. During the Cold War, the U.S. and the U.K. cooperated to the point where joint targeting was included. France maintains its own independent nuclear arsenal, largely as a hedge against uncertainty of American credibility. The U.S. also deploys nuclear gravity bombs in Europe as a visible manifestation of its commitment to its NATO allies.

The U.S., however, must concern itself not just with NATO, but with Asian allies as well. The United States provides nuclear assurances to Japan and South Korea, both of which are technologically advanced industrial economies facing nuclear-armed adversaries and potential adversaries. If they do not perceive U.S. assurances as credible, they have the capability and know-how to build their own nuclear weapons. That would be a major setback for U.S. nonproliferation policies. In addition, the Iranian nuclear program is threatening U.S. nonproliferation goals in the Middle East.

**Grade:** At this time, most U.S. allies are not seriously considering developing their own nuclear weapons. European members of NATO continue to express their commitment to and appreciation for NATO as a nuclear alliance. Doubts about the modernization of dual-capable aircraft and even about the weapons themselves, as well as NATO’s lack of attention to the nuclear mission and its intellectual underpinning, preclude assigning a score of “very strong.” Additionally, America’s seeming acceptance of Iran developing nuclear capabilities is contributing toward other countries in the Middle East region considering whether to seek similar capabilities. Thus, allied assurance declines this year to a grade of “marginal.”

**Nuclear Test Readiness Score: Weak**

Testing is one of the key elements of maintaining a safe, secure, effective, and reliable nuclear deterrent. While the U.S. is currently under a self-imposed nuclear testing moratorium, it maintains a low level of nuclear test readiness at the Nevada National Security Site (formerly Nevada Test Site). This is critical in case the U.S. discovers a flaw in one or more types of its nuclear weapons and when fixing the flaw requires a yield-producing experiment. The U.S. might need to test to develop a weapon with new characteristics that can be validated only by testing and to verify render-safe procedures. Yield-producing experiments can also play an important role if the U.S. needs to react strongly to other nations’ nuclear weapons tests and communicate its resolve or to understand their new nuclear weapons.

For these reasons, it is required that the U.S. be prepared to conduct a nuclear weapons test within a maximum of 36 months after a presidential decision to do so. The current state of test readiness is between 24 and 36 months, although both the NNSA and Congress required the NNSA to be ready within 18 months in the past. The U.S. could meet this
requirement only if certain domestic regulations, agreements, and laws were to be waived.345

Test readiness refers to a single test or a very short series of tests, not a sustained nuclear testing program. The NNSA has been unable to achieve this goal because of a shortage of resources. The test readiness program is supported by experimental programs at the Nevada Test Site, nuclear laboratory experiments, and advanced diagnostics development.346

Grade: As noted, the U.S. can meet the readiness requirement mandated by the law only if certain domestic regulations, agreements, and laws are waived. In addition, the U.S. is not prepared to sustain testing activities beyond a few limited experiments, which certain scenarios might require. Thus, testing readiness earns a grade of “weak.”

**Overall U.S. Nuclear Weapons Capability Score: Marginal**

Though modernization programs for warheads and delivery systems are quite deficient, the infrastructure supporting nuclear programs is aged, and nuclear test readiness has revealed troubling problems within the forces, those weak spots are offset by strong delivery platform reliability and allies who remain confident in the U.S. nuclear umbrella. Averaging the subscores across the nuclear enterprise therefore results in an overall score of “marginal.”

### U.S. Military Power: Nuclear

<table>
<thead>
<tr>
<th></th>
<th>VERY WEAK</th>
<th>WEAK</th>
<th>MARGINAL</th>
<th>STRONG</th>
<th>VERY STRONG</th>
</tr>
</thead>
<tbody>
<tr>
<td>Warhead Surety</td>
<td>✔</td>
<td></td>
<td></td>
<td>✔</td>
<td></td>
</tr>
<tr>
<td>Delivery Platform Reliability</td>
<td>✔</td>
<td></td>
<td></td>
<td>✔</td>
<td></td>
</tr>
<tr>
<td>Warhead Modernization</td>
<td></td>
<td></td>
<td>✔</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Delivery Systems Modernization</td>
<td>✔</td>
<td></td>
<td></td>
<td>✔</td>
<td></td>
</tr>
<tr>
<td>Nuclear Weapons Complex</td>
<td>✔</td>
<td></td>
<td></td>
<td>✔</td>
<td></td>
</tr>
<tr>
<td>National Labs Talent</td>
<td>✔</td>
<td></td>
<td></td>
<td>✔</td>
<td></td>
</tr>
<tr>
<td>Force Readiness</td>
<td>✔</td>
<td></td>
<td>✔</td>
<td></td>
<td>✔</td>
</tr>
<tr>
<td>Allied Assurance</td>
<td>✔</td>
<td></td>
<td>✔</td>
<td>✔</td>
<td></td>
</tr>
<tr>
<td>Nuclear Test Readiness</td>
<td>✔</td>
<td></td>
<td>✔</td>
<td>✔</td>
<td></td>
</tr>
<tr>
<td><strong>OVERALL</strong></td>
<td>✔</td>
<td></td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
</tbody>
</table>
Endnotes:


2. Ibid., p. 8.


5. The United States has not had to contend in combat with any credible air force since the Vietnam War, but U.S. air force planners are increasingly concerned about an enemy’s ground-based, anti-air missile capability. For naval planners, ship-based, air-based, and shore-based anti-ship cruise missiles are of much greater concern than is the number of conventional surface combatants armed with large-caliber guns that an enemy navy has. Likewise, ground force planners have to consider the numbers and types of guided anti-armor weapons that an enemy possesses and whether an opposing force has guided artillery, mortar, or rocket capabilities. Guided/precision weapons are less expensive (by orders of magnitude) than the platforms they target, which means that countries can produce far more guided munitions than primary weapons platforms. Some examples: Harpoon ASM ($2 million); DDG-51 Arleigh Burke-Class destroyer ($2 billion); AT4 anti-armor weapon ($1,500); M1A1 Abrams main battle tank ($9 million); 120mm guided mortar round ($10,000) or 155mm guided artillery round ($100,000)/M198 155mm howitzer ($500,000); S-300 anti-air missile ($1 million)/F/A-18 Hornet ($60 million) or F-35A Lightning II ($180 million).

6. One example of balancing the forces is the Army’s Aviation Restructure Initiative, in which the active-duty force seeks to redistribute certain rotorcraft platforms among the active-duty Army and the National Guard, a plan that the Guard has contended will reduce the capabilities it has gained during recent combat engagements, such as its pilots’ proficiency flying Apache helicopters. For more on this issue, see U.S. Government Accountability Office, *Force Structure: Army’s Analyses of Aviation Alternatives*, GAO-15-430R, February 26, 2015 (updated April 27, 2015), http://www.gao.gov/assets/670/669857.pdf (accessed September 7, 2015).


9. Defense references to war have varied over the past few decades from “major combat operations” (MCO) and “major theater war” (MTW) to the current “major regional contingency” (MRC). Arguably, there is a supporting argument for such shifts as planners attempt to find the best words to describe the scope and scale of significant military efforts, but the terms are basically interchangeable.

10. The U.S. Marine Corps and the U.S. Navy have Reserve components but no National Guard components equivalent to those of the Army and the Air Force. The Marine Corps’ Reserve elements are units with equipment, structured similarly to their Active-component counterparts, while the Navy’s Reserve force consists of people but not ships. The entirety of the Navy’s combat fleet, surface and subsurface, is in the Active component.

11. The Department of Defense, through the Joint Staff and Geographic Combatant Commanders, manages a relatively small set of real-world operational plans (OPLANS) focused on specific situations where the U.S. feels it is most likely to go to war. These plans are reviewed and updated regularly to account for changes in the Joint Force or with the presumed enemy. They are highly detailed and account not only for the amount of force the U.S. expects it will need to defeat the enemy, but also for which specific units would deploy; how the force would actually flow into the theater (the sequencing of units); what ports and airfields it would use; how much ammunition, fuel, and other supplies it would need at the start; how much transportation or “lift” would be needed to get the force there (by air, sea, trucks, or rail); and the basic plan of attack. The Pentagon also routinely develops, explores, and refines various notional planning scenarios in order to better understand the implications of different sorts of contingencies, which approaches might be more effective, how much of what type of force might be needed, and the regional issue or issues for which there would have to be an accounting. These types of planning events inform service efforts to develop, equip, train, and field military forces that are up to the task of defending national security interests. All of these efforts and their products are classified national security information and therefore not available to the public.


15. For an assessment of the U.S. Navy’s readiness, see infra, pp. 242–243.


17. Ibid.

18. Ibid., pp. 8-9.


27. Ibid.


29. Ibid.


34. Ibid., p. 3-4.


36. For additional information, see Appendix, “Military Capabilities and Corresponding Modernization Programs.”


45. Ibid., p. 3-5.

46. Ibid., p. 3-6.

47. Ibid., p. 3-8.


49. Ibid.


51. Ibid.


55. Ibid.

56. Ibid.


58. Ibid., p. 1-1.


63. Ibid., p. 11.


71. Note that the first figures derive from an average BCT size of 4,500 and average division size of 15,000. The second set of numbers derives from the current average of around 3.5 BCTs per division and analysis of the structure of each Army division.


73. Ibid.
74. Admiral Jonathan Greenert, U.S. Navy, Chief of Naval Operations, “FY 2016 Department of the Navy Posture,” statement before the Subcommittee on Defense, Committee on Armed Services, U.S. Senate, March 4, 2015, p. 3,
81. This would be the first change since 1981. The change will now include ships that are often requested by COCOMS: specifically, 10 Patrol Craft Cyclone (PC-1); two hospital ships; and one high-speed transport. It would exclude three MCMs because they are not self-deployable. Ronald O’Rourke, “Navy Force Structure and Shipbuilding Plans: Background and Issues for Congress,” Congressional Research Service Report, June 12, 2015, pp. 17–18, http://www.fas.org/sgp/strs/weapons/RL32665.pdf (accessed June 17, 2014).
85. Greenert, “FY 2016 Department of the Navy Posture,” p. 18; U.S. Department of the Navy, Office of the Chief of Naval Operations, Deputy Chief of Naval Operations (Integration of Capabilities and Resources), Report to Congress on the Annual Long-Range Plan for Construction of Naval Vessels for FY2015, June 2014, p. 11, http://navylive.dodlive.mil/files/2014/07/30-year-shipbuilding-plan1.pdf (accessed June 17, 2015). If the new counting rules are to be applied retroactively, the ship count will be 289. Getting the exact battle force ship count is problematic because the Navy will often report different numbers. This is partly due to changes in ship inventory during the year (for example, a ship’s being delivered). At other times, the Navy is not consistent or is obscure as to how they are counting ships. For references on different ship counts, see Greenert, “FY 2016 Department of the Navy Posture,” p. 3.
87. Ibid.
88. Ibid., p. 59.
93. Eleven cruisers will also be placed in “Reduced Operating Status” but will be included in the ship count as they are not being retired.
94. O’Rourke, “Navy Force Structure and Shipbuilding Plans.”
98. The equation used for this determination is (104–95)/104.
99. Rotational deployments involve a ship sailing to a location for a set amount of time and returning to the United States.
101. On average, rotational deployments require four ships for one ship being forward deployed. This is because one ship is sailing out to location, one is at location, one is sailing back to the CONUS, and one is in the CONUS for maintenance.


106. Ibid., p. 16.


110. Ibid.


112. This is based on a calculation of the total number of attack submarines (which includes three different classes), which was 54 as of publication, and the number of Los Angeles-class submarines, which was 39 as of publication.


114. Ibid., pp. 17–18.

115. Ibid., p. 18.

116. Ibid.


118. There are four shipbuilders and seven shipyard locations that build major naval vessels. The four shipbuilders are General Dynamics, Huntington Ingalls, Austal USA, and Marinette Marine Corporation. General Dynamics has three shipyards, Huntington Ingalls has two, and the remaining two shipbuilders have one each.


123. O’Rourke, “Navy Ohio Replacement (SSBN[X]) Ballistic Missile Submarine Program.”

124. This is based on a Congressional Budget Office analysis of historical shipbuilding funding, which the CBO calculates as $13.9 billion annually. See Congressional Budget Office, An Analysis of the Navy’s Fiscal Year 2015 Shipbuilding Plan, p. 3.


129. Staff Writer, “Navy Aircraft,” Military Factory, last updated March 5, 2014, http://www.militaryfactory.com/aircraft/navy-carrier-aircraft.asp (accessed August 26, 2014). The last of each of these aircraft were retired in 1997 (A-6); 2003 (A-4); and 2006 (F-14).


140. Ibid., p. 6.


142. Ibid. p. 1.


144. Ibid.


147. As discussed above, the Navy reported 95 ships forward deployed for 2015 versus 104 the previous year.

148. This requirement is derived from the BUR’s requirement for four–five carrier strike groups per MRC; however, this Index finds that number low by historical accounts and recommends one additional carrier per MRC.


151. The full array of aircraft actually embarked on a carrier is more than just the strike aircraft counted here and includes E-2 Hawkeye early warning, C-2 Greyhound cargo, and various helicopter aircraft, among others, that are fielded in a ratio that is roughly proportional to the number of aircraft carriers in the fleet.


153. The size and capability of amphibious ships have also grown over time, with smaller amphibs like the old LST replaced by the much larger LSD and LPD classes. Consequently, fewer ships are needed to lift the same or even larger amphibious force.


157. Ibid., p. 8.


159. Ibid.

160. Ibid., p. 4.

161. Ibid., pp. 9-10.


167. Ibid., p. 18.

168. Ibid., p. 9.


179. Ibid.

180. Ibid., pp. 8–9.


182. Ibid., p. 7.


196. Ibid.
198. Ibid., p. 15.
207. Ibid., p. 17.
209. Ibid., p. 18.
213. Ibid., p. 3.
214. Ibid., p. 5.
217. Ibid.
219. This number represents total active component fighters. This Index considers requirements, such as aircraft, that are needed to perform Operation Noble Eagle (ONE), an ongoing mission to defend American airspace. Details regarding ONE are limited and largely unavailable to the public. Because the exact number of active component fighter aircraft participating in ONE is unknown, those fighters that may be tasked with the ONE mission are not counted in this total.


227. Ibid., p. 10.

228. Ibid., p. 11.


230. Ibid.


232. Ibid.


236. Ibid.


238. Dunford statement, January 28, 2015, p. 32.

239. Paxton statement, p. 7.

240. Ibid., p. 87.


243. Ibid.


246. Paxton statement, p. 10.

247. Ibid., p. 11.


249. Ibid.


253. Ibid.


259. Ibid., pp. 2-3.


266. Ibid., p. 3-2.


272. In regard to this overall requirement—armored lift for 10 battalions of infantry—the AAV Survivability Upgrade Program would provide for four battalions, and ACV 1.1 and ACV 1.2 would account for six battalions. Ibid., pp. 27-28.


275. Feickert, “Marine Corps Amphibious Combat Vehicle (ACV) and Marine Personnel Carrier (MPC): Background and Issues for Congress.”


284. Grosklags, Manazir, and Davis, “Department of the Navy’s Aviation Programs,” pp. 15–16.

285. Ibid., p. 16.

286. Dunford statement, February 26, 2015, p. 16.


290. Ibid., pp. 20.


292. Ibid., p. 23.

293. 31,000 Marines were forward deployed out of 184,100 authorized total end strength in FY 2015, or roughly 17 percent. For these respective figures, see Paxton statement, p. 23, and U.S. Department of Defense, United States Department of Defense Fiscal Year 2016 Budget Request: Overview, p. A-2.


299. Ibid., p. 7.


301. This count is based on an average number of 1.5. divisions deployed to major wars (see Table 6, p. 226) and an average of 10–11 battalions per division.


303. Ibid.


310. Ibid.


320. Ibid.


342. Ibid.


